

CONSTRUCTING THE AERODROME OF DEMOCRACY

Civil Engineering and the Development of the BCATP

by Tim Johnston

With a long-standing interest in the history of aviation in Alberta, Tim Johnston has been a supporter of the Bomber Command Museum for many years. During 2016, Tim led a group that included the museum that placed a roadside brass plaque to mark the location of 31 EFTS De Winton. After locating the station's flagpole lying in the grass on the site, Tim made arrangements for it to be recovered, restored, and placed on display at the museum.

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ABSTRACT

The British Commonwealth Air Training Plan (BCATP) was a joint venture between Canada, Great Britain, Australia and New Zealand, the object of which was to provide trained aircrew for the air offensive against the Axis nations during World War II. The majority of training took place in Canada and the Plan was operated by the Royal Canadian Air Force (RCAF). Eighty airfields were required in addition to 40 existing ones and each training school required the construction of barracks, hangars, roadways, sewage systems, water systems, heating and lighting, runways, aprons and taxiways. Construction of the aerodromes proceeded at a rapid pace and of the 38 elementary and secondary flying schools scheduled for opening in 1940 and 1941, all but three opened four to 24 weeks ahead of schedule. The total cost of the project was (1946) \$2,231,129,039. Canada provided 72 percent of the cost of the Plan. Of the 131,553 Commonwealth recruits who trained as pilots, navigators, air bombers, wireless operators, gunners and flight engineers, 72,835 were Canadians. The role played by civil engineers in planning and constructing the schools was key to the massive flow of trained aircrew to theatres of war.

INTRODUCTION

In the spring of 1996, I visited a foundry in Edmonton with the intention of ordering a bronze plaque. The plaque was to commemorate the founding of the Canadian Teachers Federation in Calgary in 1920 and was to include an etched metal photograph of the founders. The foundry representative showed me a finished plaque that used the same technique, to give me a sense of how mine would appear. That plaque belonged to the Canadian Society for Civil Engineering (CSCE) and was to be placed at the Edmonton Convention Centre in honor of the construction of Edmonton's Low Level Bridge.

That chance encounter with a bronze plaque in an Edmonton foundry has led to this paper being prepared for the 1997 annual conference of the CSCE. The purpose of this paper is to provide a glimpse of the contribution made by civil engineering to the development of the British Commonwealth Air Training Plan. It is also to encourage CSCE members to support an initiative to place plaques at representative sites of former Plan air bases.

I have a long-standing interest in the BCATP. This began with a visit as a boy to the abandoned RCAF airfield at Pearce, Alberta, a hamlet about 15 kilometers east of Fort Macleod. At that base were 20 abandoned Lancaster bombers, veterans of the air war in Europe. Pearce, as I later learned, was part of the BCATP and had sequentially served as an elementary flying training school, an air observer school and a flying instructor school. My interest continues today. I am actively researching the Plan using microfilmed copies of the once-secret Daily Diaries that were maintained by each school and which now provide a history of the establishment and operation of the schools.

I would like to see the sites of the Plan schools marked in some way and, chancing upon the Edmonton plaque of the CSCE, I made some enquiries about why this organization provided plaques and where they might be placed in future. My first contact was with Ralph Morris of Edmonton who was instrumental in obtaining the Edmonton plaque. He, in turn, contacted Ralph Crysler, chair of the CSCE historical committee. The three of us met in Edmonton last year at the CSCE convention. Our objective was to determine the level of interest on the part of CSCE members in having plaques placed at certain former training sites in each of the CSCE regions.

DEVELOPMENT OF THE PLAN

By an agreement signed on December 17, 1939, the United Kingdom, Canada, Australia and New Zealand formed the British Commonwealth Air Training Plan to provide a flow of trained aircrew to operational units fighting the air war against Germany and Italy. The Plan was to be operated by Canada and managed by the Royal Canadian Air Force. Fifty-eight flying schools and additional support facilities were to be established. May 1940 was set as the date for the opening of the first school with the last to open in April 1942.

In 1939, the RCAF had approximately 4,000 officers and airmen and only two air training facilities. Aircraft numbered fewer than 300, mostly antiquated biplanes. The Plan expected to turn out 1,500 aircrew each month, once all of the schools came on line. An enormous growth of the RCAF itself and the training establishment in Canada was about to begin.

