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Engineering 'the aerodrome of democracy', Canada 1939–1944

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The British Commonwealth air training plan was created to address the critical shortage of trained flyers that existed at the outbreak of World War II. As the expansion of existing training facilities in areas likely to be subject to enemy attack was unlikely to be satisfactory, an agreement was reached between Great Britain, Canada, Australia and New Zealand to provide training facilities in Canada. Initial requirements were for 58 airfields, one to be complete by May 1940, 37 by the end of 1941 and the remaining 20 by April 1942. The extent of this civil engineering challenge is highlighted by the fact that, in 1939, the Royal Canadian Air Force possessed only five airfields. However, not only were the original targets achieved, they were surpassed in both scope and time. On completion, 88 'main' airfields were in use; as most of these airfields required at least one 'satellite' field with many of the facilities of the main fields, the grand total was 176 airfields. In the words of President Roosevelt, Canada had become 'the aerodrome of democracy'. As airfields were constructed in every province of Canada, planning and logistical problems were immense. Standardisation of design for airfield layout, prefabrication of components for hangars and other airfield structures, a centralised management organisation and the application of what, today, we would describe as modern construction project management techniques all helped Canada's civil engineers to successfully complete this Herculean task.

1. INTRODUCTION

Two major projects carried out in Canada during World War II had a significant impact on the war effort and civil engineers played major roles in both. One, the construction of the Alaska highway was a joint USA/Canada venture. The other, an entirely Canadian project, was the construction of airfields and infrastructure to support the British Commonwealth air training plan (BCATP). This paper describes this enormous project and interested readers are directed to the literature[1–9] for further information.

The BCATP was created to address the critical shortage of trained flyers that existed at the outbreak of World War II. With the approach of war in the late 1930s, it was realised that British training facilities would quickly become strained under the rapid expansion to be expected under wartime conditions. The creation of new training facilities in areas that could be vulnerable to enemy attack was unsatisfactory. The British Royal Air Force (RAF) therefore started to look at the possibility of establishing training centres in one or more of the countries of the British Commonwealth. Canada was one obvious choice as there had been a previous successful history of cooperation in this field in World War I when Canada had become an important air training centre for the Royal Flying Corps and the RAF. Southern Rhodesia, South Africa and Australia were also considered as candidates and each had their own particular advantages. However, the proximity of Canada to the North Atlantic trade and communication routes and to the industrial resources of the USA was the major factor leading to a preference for Canada.

After intensive negotiations, on 17 December 1939, an 'agreement relating to the training of pilots and aircraft crews in Canada and their subsequent service' was reached between Great Britain, Canada, Australia and New Zealand to implement a plan to provide training facilities in Canada, to be operated by the Royal Canadian Air Force (RCAF). The objective was to produce up to 1500 trained aircrew per month and the 'official' start day of training was to be 29 April 1940. Initial studies indicated that 58 training airfields would be required. The first of these was to be completed by May 1940, a further 37 were to be complete by the end of 1941 and the last had to be operational by April 1942.

The total estimated cost of the project over the three years of the agreement was C$600 million (1C$=£0.52) of which Canada was to provide C$350 million. The figures announced in the official statement to the Canadian House of Commons were, however, for a total cost of C$888·5 million, with a Canadian contribution of C$370 million. The size of Canada's contribution may be judged against the figure for the total federal budget of the country for 1939, which was C$500 million.

When the agreement was signed, the total establishment of the RCAF was around 4000 officers and men, about 300 mostly antiquated aircraft and five airfields of which only two were training airfields.

2. THE PLAN

In addition to initial pilot training at elementary flying training schools followed by advanced flying training at service flying training schools, the plan provided for air observer, bombing and gunnery, air navigation and wireless training schools.

Further units were required for recruiting, basic military training, maintenance and administration, making a total of 74 schools, depots and other formations. When fully developed, the BCATP was required to produce 520 pilots a month with elementary training, 544 pilots with service training, 340 air observers and 580 wireless operator-air gunners. The RCAF was given the initial responsibility for establishing, administering and operating this complex plan.

