The arctic has been the focus of architects and urban designers since the early 20th century. Ranging from the design of climate-responsive buildings (e.g. Decker, 2010, Matus, 1988), new eco-utopian towns (Projet D'urbanisation…de Norilsk, 1967; Culjat, 1975; Marcus, 2007) to industrial or military complexes and cities (e.g., Jull, 2008; Farish, 2009; Ritchot, 2011), the typology of arctic urbanism is a legacy of political and economic cycles competing against geographical and environmental inertia. Nowhere is this more evident than in the North America and Russian arctic, which have experienced vastly different trajectories of development. In order to frame the future of the arctic as a result of climate change, increasing globalization, natural resource extraction, and demographic shifts (Smith, 2010) it is important to first understand the history of efforts to urbanize this last frontier. Toward this goal, this paper will briefly review the typologies of North American and Russian arctic cities, with specific focus on Resolute Bay, Canada and Norilsk, Russia; the first being a small military and scientific outpost on Cornwallis Island and the latter a major industrial metropolis in the Siberian arctic. Both cities have served historically as sites for experimentation on new models of arctic urbanization (Marcus, 2007; Slabuha, 2007).

Fig. 1. Resolute Bay, Nunavut.

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The North American arctic is characterized as a vast realm of tundra and boreal forest, with a loose collection of isolated small cities, towns and villages scattered in coastal areas and developed as military bases, mining interests, scientific observatories, and administrative or shipping hubs. Irrespective of population and size, the typology of development is one of *suburbanized north*: low density, single family detached homes with yards and driveways, a scattering of administrative, commercial, cultural buildings, schools, above-ground infrastructure and utilidors, and an adjacent airport and small dock for connecting the city to the outside world.

In addition, there is in general a bi-modal demographic distribution between indigenous and non-indigenous inhabitants, with the non-indigenous inhabitants working in government, social services, military, or scientific sectors. From the largest cities of Iqaluit, Nunanvut (Can.; pop. 7500) and Barrow, Alaska (USA; pop. 4500), to the smallest settlements like Resolute Bay (Can.; pop. 250), the form and organization of these cities is surprisingly similar (Fig. 1).

There have been attempts in the past to create more compact, efficient, structured, and modernized settlements in the North American arctic (e.g., Farish, 2009; Culjat, 1975) but they have either been abandoned or met with limited success. Possibly the most influential and controversial project is architect Ralph Erskine’s design for a new town in Resolute Bay. Due to improved economic conditions and a rise in oil revenues in the 1970’s, Resolute Bay became a major supply base for the high Arctic. With new economic stimulus, the Canadian government sought to resolve longstanding social problems with the Inuit who had been relocated to Resolute Bay. Prostitution and alcoholism was commonplace, with the Inuit living off discarded materials from the airbase (Marcus, 2007). In response, a paradigmatic enterprise was initiated by the Canadian government to provide a new modernist architectural and social design for the town. Ralph Erskine, an architect best known for his climate responsive buildings and social housing (e.g. Byker Wall; Collymore 1982), was commissioned for the project in the early 1970s, with the mandate to racially integrate the Inuit community (240 people) with the transient white population (250-600 people), to improve the quality of life for the residents, and to be able to accommodate an increase in town population of 2000-3000 people (Culjat, 1975).

Erskine’s design consisted of an inhabited wall structure, raised above the permafrost on pilings and bent into a horseshoe-shaped ring, encircled detached family housing units in the center and resembled a medieval walled town (see Fig. 2, Marcus, 2007). The Inuit would inhabit the houses in the center - resulting from moving their existing Inuit community from the shoreline 8km away—and the wall structure would contain apartment units for non-indigenous people, an enclosed communal area with shops, restaurant, and a library. A swimming pool and an indoor botanical garden would be attached to the apex of the horseshoe and sealed off from the climate by a bubble roof (Culjat, 1975). A principle feature of Erskine’s design was the semi-enclosed wall structure to act as fortification against the elements, creating a microclimate and intending to protect the interior houses from prevailing winds.
Fig. 2. Early (1958) early prototype drawing of Erskine’s walled city design that would be commissioned for Resolute Bay in the early 1970’s.

Besides the odd social arrangement of white inhabitants encircling the Inuit in the new town, the perimeter wall structure of Erskine’s design did not offer ideal conditions for Inuit culture and the arctic climate (Marcus, 2007). Where Inuit traditionally locate their settlements adjacent to water for ready access to boats used for hunting and fishing, the new location reduced Inuit engagement with natural environment, promoting greater reliance on food offered in the new town shops. As Harold Strub, the former chief architect of the Northwest Territories writes: “at high latitudes…one requirement for siting remains uncontested: the proximity to the water edge. At least one edge of the settlement must reach the sea” (Strub, 1996). The wall itself posed additional problems. Where the whites are very eager to get wind shelter, “wind is a part of arctic life”. Wind provides an essential component of clearing snow, and the introduction of an enclosed wall would only encouraged the snow to pile up in the center of the town where the Inuit were living. This knowledge of the arctic environment was clear in the Inuit’s earlier shoreline settlement, which allowed easy penetration of winds. After relocating the Inuit homes and beginning the construction of the perimeter wall, the project was abandoned in 1978.

