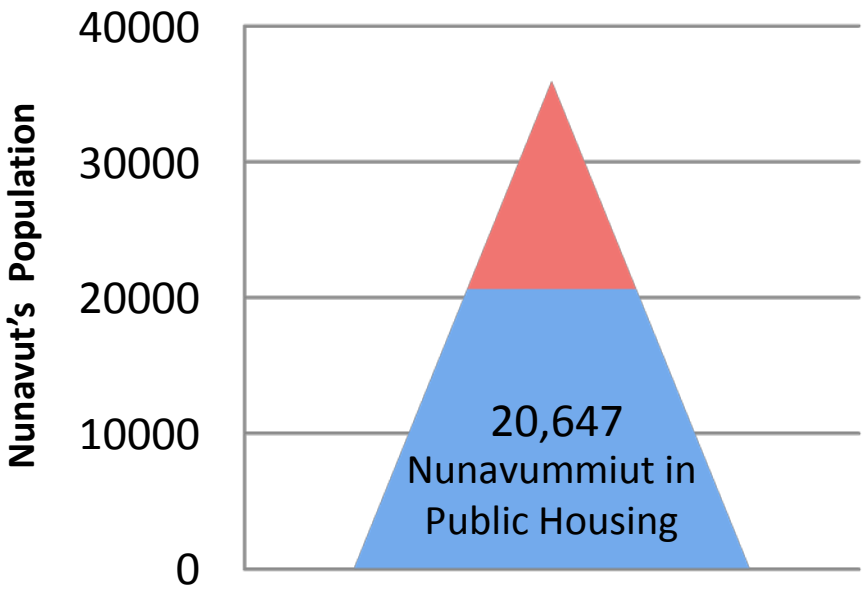
BACKGROUND

What We Build



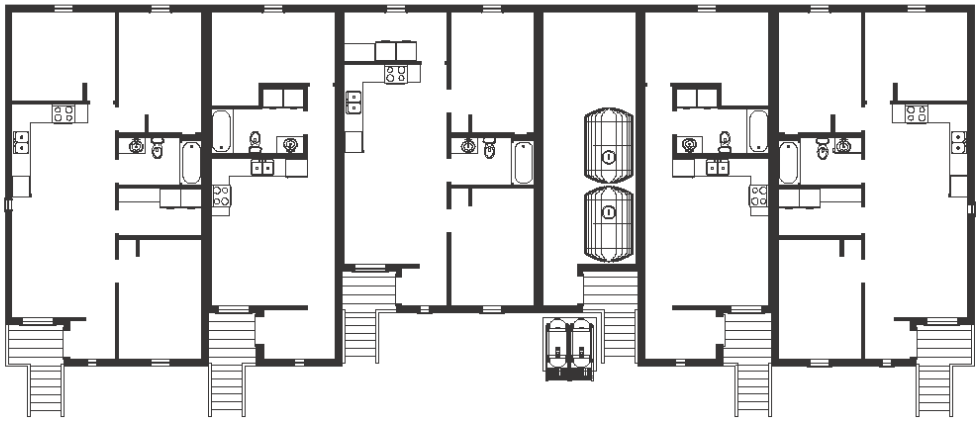
- The NHC currently provides service to 20,647 Public Housing Tenants, through an inventory of 5,431 units
- This amounts to 57% of Nunavut's population (35,944) currently living in Public Housing

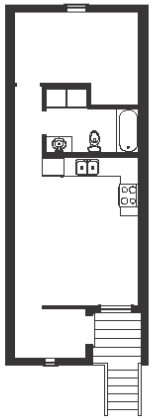
Annual New Public Housing Construction of at least 90 units just to keep pace with population growth

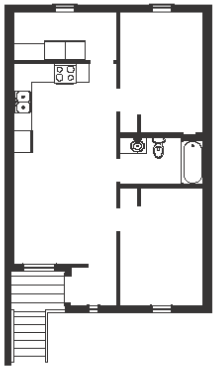
- NHC estimates a gap of over **3,000 units** to meet current housing need, and an additional 90 units per year to keep pace with Nunavut's rapidly growing population
- While costs vary by community, the average cost of a new public housing unit is between $400,000 and $550,000
- One of the ways that NHC works to mitigate these costs is through the use of multi-plex units