The difficulties to be faced were immense. Vast quantities of equipment, from aircraft to office supplies, were required. In addition to flying instructors, support personnel such as executives, technicians, mechanics, doctors, dentists, cooks, drivers, chaplains, accountants, clerks, etc. were required. Around the nucleus of RCAF personnel and the specialist RAF officers who had been sent to assist them, a force of skilled men from all walks of life rapidly gathered. Among them were some of Canada's leading doctors, engineers, scientists, lawyers and bush pilots. From the USA came a contingent of American commercial pilots eager to help in what they considered to be the common cause.

For Canada's civil engineering community, the challenges were identifying suitable existing airfields, selecting new airfield sites and then the design and construction of runways, taxiways, roads, services, hangars, barracks and many other buildings, all of which had to be carried out in an unprecedented short time span. This project promised to be every bit as daunting as the civil engineering project that played a major role in creating the Dominion of Canada in 1867, the construction of the great Canadian Pacific trans continental railway.

3. PROJECT ORGANISATION

Until shortly before the outbreak of war, the Royal Canadian Engineers had been responsible for all construction activities required by the RCAF. Recognising that this construction project was of a vastly different scale to anything attempted up to that time, the Canadian government set up a directorate of works and buildings with the task of designing and constructing the required airfields and infrastructure. This was to be indeed a fast-track project.

To manage this enormous project, the directorate looked for an experienced construction executive with extensive experience of large-scale projects, and decided upon R. R. Collard, vice president of the Carter–Hall–Aldinger Construction Company of Winnipeg. Collard, drafted into the RCAF with the rank of Wing Commander, quickly set to work by assembling a large project management team headquartered in temporary and somewhat cramped buildings in Wellington Street, Ottawa. Recognising that the key to achieving the formidable construction target that he had been set lay in standardising the layout of the airfields and the buildings, Collard set his team to design building components that could, as far as possible, be prefabricated in factory conditions and shipped to the sites for rapid assembly. Equally important was to ensure that only readily available materials were used in the designs; for example, the scarcity of steel following the outbreak of war dictated that the majority of buildings be designed with wooden structural components.

4. AIRFIELD REQUIREMENTS

Initial airfield requirements were of the order of 120 airfields. Of these, 68 were to be main airfields and approximately 52 were relief airfields. Once this had been determined, together with a breakdown of the different types of airfield required, the first problem was to determine which of the existing airfields in Canada could be made available. From this list of potential sites, the question was: which were immediately suitable for use and which could be readily modified for use? Then, having determined existing availability, how many 'new' airfields were required and where were they to be located. Two potential sources of suitable airfields already existed—RCAF airfields and those of the Trans Canada Airway System.

At this point in time, the RCAF had only five operational airfields although a further six were at various stages of construction. Of the operational fields, only two (Borden and Trenton in Ontario) were training airfields. Anticipating the 'agreement', the first BCATP school was opened unofficially at Camp Borden on 1 November 1939, some six weeks before the official signing. The other airfield at Trenton was to be developed to become the hub of the plan, with the establishment there of the Central Flying School, the training base for flight instructors.

In the 1920s, Canada's vast spaces, together with the rapid development of passenger aircraft, led to an interest in the development of transcontinental commercial air transportation. In 1928, the government gave permission for survey work to start on what was to be known as the Trans Canada Airway. This was to be a series of airfields from Montreal to Vancouver, at approximately hundred mile intervals, with emergency landing fields located about half way between each of the main airfields. Between 1932 and 1938, 94 of these airfields had been completed, mostly employing labour available because of the depression. Obviously, a number of these airfields were likely to be satisfactory for use in the BCATP.

An initial review of the Trans Canada Airway airfields showed that there were 37 airfields with a landing length of the minimum 1000 m required by the BCATP and a further five airfields were deemed capable of being developed to a landing length of 1000 m. Studies indicated that 24 of these airfields could be quickly developed to satisfy BCATP requirements with the addition of a number of buildings. A further 15 would need considerable modifications together with additional buildings and other infrastructure to bring them to a satisfactory condition for air crew training. Taking both these sources into account, this still left a requirement for some 80 'new' airfields.

To identify suitable new airfield sites, a number of survey teams were set up, each consisting of an inspector and an engineer from the Department of Transport plus an RCAF officer. As very few adequate topographical maps were available at that time, these teams had to identify likely locations from the air and follow up by examining each potential site on the ground.

