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CRYSTAL TO IQALUIT – 75 YEARS OF PLANNING ENGINEERING AND BUILDING

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Abstract: The City of Iqaluit and its airfield is amongst a unique group of Canadian communities that originated entirely from a military presence, and reflects the origin of Louisbourg, and Kingston as strategic military hubs. From its origin as an airbase to serve the ferrying of aircraft from North America to Europe, Crystal II, then Frobisher Bay (1964), and finally Iqaluit (1987) has experienced 75 years of planning, engineering, and building. Iqaluit's modern origins began in July 1941, during the Battle of the Atlantic, with the investigation of the Frobisher Bay region for a potential site as part of a series of military airfields on the great circle route to Europe. A non-military direction for the community, and the airfield came with John Diefenbaker's 1958 grand vision for a domed community, but the grand vision disappeared when Diefenbaker lost power in 1962. Further community planning was completed in the years that followed, and these concepts were more realistic in the reflection of the climate, and terrain of the community. In 1963, the remaining military forces left, creating a Canadian government center, and a community in the eastern Arctic. Within the community itself, a central area became the community focus along with several surrounding residential areas. The community's infrastructure included a piped water and sewer system, which pioneered the use of insulated buried pipe, and steel manholes. Iqaluit became the capital of Nunavut territory, and it remains the gateway to the eastern Arctic, and an aviation resource for circumpolar air routes.

Keywords: - Iqaluit, Frobisher Bay, airfield, World War 2

1 Introduction

The City of Iqaluit, and its airfield is amongst a unique group of Canadian communities that originated entirely from a military presence, and not from some commercial venture, such as a trading post, or some government administrative venture. Iqaluit joins such venerable settlements as Louisbourg, and Kingston in Canadian history as strategic and administrative hubs. From its origin as an airbase to serve the ferrying of aircraft from North America to Europe, Crystal II, then Frobisher Bay (1964), and finally Iqaluit (1987) has experienced 75 years of planning, engineering and building.

The modern history of the region originated almost 450 years ago with the exploration of Martin Frobisher, and his apparent discovery of gold in 1576. The site of this early arctic mining misadventure, is only 190 kilometres to the south east. No significant exploration of the region advanced until C.F. Hall explored the region in the 1860, as part of the search for Sir John Franklin's lost expedition; he created the first rudimentary map of the area.

Another 80 years passed before the interest in the region once again emerged, with the Second World War and the battle of the Atlantic, through which the Allied Forces were suffering terrible losses from Nazi Germany's submarine fleet. A new mobilization plan for supplies, and aircraft in particular, was developed and

became known as the Crimson Route. The route would make use of the point of land at the south end of Baffin Island, which was on the great circle route to Europe, and would accommodate the leap frogging of fighter aircraft.

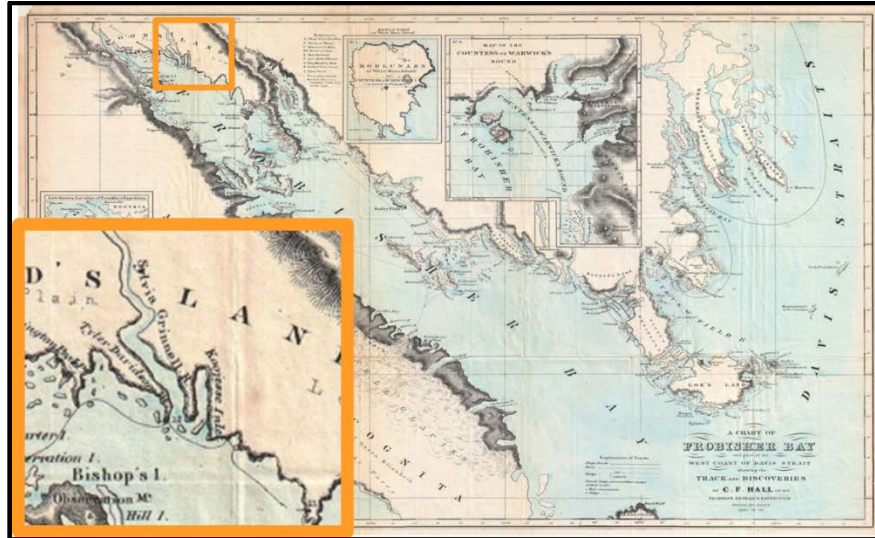


Figure 1: The map of CF Halls exploration in the 1860s was the only mapping available in 1941

During late July 1941, a United States Army Air Forces team investigated the Frobisher Bay region for a potential airfield. Ultimately a level meadow beside the community was selected as an airfield site. The base amenities consisted of the base accommodation, a hospital, and a sealift area, in addition to two runways. The construction was difficult, particularly since the military personnel had no experience in the construction in permafrost soils. A most interesting aspect of this venture was that this was a “secret” project in 1943.