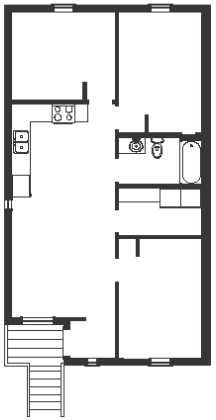
Construction costs in Nunavut average 3x higher than the cost to build the same structure in the Greater Toronto Area

Standard 5-Plex Design to increase Density





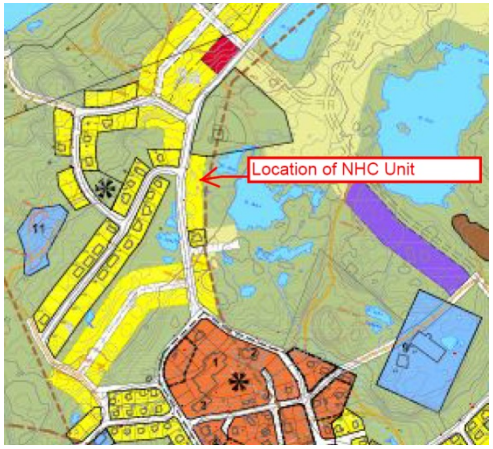




5-Plex Features

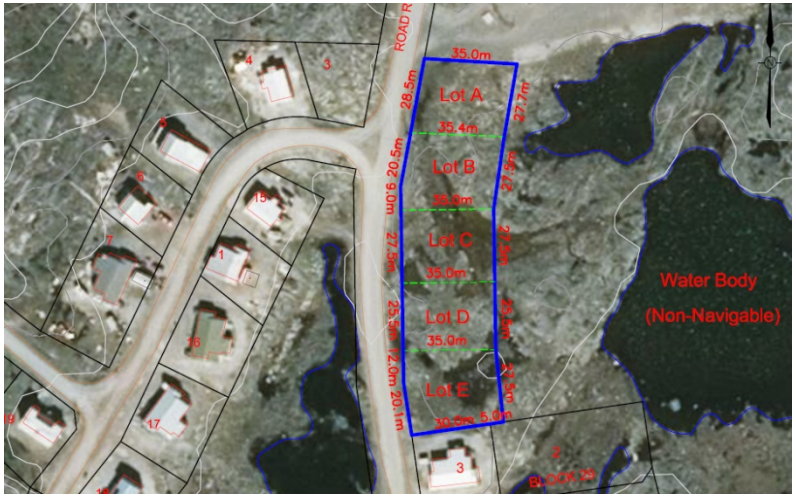
- In the past, NHC primarily constructed single-family dwellings for use in the Public Housing program. Over time, this has shifted to a standardized 5-plex model for a variety of reasons:
  - **Cost**– The 5-plex design reduces the material cost of construction by eliminating repetition. A single roof and foundation, and 4 exterior walls result in 5 units rather than 1
  - **Time** – Construction time is reduced by using a single site for multi unit builds. One team building multiple units at a time maximizes Nunavut's short construction season
  - **Environmental Factors** – The 5-plex design supports centralized water and sewer systems, housed in a central, heated room. While reducing the cost of installing individual systems in each unit, this carries an additional benefit of eliminating exterior sewer tanks, which are much more prone to freezing and damage

