

SURVEYS AND MAPPING BUILDING

Official Opening

by

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assisted by

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THE SURVEYS AND MAPPING BUILDING

The Surveys and Mapping Building houses the Surveys and Mapping Branch, including the newly formed Division of Oceanographic Research, of the Department of Mines and Technical Surveys and The Army Survey Establishment of the Directorate of Military Survey of the Department of National Defence.

Surveys and Mapping Branch

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

The Surveys and Mapping Branch is the major federal government agency responsible for the surveying, mapping and charting of the land and water areas of Canada. It is best known for its topographic maps, hydrographic and aeronautical charts, for its legal surveys and work in delineating provincial boundaries. Its surveys form the very core of Canada's economic development. Its maps and charts are the basis for the discovery, development and administration of our country's resources and the extension of our trade and commerce; they are vital to defence, and are needed for educational, recreational and other purposes.

Surveyors were from the beginning active in the young country of Canada and they rank high among Canadian pioneers. By sheer tenacity of will, initiative, courage and perseverance—the qualities that have made Canada what it is today—they measured up to the task they set themselves in the face of formidable odds. They travelled on foot and horseback, by canoe, dog-team, Red River cart and covered wagon; they lived mainly on a diet of bannock and beans; their instruments were crude and heavy to transport. But they laid the foundation for the map-makers of the twentieth century.

These men worked in Canada's hinterlands long before Confederation. Down through the years, they gradually became attached to one Department or another of the government in the form of units with specialized work: geodetic, topographical, hydrographic and legal. These units, many from the former Department of the Interior, boasted varied histories before they were brought together, for the first time, into the Department of Mines and Resources when it was formed in 1936. Eleven years later a fifth unit, the Map Compilation and Reproduction Division, was added and the five formed what was known as the Surveys and Mapping Bureau of the same department. In 1950, the Surveys and Mapping Bureau became one of the major branches of the new Department of Mines and Technical Surveys. In 1961 these branch units were brought together from varied locations into the Surveys and Mapping building, thus effecting a long-dreamed-of coordination.

Of the Branch's five divisions, the oldest is the Topographical Survey. It had its beginnings both in the Geological Survey of Canada nearly 120 years ago and in the old Department of the Interior.

The Legal Surveys and Aeronautical Charts Division had its origin in 1871 with the appointment of the first Surveyor General, Lieutenant-Colonel J. S. Dennis, in the Dominion Lands Branch in the Department of Secretary of State. Later the Division was transferred to the Department of the Interior.

The Canadian Hydrographic Service came into being in 1883 when J. G. Boulton of the Royal Navy was brought to Canada on loan to carry out a survey of Georgian Bay. The Service formed, at one time or another, part of the Department of Public Works, Railways and Canals; the Department of Naval Service; the Department of Marine and Fisheries and later, the Marine Department before its absorption into the Department of Mines and Resources in 1936.

The Geodetic Survey was established in 1909 as part of the Dominion Observatories in the Department of the Interior. It became a separate service in this department in 1916 after the death of the chief astronomer, Dr. W. F. King, who had also been the superintendent of the Geodetic Survey.

The Map Compilation and Reproduction Division was organized in December 1947 as a division of the newly created Surveys and Mapping Bureau in the Department of Mines and Resources. Its roots lie in many departments of government, commencing in the Department of the Interior with the printing of township plans in 1872 and the establishment in 1880 of a lithographic division under the Surveyor General, Col. J. S. Dennis, for the purpose of printing maps produced by his surveys. Compilation began about 1890 on the Sectional Map Series of western Canada. These maps, published at a scale of 3 miles to 1 inch, were derived from township plans. The first map of this series was printed in 1891 by the Department of the Interior.

In addition to the five divisions already mentioned, the National Air Photographic Library is under Branch Administration and an item is included in the Branch estimates to cover the activities of the Canadian section of the International Boundary Commission.

Following is a brief outline of the work of the various divisions.

