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# DEFENSE COMMUNITIES

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# Amid the Tundra, a Spark

*Thule Air Base, Greenland, provides chills and thrills in the Arctic.*

By JoAnne Castagna, Ed.D.

Army Corps of Engineers Project Engineer Paul Kara gazes out a window at Thule Air Base, Greenland, as he awaits a flight to his home in New Jersey. Kara is returning home from one of his twice monthly trips to Thule in northwest Greenland, where he and his team are completing work on a much needed dormitory on the base that is scheduled to be completed an entire season ahead of schedule.

Kara explains to one of his colleagues that during the 1940s, Greenland was barely an inhabitable area of the Arctic and was under exploration. Today, the United States has a fully operational air base at Thule. This was made pos-

The building's interior mechanical, electrical, plumbing, and fire protection systems are all designed to withstand the extreme subzero temperatures.

sible by the Corps of Engineers, which constructed several of Thule's facilities, often under extreme Arctic conditions.

To much of the world, Greenland was for many years extremely remote. The United States has maintained a military presence in Greenland for over half a century. Thule Air Base is located in a coastal valley in northwest Greenland, above the Arctic Circle between northeastern Canada and Europe, and it is a province of Denmark. The air base is



Contractors inspect the installation of flooring system metal decking. Inset: JoAnne Castagna, Technical Writer, USACE, New York District, stands in front of the dormitory in April 2006.

PHOTO CREDIT: STERRETT DANIELS, USACE, NYD.

home to the Air Force, U.S. and Danish contractors, and Greenlandic personnel. Existing housing has long been considered substandard, and lodging for visitors has been limited as well.

## Construction begins

To improve housing and lodging conditions, the Corps designed and is constructing a three-story dormitory that will withstand the harsh Arctic climate. When completed, the building will have 72 rooms for junior and senior noncommissioned officer visitors.

A number of 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 will also be a common area with a kitchen in the center of each floor with large windows overlooking the base, providing occupants with a place where they can relax and socialize.

Construction is being performed by MT Hojgaard, a Danish firm, with supervision by the Army Corps of Engineers. Construction began in March 2005 and was completed ahead of schedule this past summer.

"The team is completing the project one winter season ahead of schedule, is





Due to harsh Arctic conditions, outside construction is limited to summer and fall months.

staying within budget, and is providing a quality new landmark facility for American servicemen and women at Thule Air Base," said Kara.

The project is in the center of the air base, and its bright red and blue exterior stands out against the Arctic snow-covered landscape. The steel superstructure has an insulated metal panel system exterior and a pitched standing metal roof, and it stands on concrete footings.

The building's interior mechanical, electrical, plumbing, and fire protection systems are all designed to withstand the extreme subzero temperatures. The walls are constructed with a typical metal stud and gypsum board assembly.

Constructing the dorm can be a challenge considering the severe weather conditions at times and limited exterior construction timeline. Due to the weather, outside construction at Thule is limited to a three-month time frame—the summer and fall months (June to mid-September)—because the weather during the winter season is too severe to work outdoors, ranging from  $-30^{\circ}\text{F}$  to  $-40^{\circ}\text{F}$ .

Kara has been involved in several construction projects at Thule for over 24 years and is familiar with the working conditions, sometimes staying on the installation for months at a time.

There are also times he travels to the contractor's home office and the U.S. Embassy, both in Denmark.

The exterior must be enclosed within this window of time. Once the building shell is completed, interior work can continue uninterrupted during the winter months.

Kara's team worked 12-hour days during the summer months and worked inside throughout the long winter months; these factors contributed to the project being ahead of schedule.

It is also during the summer months, with temperatures in the  $40^{\circ}\text{F}$  range, that the team receives building supplies. Greenland is locked in by ice nine months out of the year. During the summer months, the island's frozen shipping lanes can be broken up to allow the supply ships in.

Outside construction is also limited by daylight cycles. Because of Thule's proximity to the North Pole, it has 24 hours of sunlight from May through August and 24 hours of darkness from November through February—once again leaving only the summer months for outside construction.

Because of the limited construction time, most of the building materials are prefabricated elsewhere before being shipped in. Prefabricating the parts helps the workers to rapidly perform the construction. Some of the

materials that were prefabricated for the dorm include the concrete foundations, structural steel and insulated metal wall, and roof panels.

### Unique challenges

The building's unique foundations comprise one of the most significant differences between constructing in the Arctic region and constructing elsewhere. The land is primarily composed of permafrost, permanently frozen ground below the earth's surface from 6 feet in some areas and up to 1,600 feet in others.

Because of this terrain, building foundations need to be elevated. The building must sit on concrete supports or require air corridors to separate the building from the ground (with 1 meter of clearance between the ground and the bottom of the building). Heat generated from the building will melt the permafrost, and the building could sink if it were not elevated.

Kara suggests that engineers who are working on projects with limited construction time due to the elements should consider doing the following: minimizing construction delays by quickly resolving contractor requests by thoroughly reviewing contract plans and specifications prior to construction; and promptly resolving contractor issues by being flexible and available.

Anders Fogh Rasmussen, Denmark's prime minister, recently toured the dormitory. "He was very impressed with the way the dorm is being constructed, especially how the building is being highly insulated, because this will lead to expected savings on fuel consumption," said Christian Levinson, project manager, MT Hojgaard. ■

*Dr. JoAnne Castagna is a technical writer with the U.S. Army Corps of Engineers, New York District. For additional information about Thule Air Base, visit [www.thule.af.mil](http://www.thule.af.mil). Reach the author at [joanne.castagna@usace.army.mil](mailto:joanne.castagna@usace.army.mil).*