In general, the coastal areas of the country were avoided, particularly the East Coast, where military involvement was likely to be highest. Mountainous areas, too, were not ideal for trainees and this ruled out airfields close to the Rockies and therefore most of British Columbia. In addition, none of the airfields were to be located within five miles of the US border. Whenever possible, it would obviously be an advantage to

establish airfields near populated areas, with better access to services, materials, labour, power and water supplies, etc. In addition to the obvious topographical requirements of level ground, good drainage, satisfactory subsoil conditions and no obstructions to runways, local sources of minerals suitable for use as road/runway base, and as aggregates for concrete and tarmac were also key components in deciding on a suitable location.

Each type of training school had unique requirements. Bombing and gunnery schools (B&GSs) required an area of around 160 km^2 to include practice bombing ranges and to ensure that they were remote enough to minimise danger to both people and property. Navigation schools were to be sited where trainees could gain experience over varied terrain, including large bodies of water. Although training requirements were the main factor in locating these airfields, in cases where there was a choice of one or more sites with otherwise equal 'qualifications', priority was given to a site that appeared to show greater postwar potential as either a military or civil airport. Once the word was out that sites were being sought for airfields, letters flooded in to the Ministry of Transportation offering land for sale. However, most of these offers were opportunistic rather than practical and served only to distract the already hard-pressed staff from the search process. Inevitably there was also political pressure exercised on those responsible for site selection by representatives of local communities who were quick to realise that an airfield would be of considerable commercial advantage to a community after the war.

Although BCATP airfields were eventually located in every province of Canada (Newfoundland was not part of Canada at that time), as proximity to populated areas was preferable for ease of access for construction and availability of services, the sites finally chosen were focused mainly on southern Ontario and the southern parts of the Prairie provinces. Experienced real estate staff of Canadian National Railways were appointed to handle negotiations for the selected sites.

As the plan was intended to train more than just pilots, several different types of training school were required. As each school required different facilities, standard layouts were designed for each type: elementary flight training, service flying training, air observer, air navigation and bombing and gunnery schools. In general, the runway layouts were standardised in an equilateral triangular pattern so that there was always a runway available within 30° of the wind direction.

4.1. Elementary flight training schools (EFTSs)

A decision was made in 1939 that the quickest and most efficient way to get elementary pilot training under way was to contract out this work to local flying clubs under the Canadian Flying Clubs Association. At the time there were 22 government-subsidised flying clubs in Canada and eight (located in Vancouver, Calgary, Regina, Winnipeg, Hamilton, Toronto, Montreal and Halifax) were selected for this role. The clubs were required to raise working capital of C$35 000 through local subscription as a guarantee of stability and good faith. These were not for operating expenses, but were guaranteed by the government.

The clubs all operated from existing airfields that were, over time, modified to conform to standard EFTS airfield design. The airfields initially had 'all-way' grass surfaces, although most were later given paved runways in the single equilateral triangle format. The average cost of a new EFTS airfield was approximately C$100 000. Training aircraft were principally Tiger Moths and Fleet Finches. This was not for operating expenses as these were guaranteed by the government.

4.2. Service flying training schools (SFTSs)

The SFTSs provided advanced flying training with instruction by RCAF instructors. These schools used larger aircraft, like Harvards and Ansons, and had a much higher volume of traffic than the ETFS airfields. Their design was therefore much more elaborate and required a 'main' airfield together with at least one and frequently two 'relief' airfields. The main airfield (where hangars, living quarters, hospital, motor pool, etc. were concentrated) had a double hard-surfaced equilateral triangle runway layout—that is, laid out as two equilateral triangles, one within the other (Figure 1). The runways were 30 m wide and 1000 m long. Hard surface taxiways were also provided.

The primary relief field, located within about 15 min flying time from the main airfield, had single hard-surfaced triangular runways and taxiways. A single hangar, an H-hut (barrack) and a garage were provided for overnight stops. The secondary relief field usually had an 'all-way' grass field. The average cost of an SFTS establishment was approximately C$800 000.

4.3. Air navigation, bombing and gunnery and air observer schools

The airfields for these schools were similar in design and layout to the main SFTS airfields, except that they usually had only the single triangular runway layout—that is, three hard-surfaced runways (Figure 2). The runways were generally wider, at 46 m, to account for larger multi-engine aircraft, although with a standard length of 1000 m. The average cost of these facilities was stated to be approximately C$350 000 each.