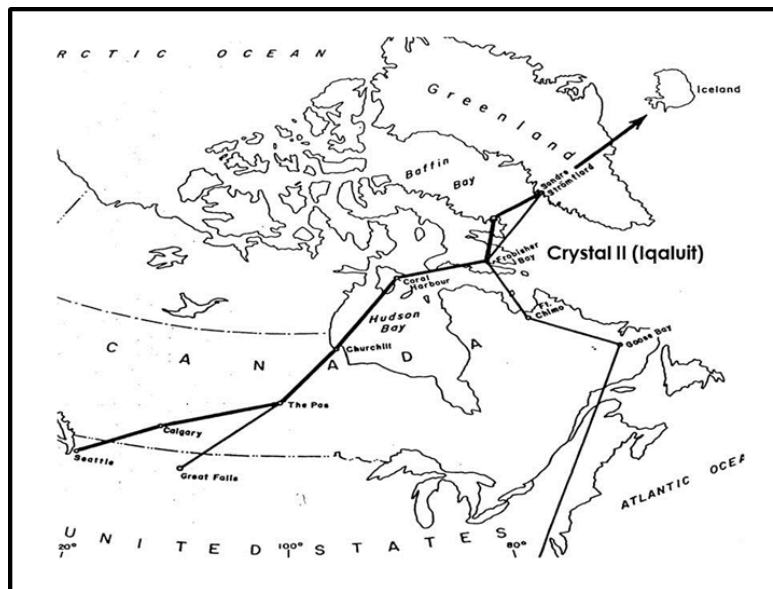


Figure 2. The “Crimson Route” of airfields across North America to Europe, included an airfield in Iqaluit.

2 Battle of the Atlantic and the Cold War

The Battle of the Atlantic turnaround in 1943 meant that the Crimson Route through the base became obsolete because the location was not particularly strategic. The airfield activity was reduced to weather, communications, and logistics duties, and ultimately the base was inactivated in 1950, functioning as a weather station only. In 1944, the airfield, and its associated amenities was purchased by the Canadian government for \$6.8 million.

The Americans moved back to the Canadian Department of Transport administered Frobisher Bay Airport in 1951 because the advantages of having high latitude airfields were realized with the possibility of an over the top attack from the Soviet Union. The US military reactivated the base in 1951, and Crystal II became known as Frobisher Bay Air Base. As part of the reactivation the US military extended the paved runway to 2750 metres (9,000 feet) for aerial tanker operations.