The Geodetic Survey of Canada provides a nation-wide network of basic horizontal and vertical control for surveying, mapping and engineering projects undertaken by federal and provincial departments and private agencies. It determines the latitudes and longitudes of selected points, and the elevations above mean sea level of a separate series of points, to a very high accuracy. The Survey also engages in a limited amount of research work, mainly directed toward investigations of the precise size and shape of the earth and the accuracy attainable by different surveying instruments and methods.

The Topographical Survey is responsible for mapping in Canada at scales 1:250,000 and larger. It carries out field surveys to provide a framework of horizontal and vertical control on which it plots cultural and physiographic detail from aerial photographs by photogrammetric methods. It checks and completes the map manuscripts so produced to the stage where they are ready for final drafting and reproduction. The Survey is also responsible for the checking of aerial photography obtained for the federal government to ensure compliance with specification standards.

The Canadian Hydrographic Service is responsible for the charting of the coastal and inland navigable waters of Canada, the analyses of tides and tidal current phenomena and the investigation of water-surface elevations of the St. Lawrence-Great Lakes waterway. The resultant data are published in the form of standard Canadian navigation charts, charts for special purposes, Pilots and Sailing Directions, Water-level Bulletins, and the official Tide and Current Prediction Tables.

Administration is directed from the headquarters at Ottawa, which is also the clearing centre for general navigational information. The regional establishment at Victoria, British Columbia, supervises the charting and tidal operations on the Pacific coast and serves as the principal distributing centre for nautical publications pertaining to that seaboard. Another regional office has recently been established in Halifax, Nova Scotia.

Legal Surveys and Aeronautical Charts Division is responsible for the technical control, recording and execution of legal surveys pertaining to land or other resources administered by the federal government. These include National Parks and Indian Reserves and, in the Northwest Territories and Yukon, land, oil and mining properties, both private and public. It cooperates with the provinces on surveys of their boundaries through appointed boundary commissions. It is also responsible for the increasing number of charts and manuals required by both civil and military pilots for safe air navigation. In addition, it collaborates in the definition and mapping of the boundaries of the federal electoral districts.

The Map Compilation and Reproduction Division compiles small and medium scale maps, and reproduces, by lithography in multicolor, the maps and charts prepared in the Surveys and Mapping Branch. This work includes the drafting and printing of topographic maps; the drafting and printing of air-chart bases and the overprinting of air information thereon; and the printing of hydrographic charts. It also does photographic and lithographic work for a number of other federal government agencies and, by special arrangement, publishes the maps produced by some provincial government agencies. In addition, it handles the sale and distribution of maps and aeronautical charts.

The National Air Photo Library maintains complete records of all survey photography taken by and for the federal government, including a copy of each photograph and information on the flight lines, the flying agency, the film, and camera operations. The files contain nearly 3,000,000 oblique, trimetrogon and vertical photographs which provide aerial coverage of nearly all of Canada. This vast picture holds vital information, not only for cartographers but for the many people interested in the development of Canada and its natural resources.

Reference facilities are provided for the general public and prints may be ordered through the Library.

The International Boundary Commission, Canadian section, reports functionally to the Department of External Affairs and administratively to the Branch. The Commission operates under the treaty of 1925 between Canada and the United States, which provides for the maintenance of an effective boundary line between the two countries. This includes up-to-date information upon the positions of all boundary monuments. Expenditures for the maintenance of the boundary are shared equally by the two countries, but each country pays the salaries and travelling expenses of its own Commissioner and his assistants.

PROGRESS TO DATE AND THE TASK AHEAD

The Surveys and Mapping Branch, as its name indicates, has two main functions — the carrying out of surveys and the making of maps and charts.

In the case of surveys, the geodetic control established up to the present consists of nearly 60,000 miles of precise and secondary levels, some 19,000 linear miles of triangulation arcs, mostly first-order, and a network of shoran trilateration covering all of northern Canada.