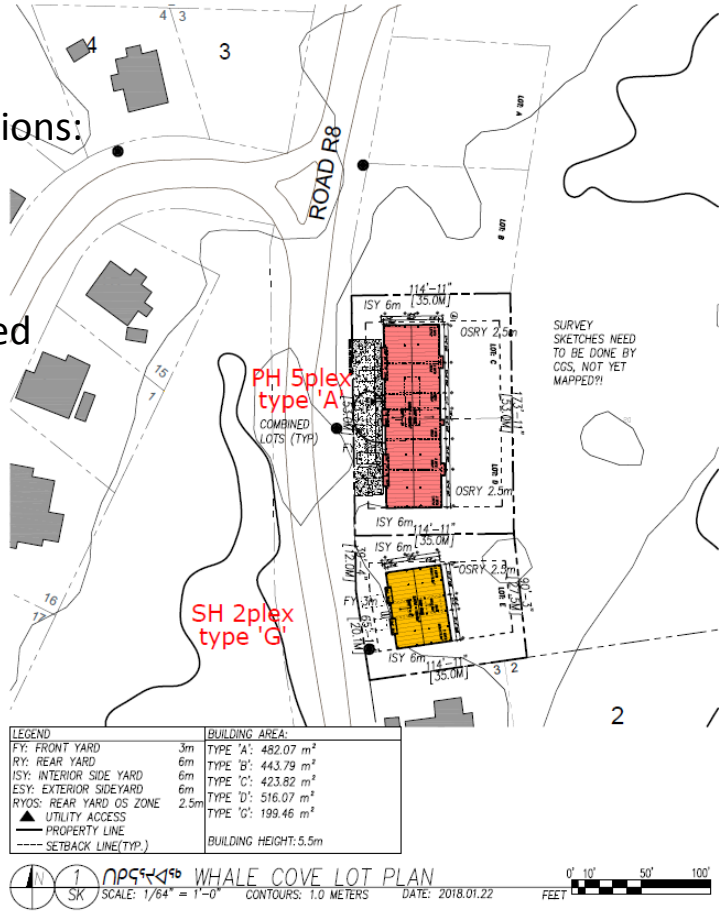
Community Plans – Developed Lots



Bldg. Planning Expectations:

- Road Access
- Power line
- Site features defined
- Site limitations defined





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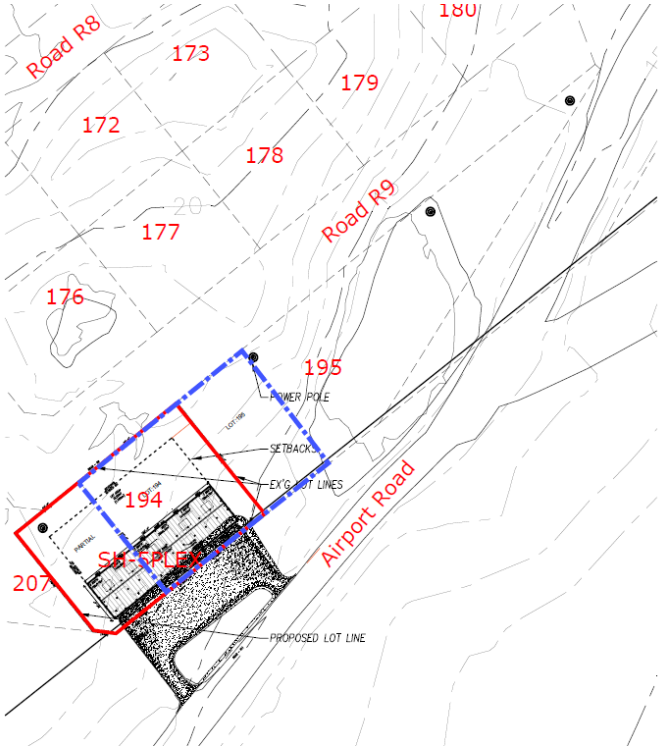