The area of paving required over the term of the plan in runways, taxiways and other hardstanding was approximately 30 000 000 m^2. The design thickness of runways varied depending on the type of airfield and the size of aircraft that each was designed to accommodate, together with subsoil conditions, etc. The base depth varied from 120 to 250 mm of crushed gravel or crushed stone, and sometimes waterbound macadam/soil. The finished surface had at least 50 mm of tarmacadam.

5. BUILDINGS

Records show that a total of 8300 buildings were constructed.[5] The principal building types were

(*a*) hangars
(*b*) barrack blocks (H-huts)
(*c*) mess blocks
(*d*) classrooms
(*e*) administration offices
(*f*) control towers
(*g*) workshops
(*h*) machine shops
(*i*) hospitals
(*j*) motor pools

Figure 1. Double equilateral triangle runway layout at No. 5 SFTS, Brantford, Ontario

Figure 2. Single equilateral triangle runway layout at No. 31 B&GS, Picton, Ontario

(*k*) recreation halls
(*l*) club rooms
(*m*) boiler rooms
(*n*) water pumping stations.

Wood was the principal construction material for both structure and finishes. The buildings were wood framed with wood roof joists and cedar shingles for siding. Internally they were generally finished in plasterboard. The most prolific design type was that of the barrack blocks. These were laid out in two long wings connected at the centre of each by a short corridor, thus becoming known as H-huts (Figure 3). An example of another standard design, again virtually all of wood, is the recreation hall shown in Figure 4.

One of the most serious problems faced in developing the infrastructure to support the airfields was provision of a water supply that was adequate in both quantity and quality. The daily requirements of water ranged from 20 000 gallons (≈91 000 litres) for an EFTS to 45 000 gallons for a bombing and gunnery school. This problem was particularly serious in the Prairie provinces where it was not unusual for several wells to have been developed before a satisfactory supply of potable water was obtained. Where wells were located several miles from an airfield, the pipelines were frequently made of wood because of the wartime shortage of steel pipes. These pipes, consisting of staves joined by hoops, frequently leaked and the resultant drops in water pressure caused many problems not only in the domestic supply but also in ensuring that an adequate supply of water was available for firefighting purposes. On several sites, water had to be brought in by tanker and stored in tanks on site. These water supply problems,

Figure 3. H-hut still existing at Picton, Ontario

Figure 4. Recreation hall at No. 20 EFTS, Oshawa, Ontario

however, resulted in some schools receiving an unexpected amenity—the storage tanks were designed so that they could also be used as swimming pools (Figure 5). Although usually located in the open, two schools (at Mossbank and Dafoe in Saskatchewan where the water supply problems were particularly severe) had indoor pools that the local community was also permitted to use.

6. HANGAR DESIGN

The largest buildings were the hangars, with a total of 701 constructed. A great number of hangar designs already existed and one of the first considerations was to review these designs (e.g. the RAF's 'T' hangar design) to determine if it was feasible to use one of these rather than to design a BCATP standard from scratch. Due to wartime shortages of steel and Canada's abundant wood supply, it was quickly established that a 'domestic' design incorporating as much wood as possible was likely to be the best solution. All design work was carried out by the directorate of works and buildings in Ottawa. To form the necessary design teams, Collard recruited large numbers of engineers and draftsmen from engineering and construction companies across Canada.

The hangars posed the most difficult building design problems. They had to provide a large, well-lit and clear floor area for aircraft maintenance. Efficient heating was essential as they had to be usable at temperatures as low as −40°F; for some locations, high-velocity air 'curtains' were provided at the hangar doors to prevent loss of warm air when the doors were open. Hangar sizes varied depending on the type of school, but there were three main variants—the single hangar (34 m × 38 m), double hangar (68 m × 49 m) and the double–double hangar (68 m × 98 m). The structure consisted of Warren trusses supported on braced wooden columns, both built of Douglas fir (Figure 6). Bolted joints and split ring connectors were employed to make the joints stronger than in traditional

Figure 5. Water tank/swimming pool at No. 20 EFTS, Oshawa, Ontario

Figure 6. Hangar at No. 14 EFTS and No. 7 AOS, Portage la Prairie, Manitoba

Warren truss systems. The main hangar doors were generally of the horizontally folding type, with wicket doors for personnel access. The siding was generally cedar shingles over diagonal sheeting. Lean-to buildings that housed offices, stores, washrooms, etc. were provided on one or both 'closed' ends of the hangar (Figure 7). Up to ten large windows on each of these closed sides provided good natural lighting. As most construction was of wood, high standards of fire protection and prevention were necessary and, as water supplies presented problems in several locations, around 100 water pumping stations were also required.