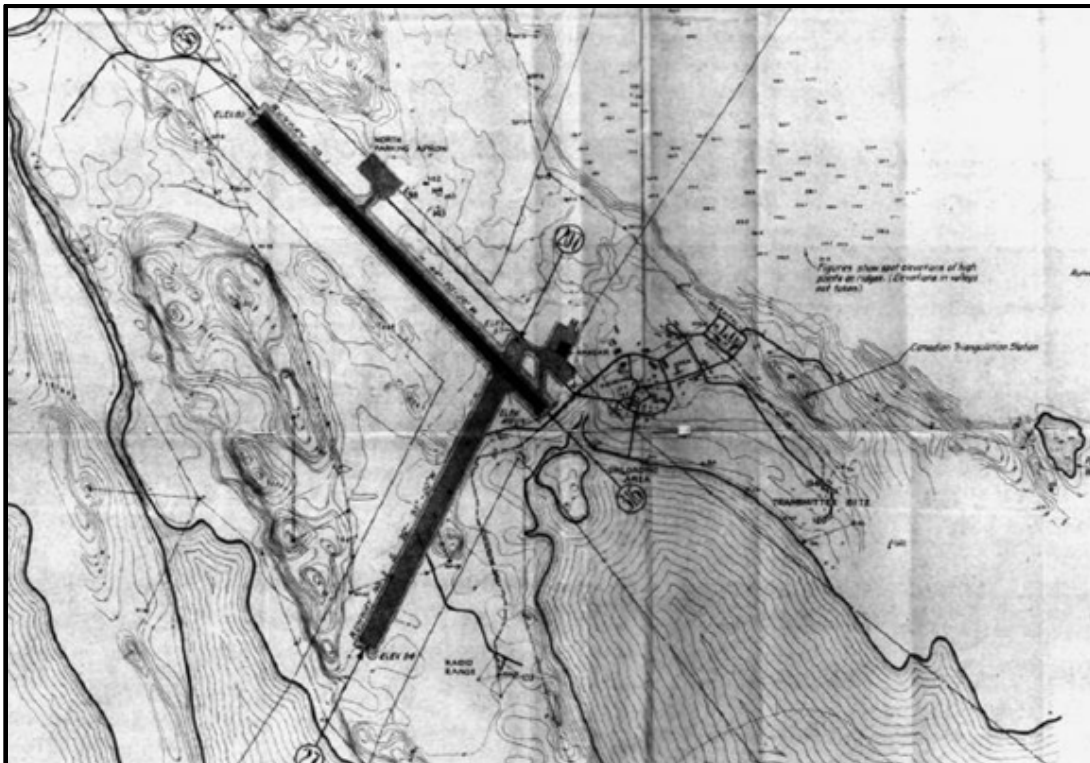


Figure 3: The airfield originally had 2 runways, however, once was unsuitable because of steep terrain

The airbase became a staging point for the construction of the DEW Line with materials sealifted to the airbase and then transported by air to DEW Line sites in the region. A DEW Line site at the base itself opened in 1957, and subsequently closed in 1961, ending the surveillance activity. In 1957, the community had a population of 1,200, with 489 being Inuit.

In nearby Ward Inlet, 10 kilometres south of the community, the Hudson's Bay Company had an outpost. In a strictly commercial venture, the HBC outpost moved in 1949 from Ward Inlet to the neighbouring River valley of Niaqunngut, officially called Apex, to take advantage of the commercial prospects at the airfield. The HBC could not relocate to the base itself because of its military status, so they settled on being 5 kilometres away.

As much as one would expect Frobisher Bay to be a backwater of military activity, the Cuban Missile Crisis in mid October 1962, proved that to be wrong. "Kennedy stood eyeball to eyeball with Khrushchev and Castro and demanded that all missiles be removed from Cuban soil. It was a volatile and demanding situation. The consequences were felt at Frobisher Bay with full military security action and lockdown. All secure points were established with fully armed personnel. Everyone was confronted by armed guards going to and from work, going to eat in the mess hall, and going back to upper base when day duties were finished." (excerpt from "A Good Pair of Boots and a Road to Walk On" by CH Evers.

CH Evers further described that "All transport, coming or going, came from Montreal, goods or personnel on a DC-3 twin-engine prop plane. It was not unusual for potential workers to be flown in from Montreal, step off the plane, turn around once, then board and fly back to Montreal on the same plane they flew in on."



Figure 4: The original hangar building at the airfield is still in use today

3 A Northern Vision

A new direction for the community came with John Diefenbaker's 1958 election campaign, when Dief announced his 'Northern Vision.' This was a strategy to extend Canadian nationhood to the Arctic and develop its natural resources for the benefit of all Canadians. The Department of Northern Affairs and National Development (DNANR) implemented the 'National Development Policy' and announced the 'Road to Resources' program.

In March 1958 a speech by the chief of the industrial arctic division of the DNANR was made regarding the redevelopment of Frobisher Bay (Iqaluit). "It will be the most revolutionary community in the country, perhaps on the continent. Today, architects and engineers are talking in terms of a new community shaped roughly like a snow flake. In the centre of the snow flake would be the stores, the newspaper and radio, the hotel and restaurants, the banks, the movie and cocktail lounge, and other small enterprises that go to make up a modern community of more than 4000 people. In the outer areas might be the accommodation unit reaching into the sky."

This futuristic plan for a domed city surrounded by residential towers had a price tag at the time of \$120 million, which would be at least one billion dollars today. In fact, residential towers around a central covered dome, was a totally impractical design for an arctic community, particularly given the extreme construction challenges of building on permafrost.

Following the shelving of the futuristic concept, a more modest “new town two” plan was developed; this concept was still based upon a sheltered environment from the harsh arctic temperatures. The grand vision came and went when Diefenbaker lost power in 1962. Further community planning was completed by Moshe Safdie in the years that followed, and these concepts were more realistic in the reflection of the climate, and terrain of the community.

