Trans-Arctic Urbanism: Toward a New North

The dual forces of globalization and climate change are combining to rapidly transform the Arctic. With increasing temperature, retreating sea ice and permafrost, and the opening up of new shipping routes and opportunities for natural resource exploration, the arctic is poised to become a network of development and human migration as this new frontier is reshaped.[1] The typology of existing urbanization of the arctic is in large part a legacy of political and economic cycles competing against geographical and environmental inertia.[2,3,4,5,6,7]

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Nowhere is this more evident than in the North America and Russian arctic, which have historically experienced vastly different trajectories of development. In order to frame the future of the arctic in the face of current economic, climatic and demographic pressures, 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 comparing Resolute, Canada and Norilsk, Russia (Fig. 1); the first being a small military and scientific outpost on a remote island and the latter a major industrial metropolis in the Siberian arctic. Both cities have served as sites for urban design experimentation on social and environmental integration and, despite their difference in scale and vastly different political, economic, cultural, and geographic contexts, show a legacy of interconnected set of design principles.

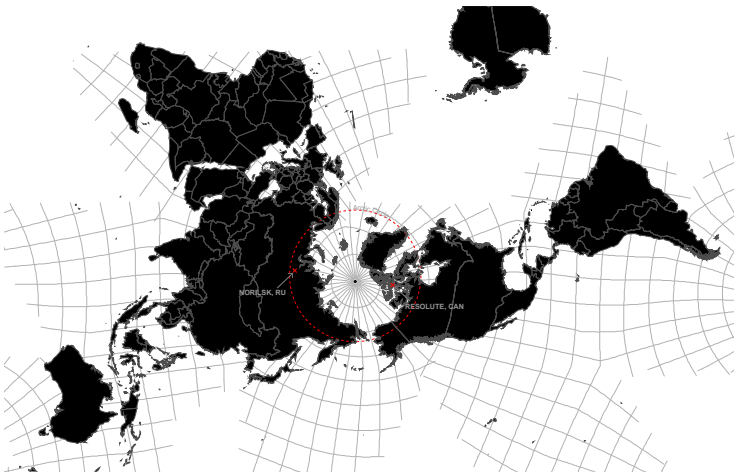

Figure 1: World Map with locations of Resolute (CANADA), and Norilsk (RUSSIA).

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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 (Canada; pop. 7500) and Barrow, Alaska (USA; pop. 4500), to the smallest settlements like Resolute (Canada; pop. 250), the form and organization of these towns is surprisingly similar (Figure 2).

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There have been attempts in the past to create more compact, efficient, structured, and modernized settlements in the North American arctic (e.g., Figures 2 and 3) 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, in northern Canada. 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 accommodate an influx of two to three thousand new workers and to resolve longstanding social problems with the Inuit who had been relocated to the town. Prostitution and alcoholism was commonplace, with the

Figure 2: Resolute Bay, Nunavut (photo taken by Ansgar Walk, 1997).