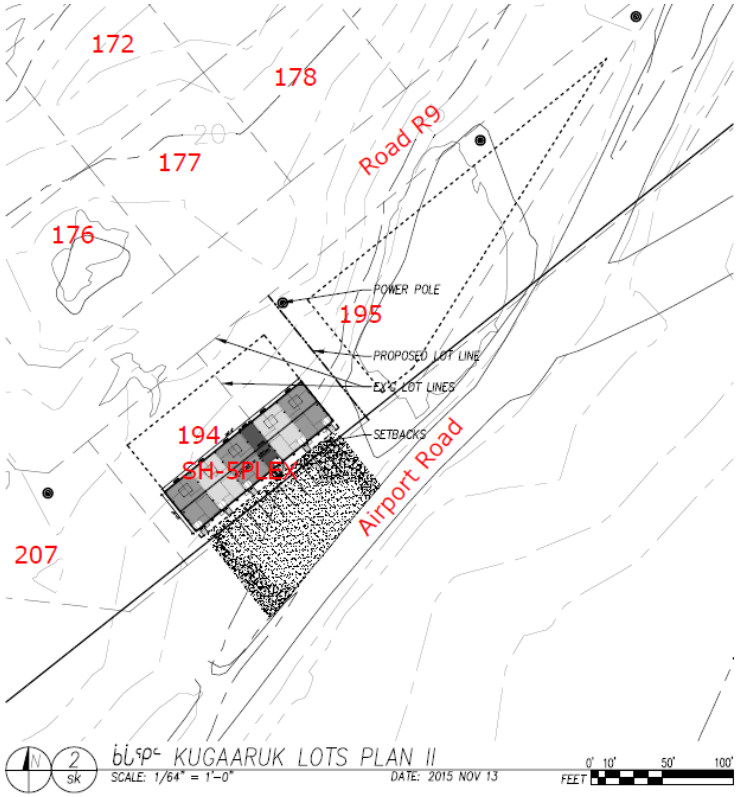

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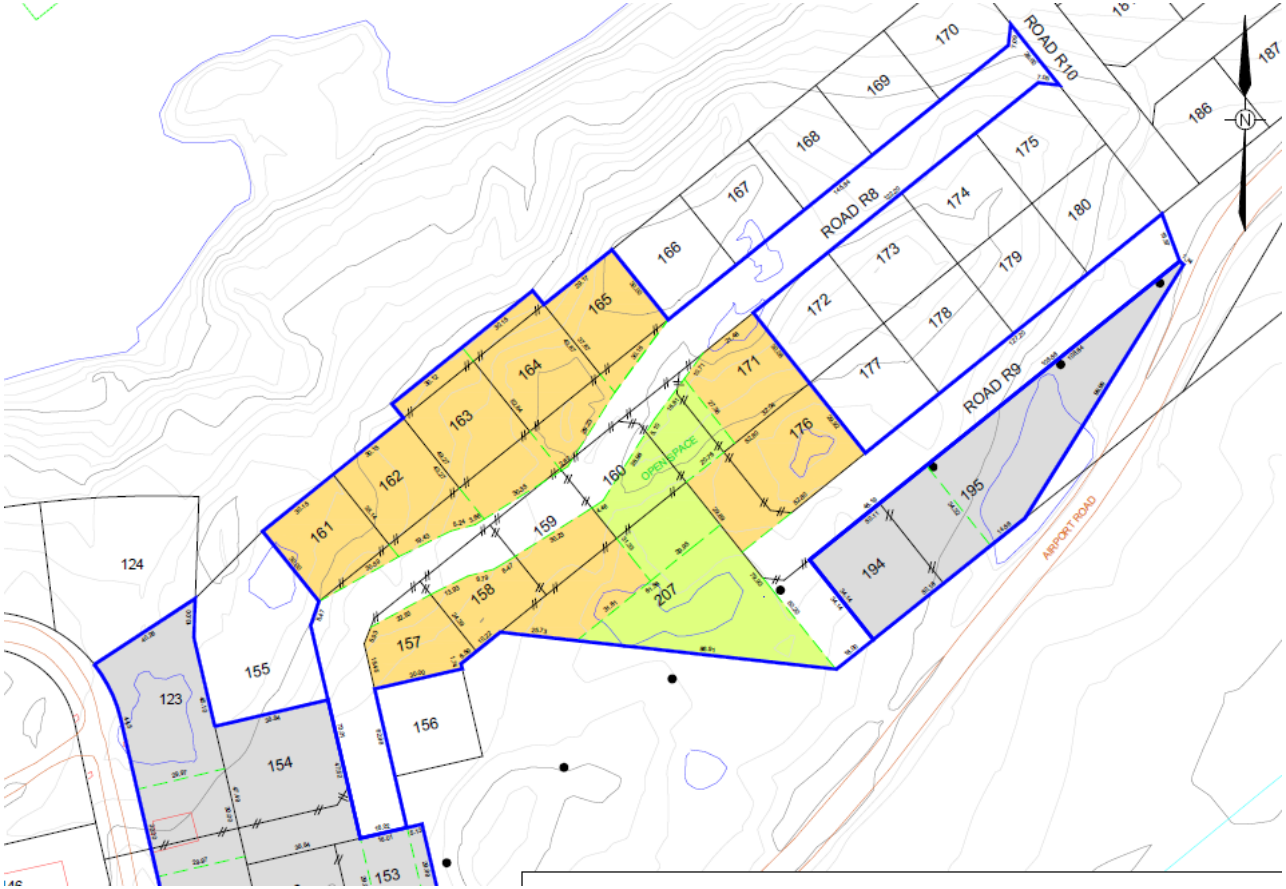