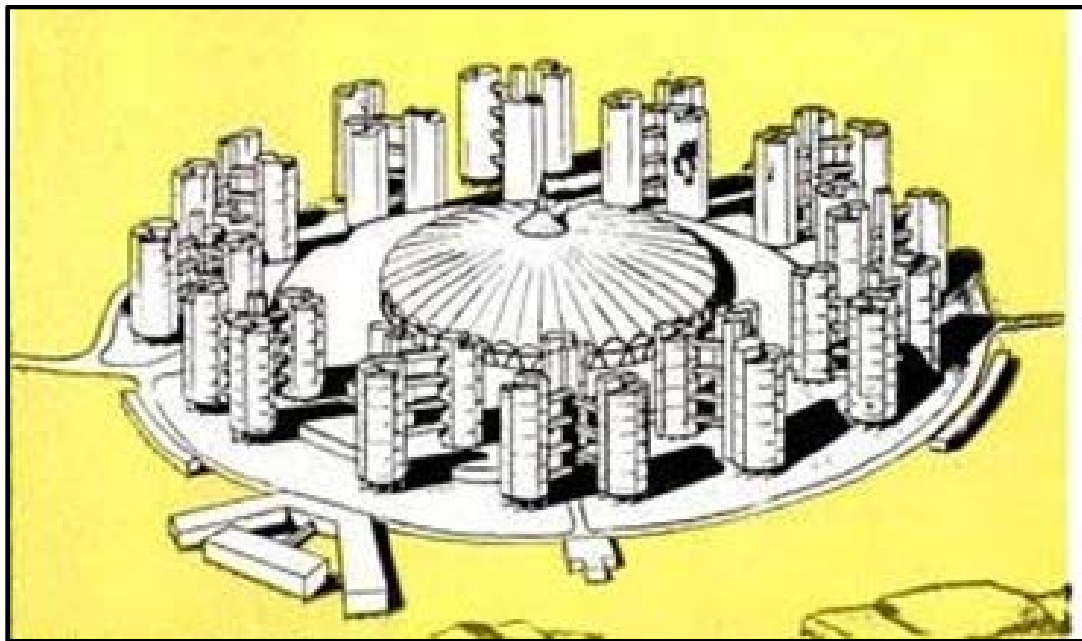


Figure 5: A dome community surrounded by apartment towers was envisioned in 1958

4 Community of Frobisher Bay

In 1963 the remaining military forces left, creating a Canadian government center for the eastern arctic. This was the action which ultimately transformed a military base into a community, with a legacy of the “bedroom community” of Apex, which was accessed by a road in 1955. During this period the overlying governance for the community changed from Ottawa to Yellowknife, when Yellowknife became the territorial capital in 1967. This changed the previous north-south working relationship to an east-west working relationship. Frobisher Bay reported to Yellowknife, which created an ongoing tension until the Nunavut Territory was created in 1999.

Within the community itself, a central area called Astro Hill became the community focus in the late sixties, and a satellite residential area was connected with a sheltered corridor to the “White Row” housing. The limited residential neighborhoods included the “Lower Base” and Iqaluit with “k” instead of a “q”. The community’s infrastructure included a water supply originating from a lake above the community, and a sewage collection system that discharged into the inlet. Only the Astro Hill neighbourhood had piped services, with the remainder of the community on trucked services.

In the mid 1980's planning occurred for a new expansion area, with a major residential development design, which would be substantially served with a piped system that employed a buried system of insulated plastic pipe and steel manholes. The original naming of the new development was quite "literal", and the neighbourhood name of the "New Expansion Area" stuck. With time this literal name was replaced with neighbourhood names of Tundra Valley, Tundra Ridge, and Legoland. The New Expansion Area began to build out in the 1990's to create the first large unique neighbourhood in Iqaluit.



Figure 6: The Astro Hill complex was the community centre for many years

5 Water and Sanitation

The oldest existing water supply infrastructure in Iqaluit dates back to the early Cold War. Specifically, the water treatment plant and the Lake Geraldine water storage date from DEW Line era of the late 1950's. In fact, the original drawings for these facilities carry the approval of the USAF. The water treatment plant was constructed adjacent to the power plant that provided both electrical power and heat. The supply watermain was shared by the water and power plants, and cooling water from the power plant generators was returned to the lake. This shared intake arrangement assured flow in the supply main and tempered the influent water prior to treatment. Water was conveyed from the water treatment to connected users via a system of aboveground utilidors and pipelines. The design and operating criteria of this era was "Heat 'er good and keep 'er flowing."

Beyond the innovations of improved materials and buried piping, the servicing of the 1970's recognized the merits of looping, especially as a means to facilitate circulation. As with all evolutionary processes, the later phases represent a better implementation of the concept of looping and circulation. A reheat, and recirculation station was constructed as a freeze prevention measure.