It is the ultimate aim to have control points, both horizontal and vertical, established at such intervals that no place in Canada will be more than 10 miles from a control point. As an intermediate step towards this goal, so far as horizontal control is concerned, a network of interlocking triangulation arcs is being established at an average distance apart of about 200 miles, covering the Canadian mainland. It is estimated that 15 or 20 years will be required to complete this skeleton network, and even then the Arctic Islands will not be covered. For vertical control, it is necessary to follow travelled routes, and it will be many years before the suggested density is approached.

Topographical and military mapping has resulted in additional triangulation and traverse of lesser accuracy as control for the mapping of over half of Canada. Surveys to complete this mapping and then to

up-grade original surveys by improved methods are regarded as a continuing requirement.

Hydrographic surveys in addition to providing an impressive fund of underwater data on charts, have provided land-based control surveys which greatly assist land surveys.

Apart from the widespread surveys for control purposes, many property surveys are made at the request of other government departments for legal or administrative purposes. The peak of this kind of activity was reached in the era of settlement of the prairie provinces when about 27 million acres of land was subdivided in one year. Although this figure will probably never again be equalled, the development of the north and management of the land holdings of the Indian population create a continuing demand for such surveys. Sustained activity in this field is foreseen as a continuing requirement, the level being dictated by the rate at which our resources are developed.

In the case of mapping, the Branch, in cooperation with the Army Survey Establishment, has several objectives. The first is to map all of Canada at the scale of 1:250,000, the smallest scale which is generally acceptable for reconnaissance purposes. In this connection, branch officers expect to see field work completed by 1964 and mapping by 1967. A second objective is to map areas of present and predicted economic value at a scale of 1:50,000. Approximately 23½ per cent of Canada has been so mapped but much remains to be done to keep pace with the demand.

Another requirement is for larger scale mapping for special detailed investigations. In this connection the most recent need is for larger scale maps for special civil and military purposes. This mapping is being done at a scale of 1:25,000 for urban and other selected areas by the Army Survey Establishment with part of the work being undertaken by the Surveys and Mapping Branch.

Concurrently with the production of new maps, the Branch has under way a program for the revision of existing map sheets, many of which are over 30 years old. This work is long overdue but, because of the pressure for maps of newly-developed areas, has been deferred. A start has been made in the Maritimes and maps of other areas will follow.

In the field of nautical charts, the goal is to chart all navigable waters, both coastal and inland, at various scales, with an accuracy suitable for safe navigation. A glance at the map of Canada will indicate the dimensions of the task of charting our deeply indented coastline. Add to this the necessity for continual scrutiny and revision of existing charts for the protection of human life and of property and the magnitude of the task can be appreciated.

The rapid development of transportation by air has led to a substantial need on the part of both civil and military pilots and air traffic controllers for charts and handbooks enabling quick access to all the complex information which is vital to safe air navigation. Since the publication of the first aerial strip map in 1931, the responsibility of the Branch has grown to include at the present time the production and revision of more than 1,750 different charts or information lists. As new navigational devices and flight control systems are developed to meet the increasing air-traffic problems, this task continues to grow. Its ultimate magnitude cannot be predicted.

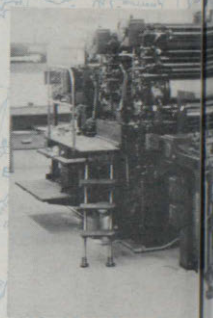
Although almost all of Canada has at one time or another been covered by aerial photography, tremendous changes have occurred over the face of the country, especially in the vicinity of our cities. Accordingly, there is a continuing requirement for new photography to provide up-to-date coverage for 1:25,000 maps, 1:50,000 maps and aeronautical charts.

The Branch faces a tremendous task. The great areas to be covered—Canada has an area of 3.8 million square miles — and the high percentage of terrain that is extremely difficult of access pose substantial problems to the surveyor and topographical engineer. Similarly, the thousands of miles of coastline, much of it in ice-infested Arctic waters, present real difficulties to the hydrographer.