In May 1940, elementary flying training schools commenced operation. These schools, under the direction of the RCAF, were formed by civilian flying clubs and employed civilian flying instructors as the teaching staff. The RCAF supplied buildings and equipment. Later, high achieving graduates of the advanced flying schools were often returned to the elementary flying schools on leave without pay. They were employed as instructors, subject to recall to the service, and received their salaries from the civilian operating companies.

The Plan progressed rapidly in terms of numbers of aircrew graduated, number of schools brought on line and the number of support staff required to meet the expansion of training output. By the end of 1943 there were 73 Canadian schools in operation along with 24 additional schools transferred from Great Britain. These latter schools, while serving primarily to train Royal Air Force (RAF) pupils from Great Britain, were administered by the RCAF. The training needs of the British Fleet Air Arm were also addressed within the Plan with two elementary flying schools and one service flying training school dedicated to naval aviation. A specialized school for naval air gunners/telegraphists was formed at Yarmouth, Nova Scotia.

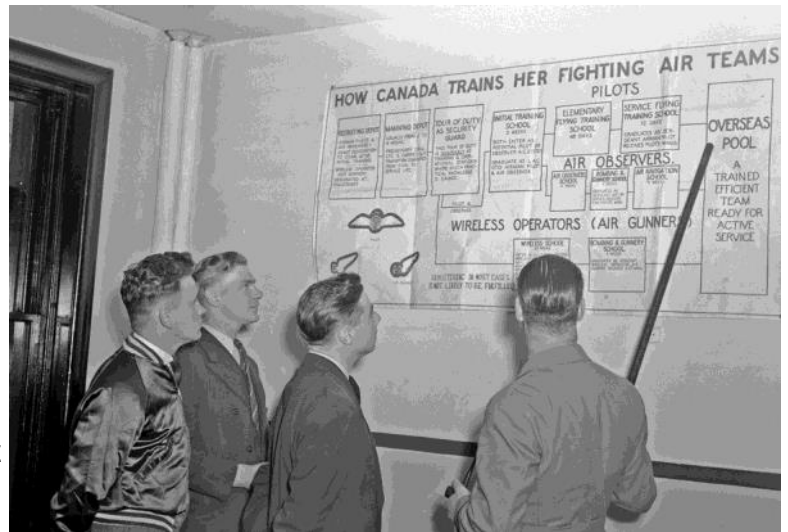
The Plan was highly successful and the reserve of trained aircrew grew to the point where by mid-1944, the decision was taken to begin a progressive closing of the schools, starting with the RAF schools transferred from Great Britain. By the end of 1944, only 52 schools continued in operation. By March 31, 1945, the Plan ceased to exist and any units still operating reverted to other uses within the RCAF.

PLANNING, ENGINEERING AND CONSTRUCTION

Throughout its history, the RCAF relied upon the Royal Canadian Engineers to see construction projects through to completion. Shortly after war was declared, however, a Directorate of Works and Buildings was established. The BCATP presented an enormous challenge to the new directorate and it was placed under the command of a construction engineer familiar with large-scale projects.

R R Collard, vice-president of the Carter-Hall-Aldinger Construction Company of Winnipeg, was selected and was brought into the RCAF with the rank of wing commander. He assembled a large staff of engineers and draftsmen who, working in crowded and stressful conditions in Ottawa, produced more than 750,000 blueprints and 33,000 drawings. In addition to the needs of the Plan, the Directorate of Works and Buildings served the requirements of the RCAF Home War Establishment.

The Department of Transport became involved in the selection of suitable sites for aerodromes because of its experience constructing airfields prior to the war. In the fall of 1939, field parties composed of an inspector, and engineer from the Department and a RCAF officer, started the task of proposing sites for airfields of the Plan. Meanwhile, in Ottawa, engineers under Collard's direction began the design of many



Explaining the structure of the BCATP

forms of buildings – hangars, barrack blocks, offices, messes, motor pools, hospitals and drill halls – adopting a high degree of standardization. A major accomplishment was the substitution of wood for steel in the construction of the hangars. Wooden trusses spanning more than 30 meters were developed. The designs of the various types of schools were also standardized with runway layouts typically forming a triangular pattern. Tremendous pressure was brought to bear on the Directorate of Works and Buildings but there emerged an engineering and construction organization that successfully brought to completion one of the largest undertakings of its kind ever attempted.