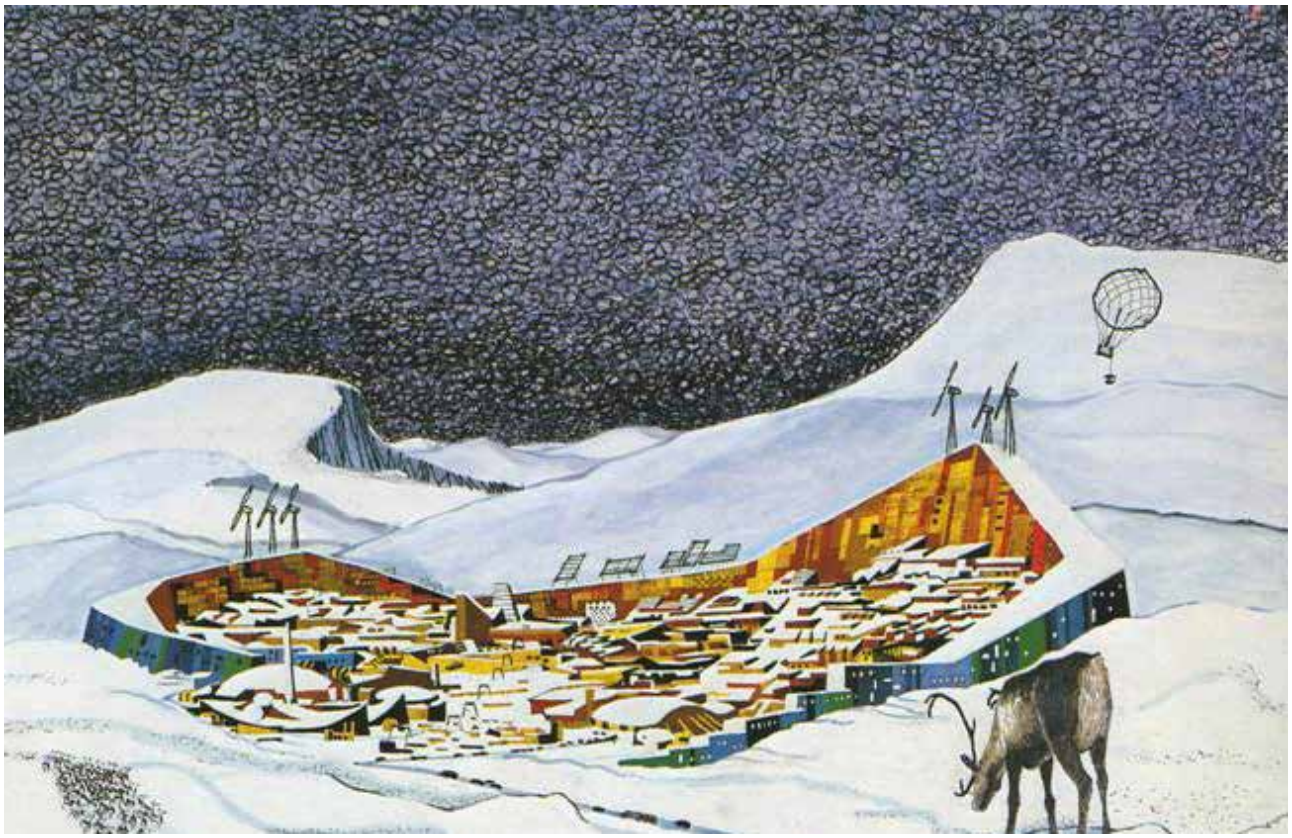

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Figure 3: Early (1958) early prototype drawing of Erskine's walled city design that would be commissioned for Resolute Bay in the early 1970's.[9]

Inuit living off discarded materials from the airbase.[4] 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),[7] was commissioned for the project in the early 1970s, with the mandate to racially integrate the Inuit community with the transient white population, to improve the quality of life for the residents, and to be able to accommodate an ten fold increase in town population of migrant workers.[1]

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 (Figure 3).[3] The Inuit would inhabit the houses in the center - resulting from moving their existing Inuit community from the shoreline 8 km 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.[2] 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.

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.[4] 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:

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"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."[9] 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 encourage 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 more remote and isolated. Murmansk is by far the largest arctic city and shipping/military port in the world, dwarfing any of its North American counterparts. Norilsk is the largest industrial town based on mining and resource extraction, and is disconnected from the "mainland" of Russia by one thousand miles of tundra and boreal forest. Almost as extreme as its climate and isolation, Norilsk has an almost radical form of urbanization (Figure 4) in the mode of Hilberseimer's High Rise City,[11] and conjures up Oscar Neimeyer's design for Brasilia in the remote amazon jungle.[12] In addition, Norilsk is ranked above Chernobyl as one of the most polluted cities on the planet.[13]

Situated in the permafrost of the arctic tundra and similarly 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.[14,15,16] 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

Figure 4: Norislk, Russia.