The demand for maps and charts has soared in recent years. Under the impetus of the quickened pace of development throughout the country and the growing problems of defence, mapping requirements have more than doubled during the past decade. In the drive northward, Canadian frontiers have been pushed back to the rim of the Arctic and the production of maps and charts of the archipelago and its waters must now receive high priority.

Modern innovations in means of travel and the application of electronics to the field of surveying methods have greatly assisted the Surveys and Mapping Branch in speeding up the mapping and charting of Canada. Today's surveyor and engineer can travel by plane and helicopter, if distance and locale warrant it. Hydrographers travel in ships strengthened for Arctic duty. All are equipped with the latest instruments; the geodesist and topographer, for instance, with the geodimeter and the tellurometer, and the hydrographer with decca and radar equipment. While living conditions away from civilization must still be on the primitive side, the bannock and beans have given way to fresh meat and vegetables and an otherwise varied menu.

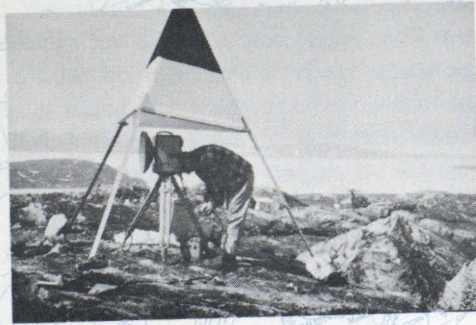
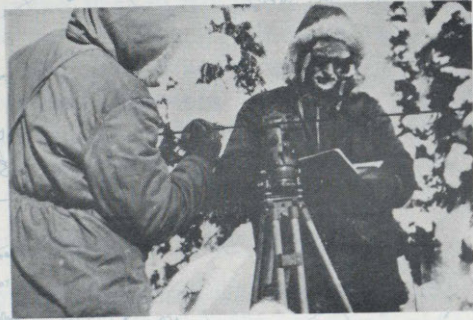
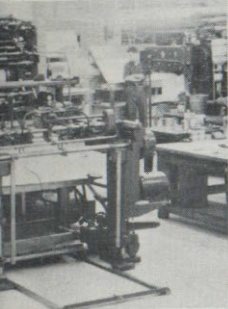
In the office, much progress has been made in the development and application of modern photogrammetric instruments for the plotting and compilation of maps from air photos. At the present time practically no map