BCATP drafting office

Wilf Sadler, civil engineer: “Working on the BCATP was one of my first experiences with what they called “fast track”. When the contractor would be finishing up a job, you would come to the office and they knew what stage things were at and in a week we would be back on another job. They would be negotiating the prices and they never stopped anybody from going to work and they didn’t give them any bargains, either. The government got a fair deal from the contractors but the contractors never lost a day of work unless it was raining or something. Well, that was unique to me.”

Approximately 7,000 buildings were erected during the five-year life of the Plan, most of these in the first two years. In 1942, approximately 1,000 construction contracts were awarded with a value approaching \$80,000,000. In addition to building and paving contracts, water supplies had to be secured and this proved a major problem on many of the bases, particularly those in southern Saskatchewan, but including such sites as Mount Hope, the airfield built south of Hamilton, Ontario. Nearly 100 water-pumping stations were constructed and on some bases indoor swimming pools were built for the main purpose of storing water for emergency purposes. Sewage lines were required for all buildings and treatment plants had to be provided where local facilities did not exist. Electrical power usually came from the local utility company but in some isolated locations, diesel, steam or gasoline generating plants had to be installed.

The early days of the Plan saw rapid construction and a massive build-up of trainees converging at the sites of the schools. The need to accommodate students conflicted somewhat with the ability to provide finished facilities. Improvisation and ingenuity overcame any problems until finishing touches could be made to all construction projects. Even so, a very high standard of design and construction was set and maintained in the belief that good living and working conditions would help offset the mental and physical strains of flying instruction.

Civilian ground staff: “We got there in September and there were no barracks, no dining hall and the hangars were only half finished. The first two months were tough – training the ground people and getting things organized. But once the crews got into their stride, the only real problem we had was the mud.”

Junior officer, RCAF: “The important thing was to get a place you could fly off and accommodation but roads and pathways were secondary. As long as you could get there and get the aircraft in the air and down again, that was number one.”

Heating station buildings and hangars provided other engineering challenges. In Alberta, many schools were heated with natural gas, abundant in the area. In Saskatchewan, special facilities were developed for burning lignite, a local fuel of low heat value and



BCATP station under construction

high ash residue. Thousands of tons of high-grade coal were consequently released for other critical needs. Hangars were designed to be useable at temperatures as low as -40 Celsius and, where required, curtains of high velocity hot air were provided at the doors to prevent the loss of warm inside air when the hangar doors were opened. One school was provided with a steam turbine plant that provided all electrical power as well as steam heat for all buildings in the camp.

Providing excellent fire protection equipment and constantly drilling station fire brigades paid dividends throughout the life of the Plan. Considering the material used for construction and the high fire hazards present in the hangars, it is remarkable that very little loss was accounted for by fire.



**35 Service Flying Training School near
North Battleford, Saskatchewan**

Daily Diary Number 13 EFTS, St Eugene, Ontario:

“November 5, 1941: The first fire since the Station’s inception occurred this morning when a tank of varsol caught fire from a hot piece of metal held too close to it. The engine shop room caught fire and one wall and the ceiling were burned to some extent. Prompt action by the fire brigade undoubtedly saved the hangar. The planes and flying equipment had been speedily taken out of the hangar and were never menaced.”

At the beginning of the Plan, existing airfields were the first to be used as training sites. To accommodate all of the schools, however, it was essential to build additional airfields throughout every province then in Canada. The Department of Transport was responsible for the construction of runways. When completed, runways at main aerodromes and relief fields would account for nearly 30,000,000 square meters of paved surface or the equivalent of a road six meters wide extending some 4,300 kilometers. In addition, great quantities of fill including rock, gravel and soil were required. Parking aprons, taxiways, perimeter tracks and access roadways were provided and upgraded as larger numbers of new aircraft became available.