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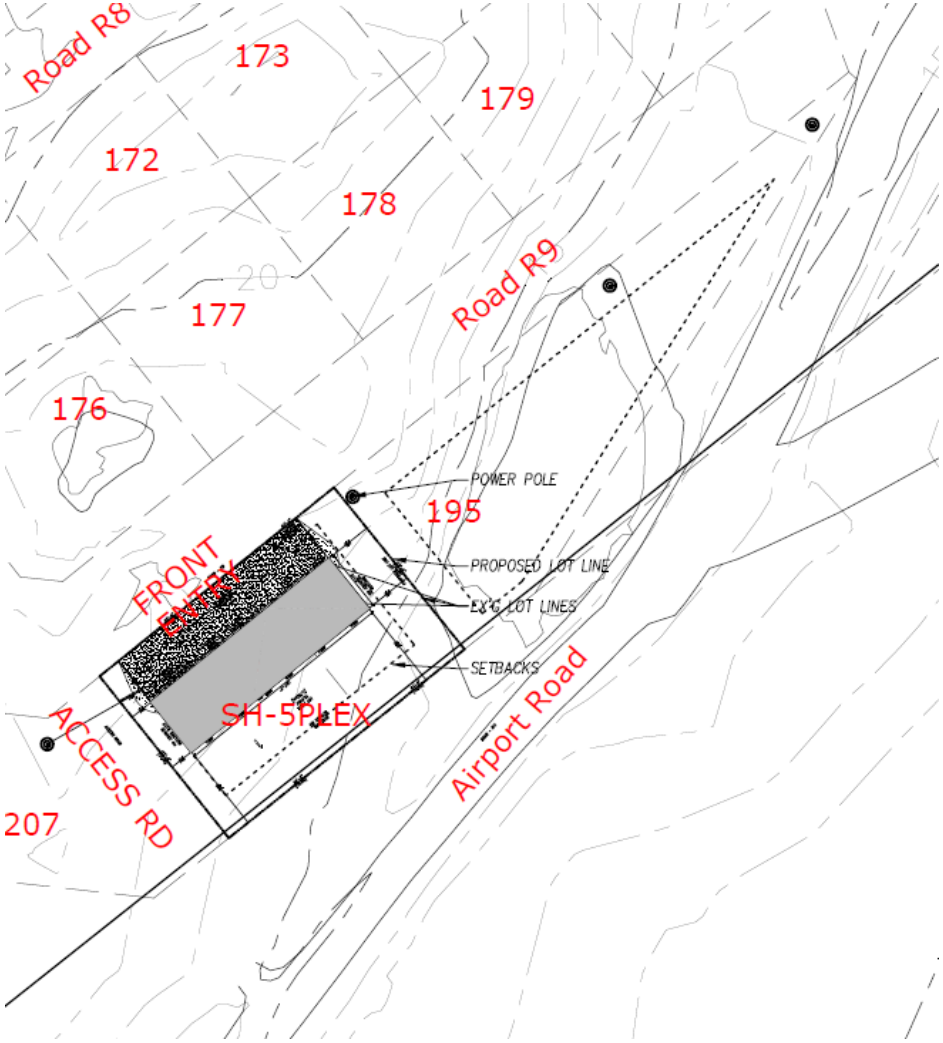
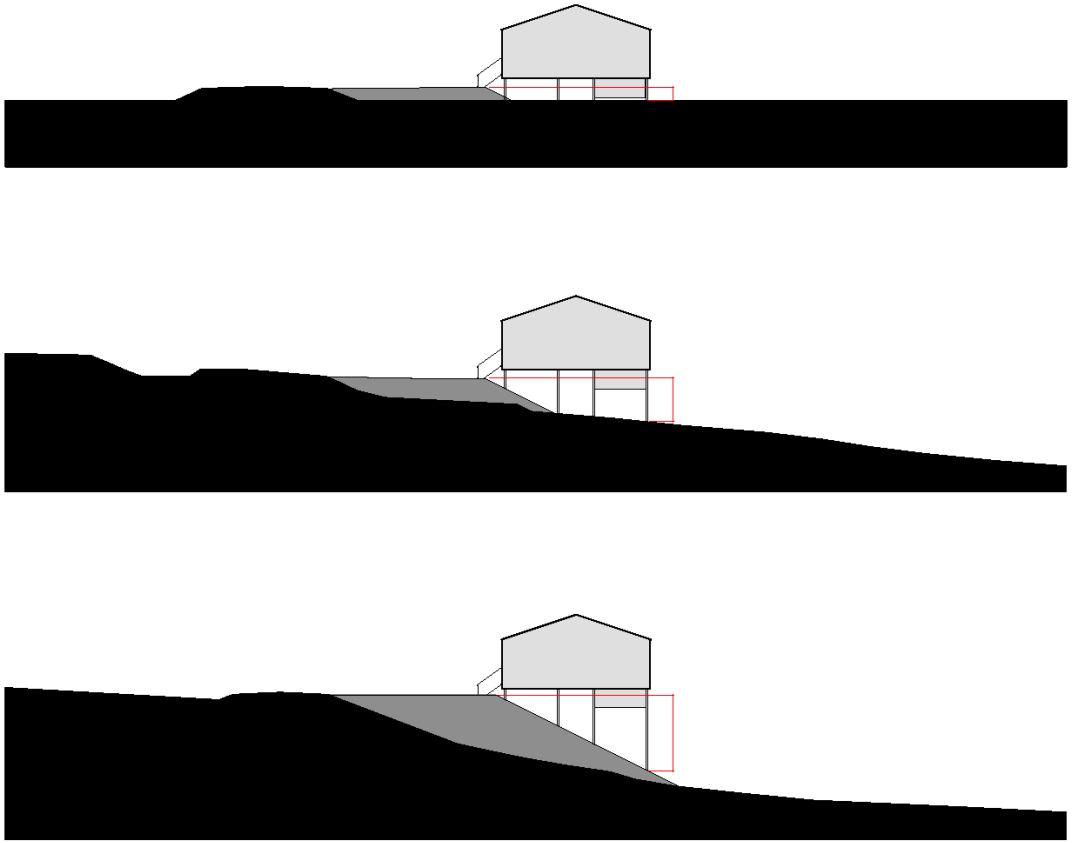