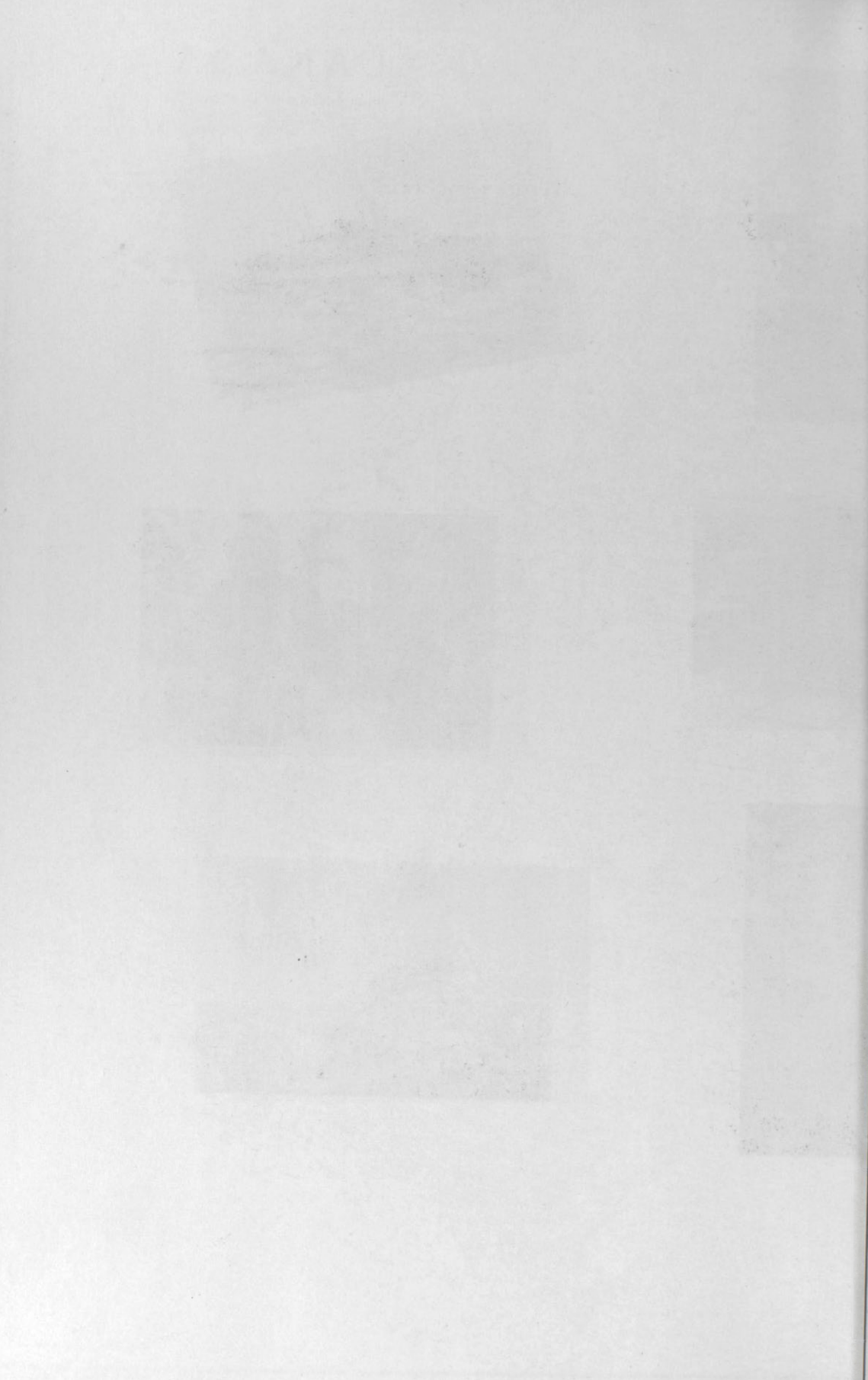


CANADA

SCALE 1:15,840,000 OR ONE INCH TO 250 MILES

MILES 100 200 300 400 500
KILOMETRES 100 200 300 400 500





is produced without fullest use being made of the associated aerial photographs. The impact of the electronic computer is also being felt in the Branch. Its use has brought increased efficiency to the processing of survey data, notably in the adjustment of observations, the computing of geodetic positions, in the transformation of geographic to plane coordinates and in the calculations required to produce star cards for surveyors. In the map-reproduction field, the Branch has made significant progress with the development of negative engraving. This is a semi-mechanical technique which produces excellent line definition, offers opportunity for invention and improvisation and effects marked savings in reproduction time.

Thus with the aid of modern tools and methods of transportation in the field and the progress achieved in recent years in various phases of map-making, the Surveys and Mapping Branch has been able to speed up its coverage of Canada and to realize marked achievement in the tremendous task of mapping and charting its land and water areas. Against the fine heritage of its early surveyors and engineers, the Branch looks to the continued production of high quality maps and charts for use in the active development of this country's wealth of natural resources.

DIVISION OF OCEANOGRAPHIC RESEARCH

The Division of Oceanographic Research was formed in 1960 to take charge of the extensive program of oceanographic research assigned to the Department of Mines and Technical Surveys by the Canadian Committee on Oceanography, an interdepartmental body coordinating all oceanographic research in Canada. The Division is responsible for meeting the increasing federal needs for oceanographic information in waters of Canadian interest, mainly for defence, transport, and resource assessment purposes. This includes an intensive study of oceanography in the Arctic and the extension of Canadian studies farther out to sea to examine the special problems of the deep ocean. In addition, the Division will contribute to international oceanographic studies in which Canada will become involved.