Wilf Sadler: “In this country the only time we could work was in the summertime. You can’t build airports in the middle of winter. When I went to Swift Current the field was operating and we put in two additional hangars and additional taxi strips. The CO was a group captain who said we would be allowed to work between four in the afternoon and eight in the evening. I told him he had to be crazy. He was going to put me under arrest so I went to the weather office where there was a teletype and I got in touch with Robbie (Robbie Robertson, district airways inspector). About 15 minutes later a message came telling the CO to mind his own business. The air force is kind of an autocratic group and sometimes it issued orders to us that were kind of stupid. So we would call up Robbie and he would get some air marshal in Ottawa on the phone. The field commanders pretty soon found out who was the boss. They were interfering with our progress and that just wasn’t allowed. The thing was to move this forward and we did.”

Construction of the bases did not bring about an end of engineering requirements. During the life of the Plan, the RCAF was operating more plants of all kinds than any other organization in the country. Skilled personnel were at a premium and great difficulty was experienced obtaining supplies and spare parts. In addition, extensive maintenance was required to keep airfields operational in both summer and winter conditions. Seal coatings of the bituminous runways as well as other surface repairs and repairs to the sub-base of the runways was required. Extensive drainage systems had to be cleaned and repaired and thousands of acres of surrounding open spaces had to be seeded to grass. Winter conditions had to be addressed and methods instituted that would allow as little interruption as possible to flying brought about by heavy snow and blizzards. Special equipment was designed and procedures prepared to either compact the snow, remove snow from the runways or a combination of both. Nevertheless, some storms were of such monumental nature that all procedures had to be abandoned and in one case an entire school evacuated.

Daily Diary Number 13 EFTS St Eugene, Ontario: "March 16, 1943: Terrific high winds with snow. Station isolated by blocked roads. Power cut off to entire Station. Arrangements completed to send all trainees and staff with the exception of hospital staff and a few officers to Number 5 Manning Depot, Lachine, departing at 1800 hours. Two hundred fourteen personnel evacuated across the fields to the village of St Eugene. Every conceivable contraption to protect the faces of personnel was used and the entire detachment marched out single file. Looked like 'the retreat from Moscow'. Wind whipped up salt-like snow at terrific rate and made visibility practically nil. Power resumed partially at 1900 hours but still no heat. Foresight of evacuation confirmed."

RESULTS OF THE PLAN

The total of trainees from all sources entered on aircrew training from the inception of the Plan to its conclusion was 157,614. Graduates from RAF transferred schools, including Fleet Air Arm students, added another 5,296 trainees. Of these, 26,061 failed to graduate and were remustered to ground trades, discharged, transferred to the army or failed to graduate by March 31, 1945 due to delays in their training. The 10,000th graduation occurred in September 1941; the 50,000th graduation in April 1943; and the 100,000th graduation in June 1944. Most of the graduates received post-graduate training at operational training units in Canada or in the United Kingdom before being assigned to operational squadrons.

While training was in progress, 856 trainees and instructors lost their lives in accidents. On operations, more than half of BCATP graduates would be killed, taken prisoner or wounded.

Wilf Sadler: "I was working on an airfield in Estevan, Saskatchewan when the South Saskatchewan Regiment went into Dieppe. So I went and joined the army as a regular soldier as the quota for officers was full. I went back to work and told my boss, E F Cook, the district aero engineer, that I had joined the army. Turned out I hadn't joined because Cook wouldn't allow it. Then I moved to Swift Current and by God, along came recruiters from Regina. I went to Regina and resigned my job and then I joined the army. Cook had been a major in the army engineers in the first war and he told me if I had done any different he would have been very upset with me. I landed in Europe right after D Day. There were two Canadian road construction companies and we did stuff like airfields and clearing roads. We were moving all the time, keeping up with the advancing front. We went almost to Hamburg. I was in a jeep accident, lost control driving in the rain on slippery pavement and ran into a train. I've lived in a wheelchair ever since."

The cost of war is high.

CONCLUSION

The British Commonwealth Air Training Plan was the largest project ever undertaken by the Canadian government up to that time. It is viewed as one of Canada's most important contributions to the war effort. Involvement in air training and the commitment of trained Canadian aircrew to the Royal Air Force and the Royal Canadian Air Force pre-empted the possible need for the conscription of a large land-based army, as had been the case in World War I.

The contribution of civil engineers to the enterprise was enormous and ensured that a solid infrastructure was put in place that allowed the training of vast numbers of personnel. Little has been written about that contribution. Perhaps the placement of commemorative plaques in selected active airports in regions of the country could be a start to recognizing the work accomplished in this effort by the civil engineering community of the time.

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