The roof was sealed with two layers of tarred felt, covered with fibre board, then tarred and gravelled. This roof covering was designed to withstand the suction lift of high-velocity winds passing over the hangar and to resist the 'ballooning' effect caused by interior air pressure generated by high winds blowing through open doors and other gaps.

Although the majority of hangars employed Douglas fir trusses, the greater availability of steel in some parts of the country (particularly the more industrialised area of southern Ontario) meant that steel trusses were sometimes used. For example, all of the hangars at No. 10 EFTS at Mount Hope, Hamilton, Ontario used steel trusses, while not far away, at No. 12 SFTS, in Hagersville, Ontario, steel was used in two of the five hangars.

Forty-one hangars survive to the present day.

7. CONSTRUCTION

Records state that the design teams produced 'more than 750 000 blueprints and 33 000 drawings'.[5] Construction work was carried out in a method similar to today's construction management process, with 'packages' of work being let to contractors when design was sufficiently advanced. Contractors had to be found who were competent to undertake work of this magnitude and urgency and they, too, learned a great deal about management methods as a result. An indication of the volume of work required can be seen by the fact that in 1942 alone, some 1000 contracts were awarded to a value of around C$80 million—a vast sum at that time.

The rapid build-up of the BCATP meant that trainees were frequently on site before all work was complete and a great deal of resourcefulness was necessary to overcome the problems that resulted. At an early stage in the implementation of the plan, it had been decided that high standards of both design and construction were necessary to provide living and working conditions that would help to counter the difficult and stressful training period of new aircrew.

Initial contracts started to be awarded towards the end of 1939. These increased rapidly through February, March and April of 1940. At first, public tenders were called and the contracts were awarded to the lowest bidder whose bid complied with the tender documentation. However, the invasion of Western Europe in May 1940 increased the tempo of the training plan and to speed the process, restrictions were eased; from that time most contracts were negotiated on a 'unit price' basis with known reliable contractors. The calling of public tenders on earlier contracts had established ranges of prices for each class of work in different geographical areas and these were used as a basis for negotiations. There were normally multiple contracts for each site and they were usually placed with local construction companies who employed local labour. For example, for No. 2 SFTS Ottawa, the contract for construction of the hangars was awarded to Brennan Construction for C$307 750 and that for the accommodation buildings to Garvock Construction for C$267 869. The contract for drill hall, hospital, ancillary administration, etc. buildings went to Dagenair Construction for C$119 568. Records show that the hourly rate of pay for carpenters was 75 cents and for labourers 45 cents.[4] Although many workers, particularly in the more remote locations, were inexperienced in construction, they apparently learned quickly and it was regularly reported that with the simplicity of design and standardisation of components, a hangar could be assembled in hours rather than days. The speed at which work was carried out meant that much of the timber used had not yet

Figure 7. Double hangar exterior at No. 6 SFTS, Dunnville, Ontario

Number of schools (22 total)	Commissioning time relative to original schedule
2	On time
2	8 weeks early
2	12 weeks early
1	13 weeks early
1	16 weeks early
4	18 weeks early
4	20 weeks early
1	21 weeks early
1	22 weeks early
1	23 weeks early
1	24 weeks early
1	29 weeks early
1	32 weeks early

Table 1. Commissioning performance for elementary flying training schools

Number of schools (16 total)	Commissioning time relative to original schedule
1	On time
3	4 weeks early
1	6 weeks early
3	8 weeks early
1	12 weeks early
2	14 weeks early
1	15 weeks early
1	16 weeks early
2	32 weeks early
1	6 weeks late

Table 2. Commissioning performance for service flying training schools

fully dried. This was to cause considerable maintenance problems as frequent adjustments had to be made to truss turnbuckles etc. to counter the inevitable shrinkage and movement of components.

Year	Year target	Year actual	Target total	Actual total
1940	20	33	20	33
1941	36	36	56	69
1942	8	12	64	81
1943		6		87
1944		1		88

Table 3. Overall target and actual construction for 'main' airfields

Engineering and construction work did not end with the completion of base construction. Bases had to be maintained summer and winter and the introduction of newer and heavier aircraft types meant that runways, taxiways and hardstanding areas had to be upgraded. In all, 88 airfields and 88 relief airfields together with ancillary buildings and infrastructure were constructed. The success of the design, construction and commissioning crews in carrying out this massive construction project can be judged from Tables 1–3.