Road vs Site Elevations

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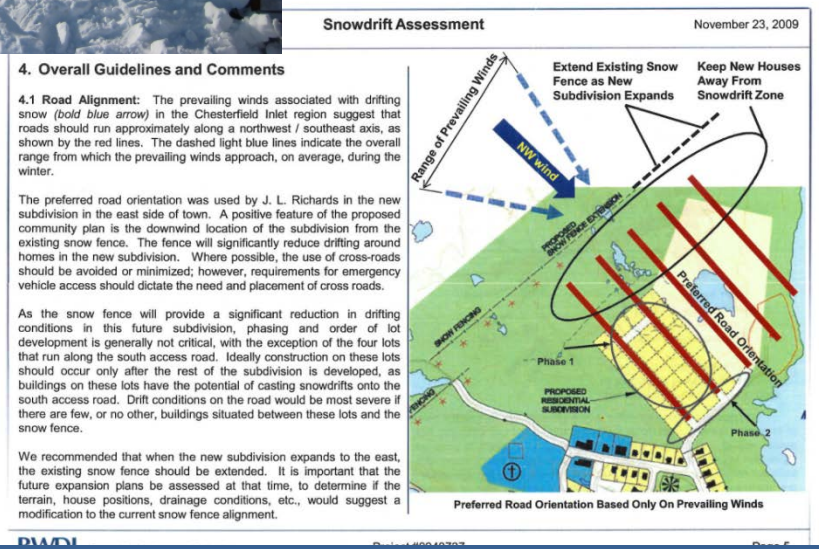
Drainage

SNOW DRIFTING



Snowdrift Assessment November 23, 2009

4. Overall Guidelines and Comments

4.1 Road Alignment: The prevailing winds associated with drifting snow *(bold blue arrow)* in the Chesterfield Inlet region suggest that roads should run approximately along a northwest / southeast axis, as shown by the red lines. The dashed light blue lines indicate the overall range from which the prevailing winds approach, on average, during the winter.

The preferred road orientation was used by J. L. Richards in the new subdivision in the east side of town. A positive feature of the proposed community plan is the downwind location of the subdivision from the existing snow fence. The fence will significantly reduce drifting around homes in the new subdivision. Where possible, the use of cross-roads should be avoided or minimized; however, requirements for emergency vehicle access should dictate the need and placement of cross roads.

