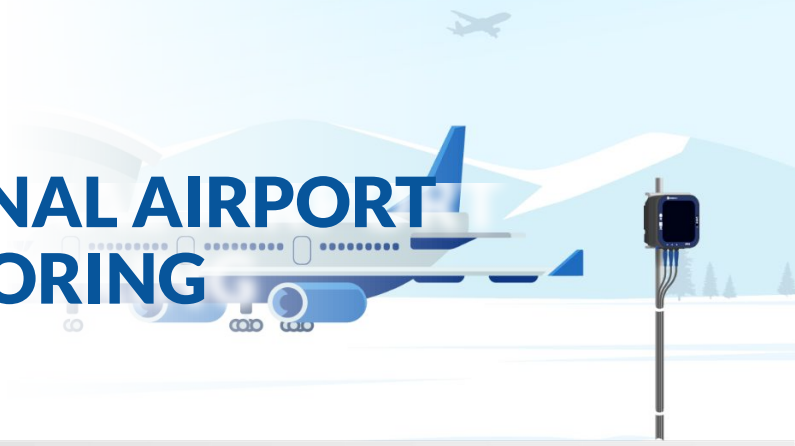
beadedstream

IQALUIT INTERNATIONAL AIRPORT FOUNDATION MONITORING

CASE STUDY



INFRASTRUCTURE

Arctic Foundations of Canada

Iqaluit, Nunavut, Canada

ARCTIC FOUNDATIONS OF CANADA

COLD

Monitoring the performance of thermosyphons installed under the new terminal and services building at Iqaluit Airport was critical to understanding the temperature of the permafrost under the buildings. Thaw of this permafrost can lead to differential settlement of infrastructure, causing costly damage to critical infrastructure.

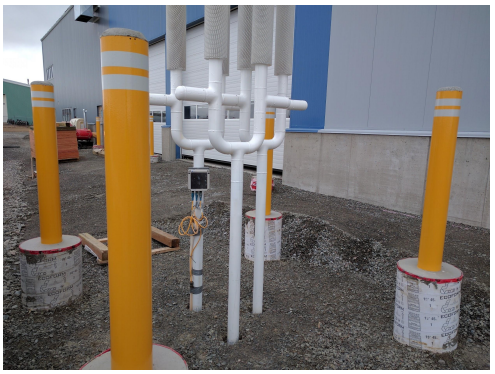
***beaded**stream supplied digital temperature cables and direct-to-orbit data loggers for stakeholders to monitor performance in real-time both during construction and operation.*

Application

The new airport terminal and services building at Iqaluit International Airport were to be constructed on permafrost. Changing climate conditions have led to permafrost thaw, which can lead to damaging differential settlement of northern infrastructure such as airports. To prevent permafrost thaw under the new buildings, passive thermosyphons were used to circulate cool air in loops embedded in the foundation. The airport is a critical piece of infrastructure for the remote community that relies on it.

beadedstream Solution

To monitor the heat transfer through the thermosyphons over time, a monitoring system was required both during construction and operation of the buildings. Arctic Foundations of Canada installed 14 digital temperature cables horizontally adjacent the thermosyphon loops and vertically into the ground. These cables had 5 to 35 sensors each.



D505 Logger mounted on a thermosyphon with Digital Temperature Cables connected.

The cables were terminated to 4 D405 Data Loggers with direct-to-orbit telemetry. The data was accessible via a web browser to stakeholders via the **beaded**cloud application for quick and easy viewing of the latest data.

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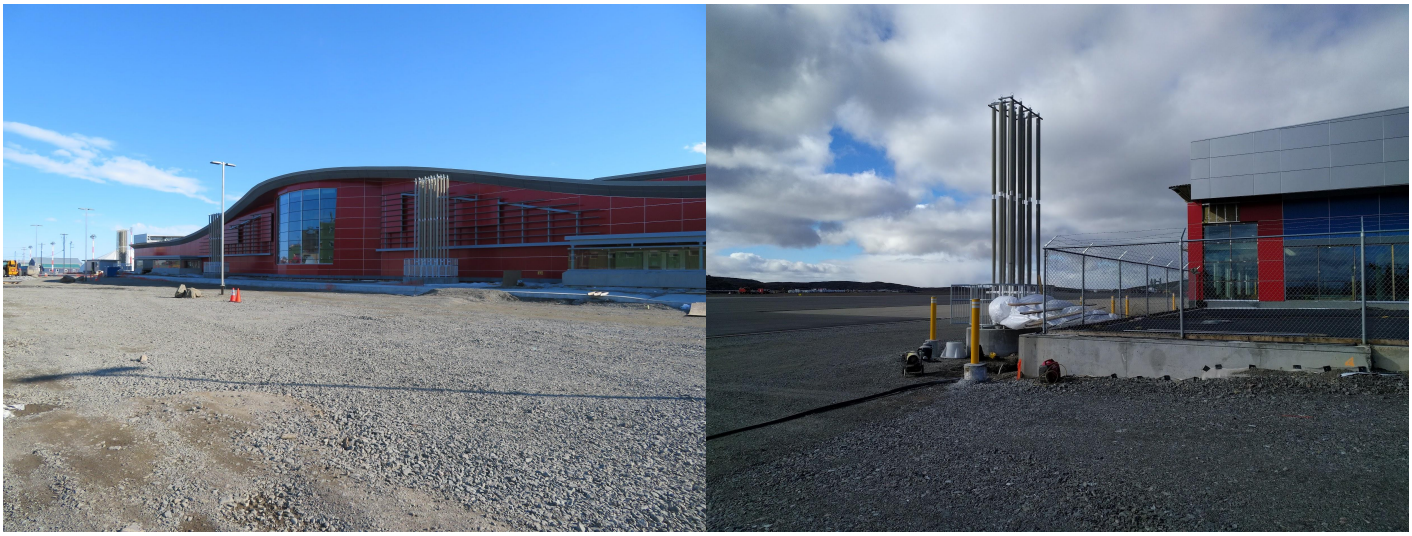
Armored Data Temperature Cables connected to a D405 Logger mounted on a thermosyphon

beadedstream Solution Benefits

With the temperature cables having up to 35 sensors each, **beaded**stream's digital technology easily allows for many sensors on a single 3 conductor cable. Using digital technology also allows all of the cables, regardless of the number of sensors, to have the same diameter, increasing the ease of installation at a busy construction site.

The data logger network was optimized to allow multiple cables to be read by a single logger, prior to data transfer to the cloud. Having remote access to the data was important for a project team that consisted of contractors, engineering consultants and the airport authority, many of whom are not permanently in Iqaluit. All the stakeholders could access data online from wherever they were located.



The terminal building of the Iqaluit Airport. Note the thermosyphons in the background. (Left)
A zoomed out view of the thermosyphons in front of the terminal building. (Right)