All of the fundamental concepts incorporated into the design of water systems in harsh climates were in place at the end of the 1970's. This included buried high density polyethylene pre-insulated piping installed as a looped system with reheat and recirculation. The only innovation of the 1980's was the application of steel manholes, which are still in use 30 years later.

The infrastructure resembled a large scale plumbing system; the Government of the Northwest Territories owned the entire system and all the system users were government related bodies. In the mid 80's the system expanded from the hospital neighbourhood towards the airport, into Happy Valley, and along Apex Road. The community officially became the Town of Iqaluit in 1987, and water and sewer system was turned over to the town after considerable negotiations, and considerable expense.

Despite being the least favoured freeze prevention technique, bleeding remains the freeze prevention technique for limited portions of the water distribution system. Bleeding is also used in occasion by the operating staff as a contingency technique to resolve localized problems, especially during mid-winter conditions.



Figure 7: Iqaluit's water and sewer system pioneered the use of insulated HDPE pipe

6 Capital of Nunavut

In the approach to the creation of the Nunavut territory in 1999, the Town of Iqaluit had to fight for the right to be the territorial capital, competing against the regional centres of Rankin Inlet and Cambridge Bay. Iqaluit won out, which created a phenomenal boom in the community, with a growth estimate to 5000 people ultimately becoming 6600 people. The housing in the New Expansion Area took on a modern look reflecting the maturation from a regional center to a territorial capital.

Considerable multifamily residential housing was also developed, and once again Iqaluit remained quite literal with one multifamily development nicknamed "lego land". In the mid 80's the system expanded from the area of the just hospital towards the airport, into Happy Valley, and along Apex Road.

The economy of Iqaluit remains entirely government based, and the capital infrastructure plans for the community total almost \$500 million, which includes a \$300 million airport expansion that is nearly completion. Other anticipated capital projects include a deep water port, a wastewater treatment facility and a landfill facility.

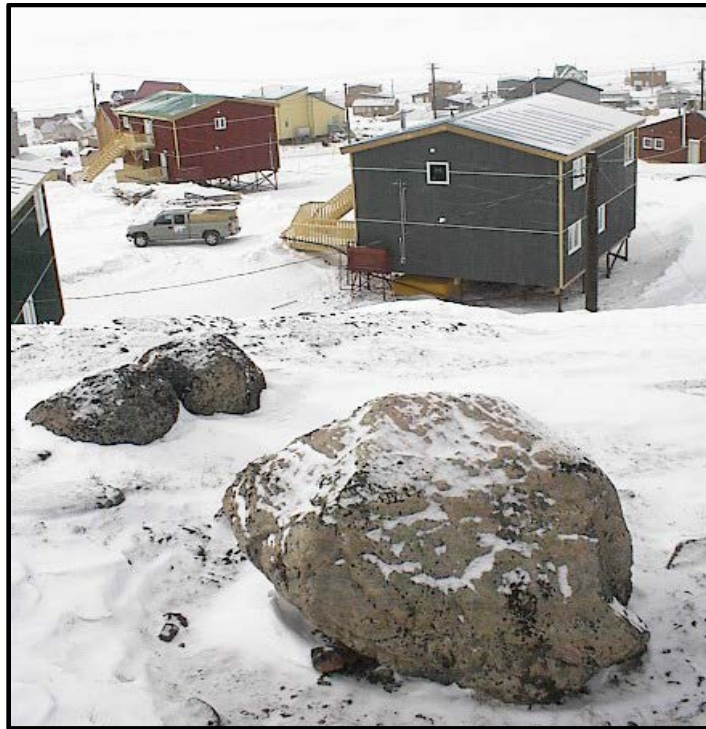


Figure 8: Tundra Ridge area residential development in Iqaluit

As much as the community itself now dominates the landscape around Iqaluit, air transport remains one of the largest private sector employers in Iqaluit and Nunavut. Iqaluit is also important on a global aviation scale because polar routes from eastern North America to Asia, and western North America to Europe are within 600 kilometres, which makes the airfield an alternative landing site for any aviation emergency. The polar route location, cold climate and runway size also make an ideal destination for aircraft testing, which Iqaluit has regular experienced. In January 2016, Airbus hopped over Greenland from Europe to cold weather test a new engine for the A320, and in February 2017 a Swissair flight from Europe made an emergency landing in Iqaluit because of the loss of power in one engine.

Iqaluit is uniquely a “big city” with features of the community, such as 200 cars per kilometre of road, which compete with the number for Singapore. As much as Iqaluit is a “big city” in the context of the Nunavut Territory, the community remains an arctic community at heart on the edge of a frontier. How many capital cities can boast about the occasional polar bear walking through town?