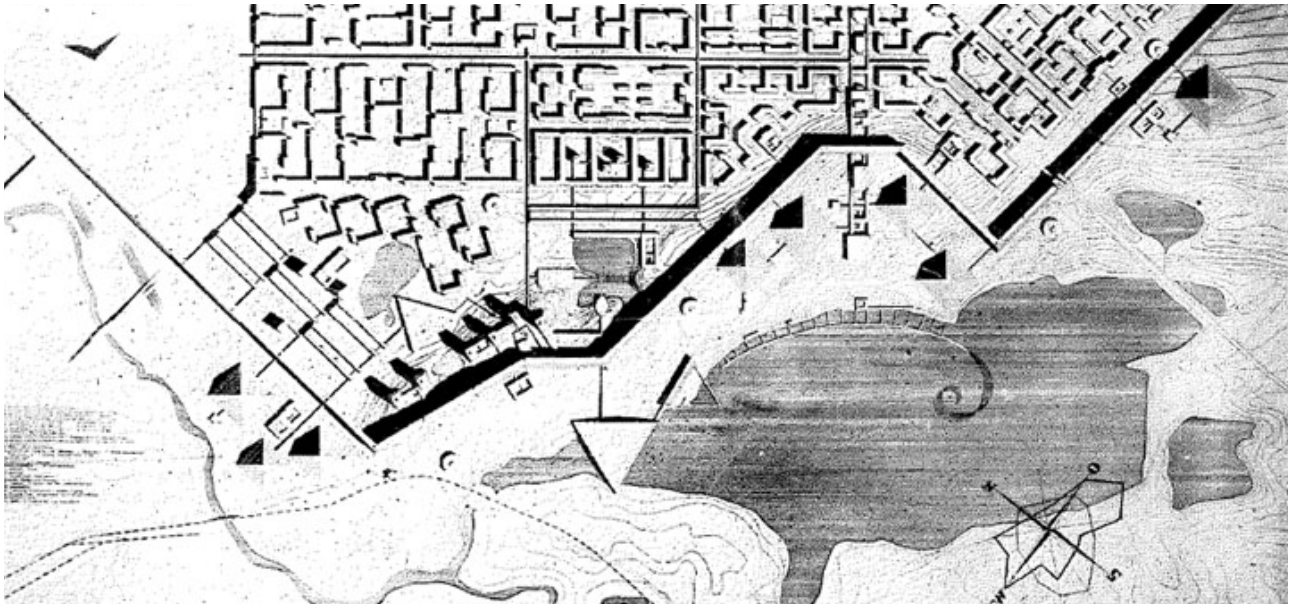

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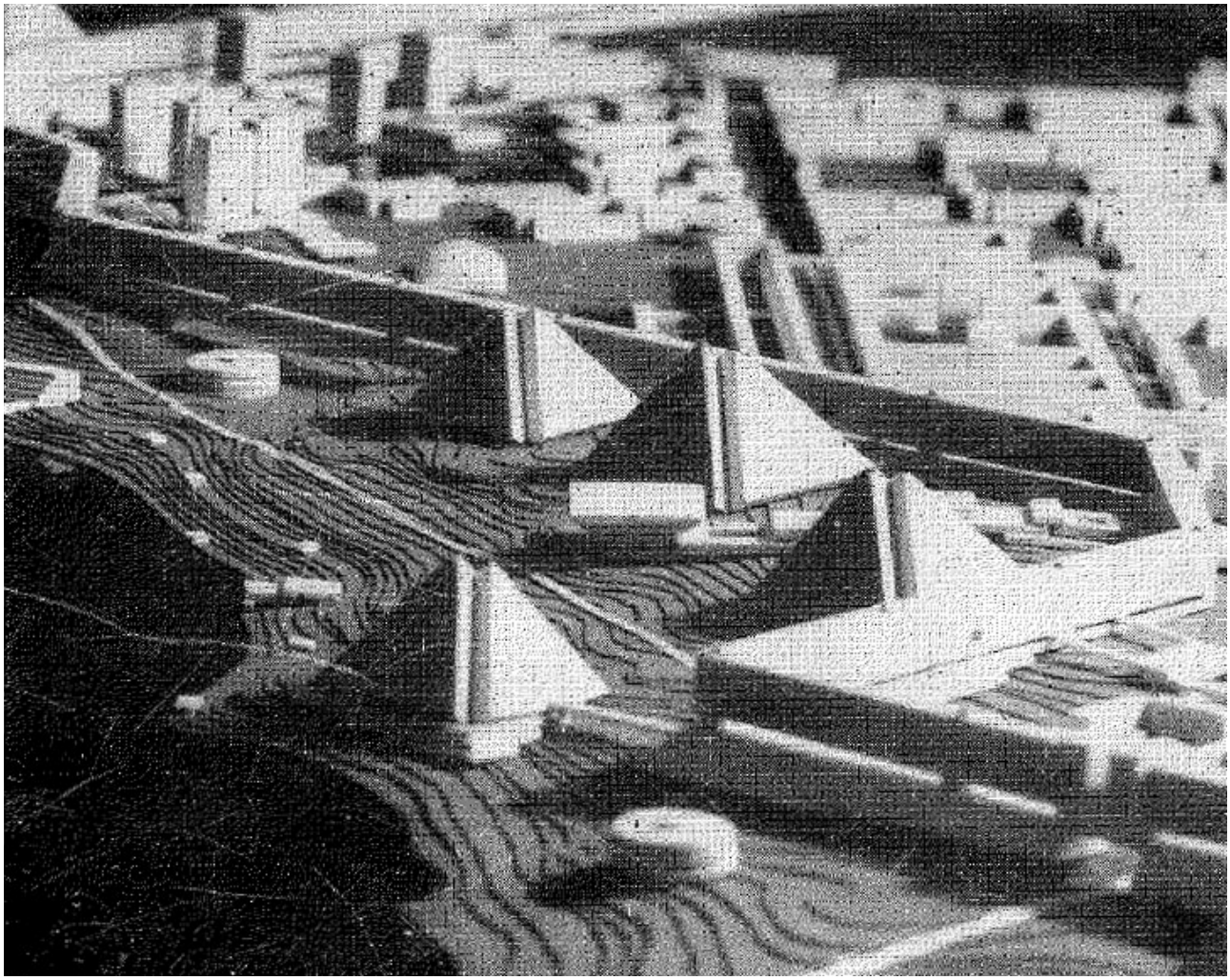
Figure 5: Design for an expansion of Norilsk by 50,000 residents . Trouschinsch and Schipkov, 1965.

environment.[17] 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.[18]

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.[19] This typology bears resemblance to what would later become Erksine's design for an inhabited wall structure as an urban barrier condition in England (Byker Wall)[8] and for creating arctic environmental protection, microclimates, and increase social well-being in Resolute Bay in Northern Canada.[2]

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.[17,20] 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.[20] The winning design by architects Trouschinsch and Schipkov [Figure 5], focused on the idea that the quality of life of the residents in Norislk 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 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 horshoe-design wall structure for Resolute Bay in 1973. In addition, they included an internal public "street" along the length of



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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, and both had hybrid program typologies and deeper floorplates compared to existing Norislk buildings. Exterior envelopes were also tuned for available sunlight.[17] 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 similar to Erskine's urban experiment in northern Canada.

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.[15,16] 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[21] 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

Figure 6: Scale model for winning design for an expansion of Norilsk by 50,000 residents . Trouschinsch and Schipkov, 1965.

ENDNOTES

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the inhabitants. This is in essence what Erskin, Trouschinsch and Schipkov were attempting to accomplish with their visions for Resolute Bay and Norilsk. What is also remarkable is the degree to which there existed an exchange of ideas between Erskine - and architect known for his social and ecological ambitions of integration - and the Soviet arctic planners and architects at the time. The question now is finding a balance between an environmentally sustainable city in the arctic and one that is also socially and economically resilient.

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