Oceanographic research will be based on the new \$4½ million Institute of Oceanography near Halifax, which is scheduled for completion in July 1962. Of the total planned Institute staff of approximately 300, over 100 scientists and technicians will be engaged in oceanographic surveys and research. Oceanographers and hydrographers will share in the use of multi-purpose ships designed for research and survey. The first of these new vessels, the *CGS Hudson*, is expected to be commissioned in late 1963.

NEW MARINE SCIENCES BRANCH

Effective April 1, 1962, a Marine Sciences Branch will be established in the Department of Mines and Technical Surveys to combine hydrographic surveys and research in oceanography, marine geology and the geophysical sciences of the seas. It will comprise the Canadian Hydrographic Service, the Division of Oceanographic Research, the new Bedford Institute of Oceanography at Halifax, Nova Scotia, and a new Ships Division.

Headquarters of the Marine Sciences Branch will be in Ottawa in the new Surveys and Mapping Building, and hydrographic and oceanographic activity on the Atlantic and Pacific coasts will be centred in oceanographic institutes on those coasts. On the Atlantic coast, the new \$4½ million Bedford Institute of Oceanography is scheduled for completion this summer. Oceanographic research in the Arctic will also be carried on from this centre. A similar centre is planned for the Pacific coast in about three years' time. Meanwhile, functions on the west coast will be centred in the present hydrographic establishment in Victoria, British Columbia. The inland waters section of the Canadian Hydrographic Service will work out of Ottawa.

The new Branch will be serviced by a fleet of multi-purpose ships which are designed for either survey or research purposes. The ships are being provided under a long-range shipbuilding program.

Military Survey

DEPARTMENT OF NATIONAL DEFENCE

The Directorate of Military Survey and the Army Survey Establishment exist to meet defence mapping needs in peace and war, at home and abroad. They also train military personnel in the mapping trades, maintain mobilization stocks of maps and a base military mapping plant which could be expanded in time of war.

Although *ad hoc* military maps were undoubtedly made for the earliest military campaigns, deliberate military mapping in Canada dates from the early 19th century when large scale maps were produced depicting the countryside in the immediate vicinity of major forts, such as the citadels at Halifax and Quebec and Fort Henry at Kingston. As the country became more developed the strategic entry routes into Canada were mapped. At the turn of the century these consisted of the Fraser and St. Lawrence Valleys, the Niagara peninsula and the Eastern Townships. At the present time coverage of the Alaska Highway, the Skeena Valley, the Stikine Canyon and the MacKenzie River Valley is also included in this category.

The scientific aids to defence have also generated their own mapping requirements. The DEW Line and Mid-Canada Line installations have been covered at large scale and the air defence of Canada has recently indicated a need for complete coverage of the country at 1:250,000.

There has been inevitably some overlapping in the mapping requirements for both defence and development purposes, but in meeting these requirements, there is no duplication of effort. The Surveys and Mapping Branch and the Directorate of Military Survey achieve this by complete cooperation at all stages of the planning and the carrying out of all mapping projects with the needs of both defence and development constantly in mind.

The Army Survey Establishment. Military units, to be effective in the present world, must be ready at all times for active operations. For this reason the Army Survey Establishment holds a high proportion of soldiers in the five survey trades, namely topographic surveyors, photogrammetrists, cartographers, cartographic photographers and lithographers. In addition, a small civilian component is needed to maintain continuity at the base plant. To meet commitments of both peace and war, a strength of about 160 military and 80 civilians is maintained in the Army Survey Establishment.

Modern equipment has been provided for Military Survey, but here again the needs of peace and war are evident. The large base plant photogrammetric plotters and heavy presses work side by side with small units that can, if necessary, be mounted in army trucks.

HOW TO OBTAIN INFORMATION*

SURVEYS

Control

The Geodetic Survey has a series of publications containing horizontal control and precise elevations throughout Canada, at prices ranging from 25 cents to 3 dollars. Some reprints of technical articles and some unpublished control information are available for free distribution. Inquiries should be addressed to:

The Dominion Geodesist,
 Surveys and Mapping Branch,
 Department of Mines and Technical Surveys,
 615 Booth Street,
 Ottawa, Canada.