As the snow fence will provide a significant reduction in drifting conditions in this future subdivision, phasing and order of lot development is generally not critical, with the exception of the four lots that run along the south access road. Ideally construction on these lots should occur only after the rest of the subdivision is developed, as buildings on these lots have the potential of casting snowdrifts onto the south access road. Drift conditions on the road would be most severe if there are few, or no other, buildings situated between these lots and the snow fence.

We recommended that when the new subdivision expands to the east, the existing snow fence should be extended. It is important that the future expansion plans be assessed at that time, to determine if the terrain, house positions, drainage conditions, etc., would suggest a modification to the current snow fence alignment.

Preferred Road Orientation Based Only On Prevailing Winds

Building on Permafrost

- Due to Nunavut's climate and Geography, many NHC builds are constructed on permafrost
- NHC uses a variety of foundation types to account for both current and anticipated future permafrost conditions
- The decision to use a particular foundation is made based on a desktop study of community-specific core samples. Contractors adapt their designs based on the appropriate study and the existing site conditions.

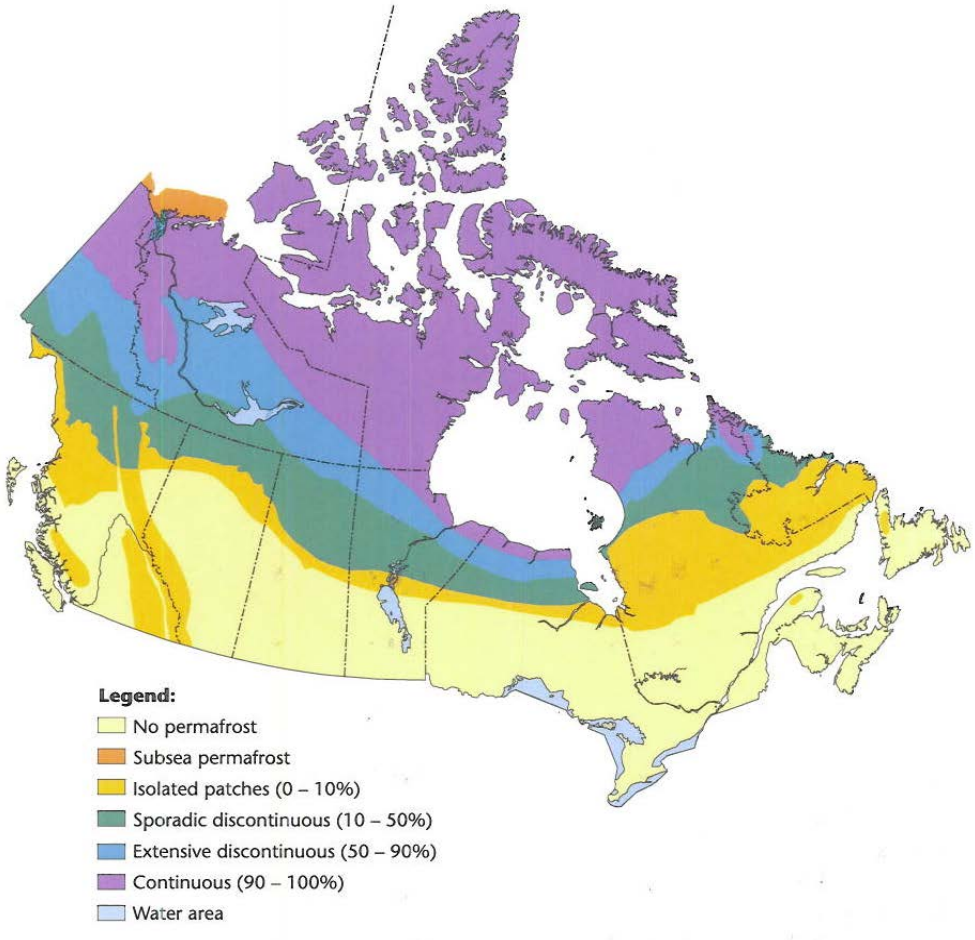


Figure 2.1
Continuous, discontinuous, and sporadic permafrost zones of Canada