Efforts to urbanize the North American arctic are in striking contrast to Russia, which has developed its northern frontier at an entirely different scale and urban density. Cities such as Murmansk (pop 307,000), Norilsk (pop 175,000), and Yakutsk (pop 269,600) are almost 40 times larger than any other city in the arctic; despite being as remote and isolated as the North American arctic. Murmansk is by far the largest arctic city and shipping/military port in the world,
Norilsk is the largest industrial town based on mining and resource extraction, and is disconnected from the “mainland” of Russia by over a thousand miles of tundra and boreal forest. Almost as extreme as its climate and isolation, Norilsk has an almost radical form of urbanization (Fig. 3) in the mode of Hilberseimer’s High Rise City (Hilberseimer, 1944), and conjures up Oscar Neimeyer’s design for Brasilia in the remote amazon jungle (Fraser, 2000). In addition, Norilsk is also ranked above Chernobyl as one of the most polluted cities on the planet (Blacksmith Inst. Report, 2007).

![Norilsk, Russia.](image)

Situated in the permafrost of the arctic tundra and as remote as towns like Barrow and Resolute Bay in North America, Norilsk originated as a small industrial town in 1935, and grew in size and scale rapidly under Stalin’s forced labor and designation of the city as a GULAG from 1935-1956 (Gregory and Lazarev, 2003; Helque, 2004; Sharapova and Richardson, 2007). In 1940, with a population of 70,000 - most of whom were prisoners - a masterplan for a new district in the city was designed and built, led by architect V. Nepokoychitsky, who had ambitions to establish an organic connection of the city to the natural environment (Slabuha, 2007). Whereas the earlier (old city) had been built on bedrock, the new city was built on permafrost and required experimentation and invention of new construction techniques by Nepokoychitsky and his colleagues, with many buildings collapsing or sinking into the permafrost during this process (Stryuchkov, 2013).

One of the characteristic features of Norilsk architecture is a repetitive module of monolithic five story housing blocks raised off the permafrost to form semi-enclosed courtyards, a rational
street grid demarcated by a strong central axis, and an organic network of urban and industrial infrastructure. With the apartment block design and urban strategy, Nepokoychitsky had intended to create enclosures and deflection of winds and blowing snow. Additionally, his ambition extended to the creation of glass-domed courtyards over sections of the city in order to generate interior spaces and microclimates, but these were never built (Zamyatin, 2005). This typology bears some resemblance to what would later become Erksine’s design for an inhabited wall structure as an urban barrier condition in England (Byker Wall; Collymore 1982) and for creating arctic environmental protection, microclimates, and increase social well-being in Resolute Bay in Northern Canada (Culjat, 1975).

From the 1960’s to the 1980’s many new large scale public facilities in Norilsk were built as well as calls for new designs that would allow expansion and densification of the city (Slabuha, 2007; Gunina, S. and M. Andriyuk, 2012). In 1965, the Soviet Council of Architects organized a competition for the design of a new urban quarter for 50,000 people in the southwest of Norilsk on the bank of Lake Dolgogo (Projet D’urbanisation…de Norilsk, 1967). The winning design by architects Trouschinsch and Schipkov [Fig. 4], focused on the idea that the quality of life of the residents in Norilsk was key to a sustainable northern city (from a social and economic standpoint). Their proposal consisted of three new typologies of urban structures: a continuous 16 story tall inhabited wall of about 16m width and up to 1000m in length, a monolithic five story rectangular block of about 150x45m in plan, and a 26 floor pyramid structure of about 150mx150m.

The proposed inhabited wall building was similar to the existing typology of Norilsk apartment blocks, but Trouschinsch and Schipkov had stretched these buildings in length to create a longer physical barrier against snow and wind, much as Erskine had proposed with his horseshoe-design wall structure for Resolute Bay in 1973. In addition, they included an internal public “street” along the length of the building to improve the quality of life for the residents by enabling the potential for social interaction. The rectangular block and pyramid buildings were arrayed adjacent to the inhabited wall, with both having hybrid program typologies and deeper floorplates compared to existing Norilsk buildings. Exterior envelopes were also tuned for available sunlight (Slabuha, 2007). With a mixture of apartments, cultural, social, and educational program components as well as interior gardens, these buildings attempted an urban experiment by juxtaposing large building floor areas (on the order of 150,000 m2) with compactness and interior microclimates for generating greater social potential via interior urban environments, and energy efficiency by layering and juxtaposing program components. These projects were never built, but they showed a new direction for the design of arctic cities that was shared in common with their North American and European counterparts.

What is important about Norilsk and other Russian arctic cities is that they were built and populated with brute force and at odds with economic, environmental, or human cost (Sharapova and Richardson, 2007, Helque, 2004). They show, in essence, what an arctic city could be if there is sufficient pressure to overcome the environmental and economic inertia. They also provide alternate scenarios of North American arctic development. As Pressman (1996) outlines in his summary of approaches to the design of sustainable winter cities, the
negative impacts of climate must be reduced and its beneficial characteristics enhanced via design principles such as compact urban form, energy-efficient principles, and the economic and social well-being of the inhabitants. This is in essence what Erskin, Trouschinsch and Schipkov were attempting to accomplish with their visions for Resolute Bay and Norilsk. The question now is finding a balance between an environmentally sustainable city in the arctic and one that is also socially and economically resilient.
Fig. 4. Design for an expansion of Norilsk by 50,000 residents. Trouschinsch and Schipkov 1965.

References