Additional control information of somewhat lesser accuracy is available for most areas in Canada and details may be obtained from:

The Chief Topographical Engineer,
 Surveys and Mapping Branch,
 Department of Mines and Technical Surveys,
 615 Booth Street,
 Ottawa, Canada.

Property

Extracts from the Canada Lands Surveys Records, which is the official repository of documentary records of property boundary surveys in the Yukon and Northwest Territories, Indian Reserves and National Parks as well as those related to certain provincial and territorial boundaries, may be obtained from:

The Surveyor General,
 Surveys and Mapping Branch,
 Department of Mines and Technical Surveys,
 615 Booth Street,
 Ottawa, Canada.

* Government policy requires prepayment for publications, maps and charts.

MAPS**Topographical**

These maps are produced at the following scales:

1:1,000,000	1:125,000 (2 miles to 1 inch)
1:500,000 (8 miles to 1 inch)	1:50,000
1:250,000 (4 miles to 1 inch)	1:25,000

Complete coverage for Canada is available for the 1:1,000,000 and 1:500,000 series. Other scales are shown by current indexes.

At the present time a conversion program is being carried out whereby those maps, listed in brackets above, are being converted to the adjacent scale.

Most maps are priced at 25 cents each and may be obtained from:

Map Distribution Office,
Surveys and Mapping Branch,
Department of Mines and Technical Surveys,
615 Booth Street,
Ottawa, Canada.

Advance information prints are available for many map sheets not yet published and may be obtained from:

The Chief Topographical Engineer,
Surveys and Mapping Branch,
Department of Mines and Technical Surveys,
615 Booth Street,
Ottawa, Canada.

Inquiries for cartographic information should be addressed to:

The Chief of Map Compilation and Reproduction,
Surveys and Mapping Branch,
Department of Mines and Technical Surveys,
615 Booth Street,
Ottawa, Canada.

Unclassified military maps may also be obtained from the Map Distribution Office, at the above-noted address.

CHARTS**Hydrographic**

The following items may be ordered from:

Chart Distribution Office,
Canadian Hydrographic Service,
Surveys and Mapping Branch,
Department of Mines and Technical Surveys,
615 Booth Street,
Ottawa, Canada.



Catalogue.....	\$.75 cents
Nautical Charts.....	.50 to \$1.25
Sailing Directions.....	1.75 to 5.00
Water Level Bulletins.....	Free

The following items may be ordered from:

The Queen's Printer,
c/o Supervisor of Government Publications,
Ottawa.

Tide and Current Tables.....	\$.20 and .50 cents
Sailing Directions.....	1.75 to \$5.00

Aeronautical

Canadian Pilotage Charts.....	Scale 1:500,000
World Aeronautical Charts (ICAO).....	Scale 1:1,000,000
Aeronautical Route Charts.....	Scale 1:1,000,000

The above charts, at 25 cents each, and free indexes may be obtained from:

Map Distribution Office,
Surveys and Mapping Branch,
Department of Mines and Technical Surveys,
615 Booth Street,
Ottawa, Canada.

The Canada Air Pilot is issued in two volumes. Volume I covers Canada west of Winnipeg; Volume II, east of Winnipeg. Each volume, plus one year of amendment service, costs \$5.00, and is available from:

The Surveyor General,
Surveys and Mapping Branch,
Department of Mines and Technical Surveys,
615 Booth Street,
Ottawa, Canada.

AIR PHOTOGRAPHS

Contact prints and enlargements from air-survey negatives at various scales covering Canada are available through the National Air Photo Library. Prices range from 60 cents to \$14.00. Photomosaics may also be obtained. Photo orders and requests for photo-coverage information should be sent to:

National Air Photo Library,
Surveys and Mapping Branch,
Department of Mines and Technical Surveys,
615 Booth Street,
Ottawa, Canada.

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