Steel Piles

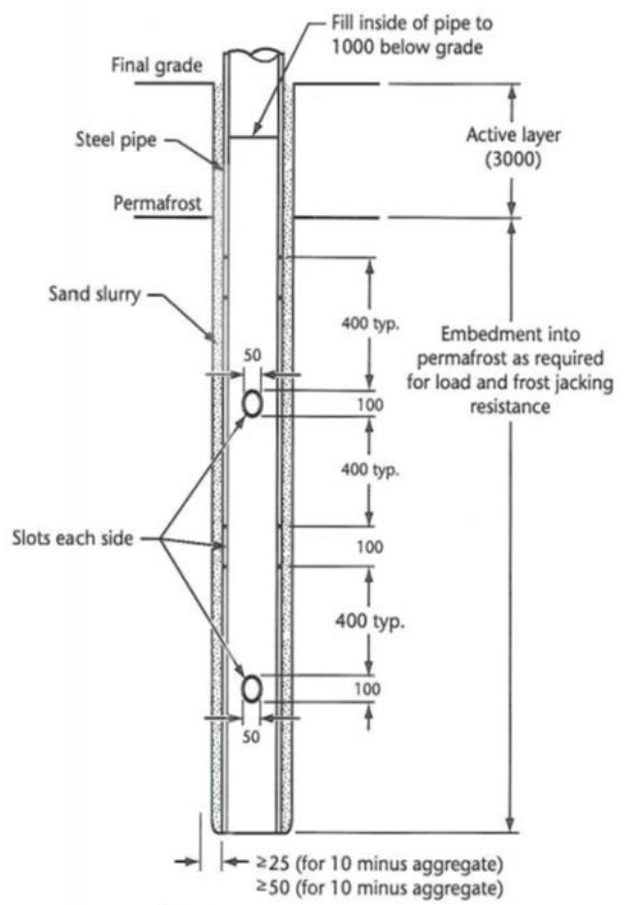


Figure 4.6
Sketch of an adfreeze pile installed in permafrost

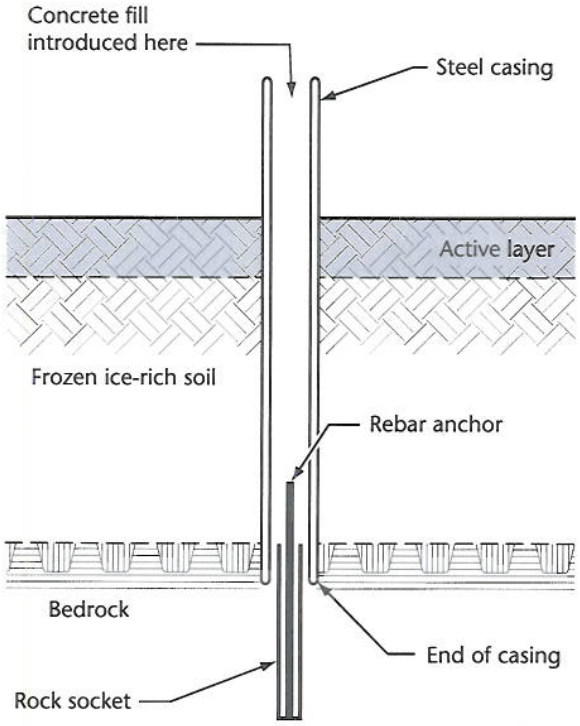


Figure 4.7
Rock-socketed pile secured in bedrock

On-Grade Foundations

Based on underground conditions or other factors, on-grade foundations (e.g. space-frame or screw jack) may be the best option.

Space frame foundation in Rankin Inlet (2015)

State of the Art vs State of the Industry

- Nunavut's remoteness and extreme climate present unique infrastructural challenges, and require unique solutions, which state of the art technologies often cannot provide.
- The uptake of industry-leading technologies can be prohibitive for a number of reasons:
  - **Logistics**: Remoteness is the reality in every Nunavut community. Many communities do not have hardware stores, or other means of easily accessing specific materials. This presents a significant logistical challenge in maintaining systems which require specialized components
  - **Skills and Training**: Systems and technologies which require specialized training to install and maintain become unviable options given Nunavut's lack of skilled tradespersons, and accessible training programs
  - **Lifecycle Cost**: While many emerging technologies may be installed at a lower initial cost, for the reasons noted above, this cost increases greatly over the lifecycle of the system where regular and specific maintenance is required

Development is Guided by the Community Plan