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Figure 1: Thule Air Base is located in the northwestern corner of Greenland.

LIVING AND WORKING ON TOP OF THE WORLD

U.S. ARMY CORPS OF ENGINEERS MAINTAINS ARCTIC AIR BASE TO
SUPPORT NATIONAL SECURITY.

By JoAnne Castagna, Ed.D.

IN THE EARLY 1950s, the United States secretly and quickly constructed Thule Air Base, located in the northwestern corner of Greenland in the Arctic Circle (see Figure 1). In record time, massive amounts of supplies, equipment, and 120,000 men were transported to Thule to construct the base. This enormous effort, which included the U.S. Army Corps of Engineers, was an incredible feat fueled by the country's security needs.

For decades, the U.S. Army Corps of Engineers, New York District has constructed facilities for the base under extreme Arctic conditions. These projects have included aircraft runways, dormitories, and medical centers. Presently, they are constructing two much-needed dormitories.

“These new dormitories will help to provide airmen with the quality of life they deserve on a difficult assignment to Thule Air Base in the Arctic Circle,” said New York District Commander Col. Paul Owen. “Thule’s remoteness and harsh climate restricts all personnel assigned there to live on base, which is why it’s so important to provide top notch housing facilities.”

Thule Air Base — “Two Lee” — is the U.S. Armed Forces’ northernmost installation that was established to perform national security. The Air Force performs several missions there, including monitoring U.S. airspace for foreign missiles.

To perform these missions, hundreds of active-duty U.S. Air Force personnel and American, Danish, and Greenlandic civilian contractors are stationed there. Quality housing is needed for these individuals to keep them safe from the harsh weather and to keep their morale up in this remote area of the world.

Both of the new dormitories were designed by the Army Corps New York District and are being constructed by Danish contractors with Army Corps supervision. Greenland is a province of Denmark. The dorms will be ready for occupation in 2015 and are replacing old structures constructed in the 1950s that have seen wear from the harsh arctic climate.

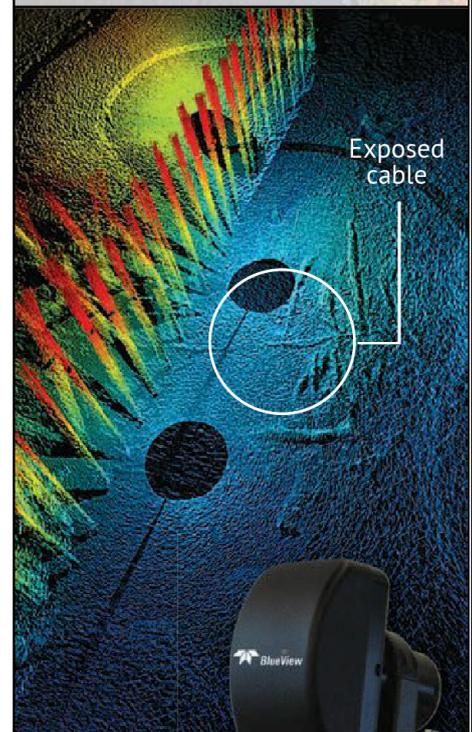
One of the dorms will house 54 people and is being constructed by Contractor MT Højgaard Gronland A/S of Søborg, Denmark; the other will house 48 people and is being constructed by Contractor Pilegaard-Henriksen of Denmark.



Thule Air Base, Greenland, is located in the Arctic. Photo: JoAnne Castagna, Public Affairs, New York District, U.S. Army Corps of Engineers

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Prefabricated materials for this 54-person dormitory include concrete foundations, structural steel, insulated metal walls, and roof panels. *Photo: JoAnne Castagna, Public Affairs, New York District, U.S. Army Corps of Engineers*



Because of permafrost, both dorms are being constructed with special Arctic foundations with spread footings that are about 10 feet deep and concrete columns that elevate the floor system above the ground. *Photo: JoAnne Castagna, Public Affairs, New York District, U.S. Army Corps of Engineers*

The dorms will house junior and senior non-commissioned officers visiting or on temporary duty. Both dorms will be three stories. Rooms will be divided into four-bedroom modules with individual bathrooms, walk-in closets, a shared social space, housekeeping areas, and laundry rooms on each floor. There is also a common area day room with a kitchen with appliances in the center on each floor with large windows overlooking the base, providing occupants with a place to relax and socialize.

Arctic construction challenges

Construction in the Arctic can be challenging because of severe weather and limited daylight, which requires the use of unique building techniques and fast-paced construction. The dorms are being constructed using techniques that will help them withstand the harsh Arctic elements, including special arctic foundations, steel frames, insulated panel exteriors, and pitched metal roofs.

One of the challenges is ice. Most of northern Greenland is covered with permafrost — permanently frozen ground, ranging from 6 to 1,600 feet in depth. Because of permafrost, both dorms are being constructed with a special, elevated Arctic foundation. If buildings are not constructed off of the ground, the heat from inside the building can melt the permafrost, making the ground unstable and causing buildings to sink. Buildings are elevated with the use of spread footings that are about 10 feet deep and concrete columns that support the floor system above the ground.

Another challenge is limited daylight. Because of Thule's proximity to the North Pole, it has 24 hours of sunlight from May thru August and 24 hours of darkness from November thru February. Therefore, construction is limited to the summer and autumn months, May thru October, because there is sufficient sunlight and temperatures are bearable to work in. Temperatures can reach 40 degrees Fahrenheit.

During the rest of the year, there is no sunlight and the weather is too severe to work outdoors. Temperatures can drop as low as minus 30 degrees Fahrenheit.

It is also only during the summer months that shipments of building materials and fuel can be received via cargo ship. During the summer, Greenland's iced shipping lanes can be broken up to allow supply ships into port. Greenland is locked in by ice nine months out of the year.

Since work needs to be performed rapidly, most of the building materials are prefabricated elsewhere before being shipped in. Prefabricating the parts helps the workers to rapidly perform the construction. These materials include concrete foundations, structural steel, insulated metal walls, and roof panels.

The dorms' outer shells must be completed so that interior work is not interrupted during the winter months. This interior work includes constructing mechanical, electrical, plumbing, and fire protection systems that are designed to withstand extreme frigid sub-zero temperatures.

Many things about Thule Air Base remain unchanged since the Air Force arrived in the 1950s — harsh weather conditions, the importance of the base to our national security, and the dedication of the men and women who serve our nation. However, construction of two dormitories for our dedicated service members and contractors is a welcome change!

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