8. CLOSURE

At the close of 1943, the BCATP reached its maximum expansion of 97 schools and 184 ancillary units, with an average of over 3000 graduates per month; in less than three years 82 000 trained aircrew were qualified. By early 1944, the reserve of aircrew was in excess of immediate needs overseas and it was possible to start a reduction in training. The closing of schools was accelerated in October and at the end of March 1945, the BCATP officially was terminated. It had done its job beyond all expectations.

Commenting on the graduation of the last trainees in March 1945, Winston Churchill referred to the BCATP as 'a spacious task imaginatively conceived and most faithfully carried out'. The final numbers of trained air crew are shown in Table 4.

Regrettably, 856 trainees and/or instructors were to die during training and it was estimated that more than half of the BCATP graduates would be killed, wounded or taken prisoner while on active operations.

The final cost of the BCATP is recorded as C$1 757 367 389·86; the share for each country is shown in Table 5.

	Cost: Can$
Canada	1 589 954 609·94
United Kingdom	54 206 318·22
Australia	65 181 068·23
New Zealand	48 025 393·47
Total	1 757 367 389·86

Table 5. Final cost of the BCATP

Skill	RCAF	RAF	RAAF*	RNZAF†	Total
Pilot	25 747	17 796	4 045	2 220	49 808
Navigator	12 855	13 882	1 643	1 583	29 963
Air bomber	6 659	7 581	799	634	15 673
Wireless/AG	12 744	755	2 875	2 122	18 496
Air gunner	12 917	2 096	244	443	15 700
Flight engineer	1 913				1 913
Total	72 835	42 110	9 606	7 002	131 553

*Royal Australian Air Force
†Royal New Zealand Air Force

Table 4. Final output of air crew

Figure 8. Canadian Society for Civil Engineering national historic site plaque at No. 6 SFTS, Dunnville, Ontario

9. AFTERMATH

Of the 176 BCATP airfields constructed, 62 remain in use today. In many cases the postwar potential of these sites that had been envisaged was indeed achieved, and provided the foundation of Canada's postwar air transportation system. Some airfields, like those at Toronto and Vancouver, have developed into major international airports. Many operate as regional airports and others continue an active life as local flying fields. Six remain as Canadian Forces bases operated by Canadian Forces Air Command.

Of the 'inactive' airfields, some were developed into industrial estates, one became a prison, another a police college, a few are, or were for a time, motor racing circuits, but many more have disappeared back into farmland retaining only a few remnants of runways and buildings as a reminder of the part that they played in the difficult days of World War II.

The Canadian Society for Civil Engineering has recognised the design and construction of the airfields and associated infrastructure for the BCATP as a 'national historic civil engineering project' (Figure 8). The Society intends to install commemorative plaques at as many as possible of the remaining active airfields and to have at least one plaque on an airfield in each of the provinces. To date, commemorative plaques have been placed on four of these airfields—Oshawa, Hamilton and Dunnville in Ontario and Moncton in New Brunswick.

REFERENCES

1. BARRIS T. *Behind the Glory*. Macmillan Canada, Toronto, 1992.
2. BYERS A. R. (ed.) *The Canadians at War 1939/45,* 2nd edn. RDA, Montréal, 1986.
3. DOUGLAS W. A. B. *The Official History of the Royal Canadian Air Force. Vol II: The Creation of a National Air Force.* University of Toronto Press, Toronto, 1986.
4. DUNMORE S. *Wings for Victory*. McClelland and Stewart, Toronto, 1994.
5. HATCH F. J. *Aerodrome of Democracy*. Ministry of Supply and Services, Ottawa, 1983.
6. MCGRATH T. M. *History of Canadian Airports*. Ministry of Supply and Services, Canada 1984.
7. MILBERRY L. and HALLIDAY H. L. *The Royal Canadian Air Force at War, 1939–1945*. Canav Books, Toronto, 1990.
8. PIGGOTT P. *Gateways: Airports of Canada*. Pottersfield Press, Nova Scotia, 1996.
9. WILLIAMS J. N. *The Plan*. Canada's Wings Inc., Ontario, 1984.