Expanding the Permafrost Tunnel Near Fox, Alaska to Meet Future Research Needs

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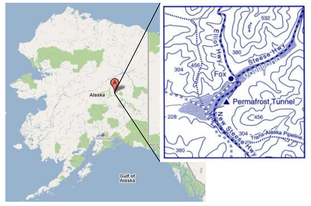
History of the Permafrost Tunnel

The Permafrost Tunnel, now almost 50 years old, will be expanded starting in 2011. The tunnel, 10 miles north of Fairbanks, Alaska, was excavated in the 1960s by the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) and U.S. Bureau of Mines. Currently, it is jointly operated by U.S. Army CRREL and Institute of Northern Engineering, University of Alaska Fairbanks It was not excavated as a natural laboratory, but rather to research excavation methods in permafrost. Nevertheless, more than 70 technical papers have been written about the tunnel, including topics on mining and geotechnical engineering, surface geophysics, geocryology, geology, biology, paleontology, paleoclimatology, and Mars permafrost studies. Beyond the research, thousands of people, both students and leaders, have toured the tunnel to learn about permafrost firsthand.



Baby mammoth tooth from tunnel

The Need for an Expanded Permafrost Tunnel

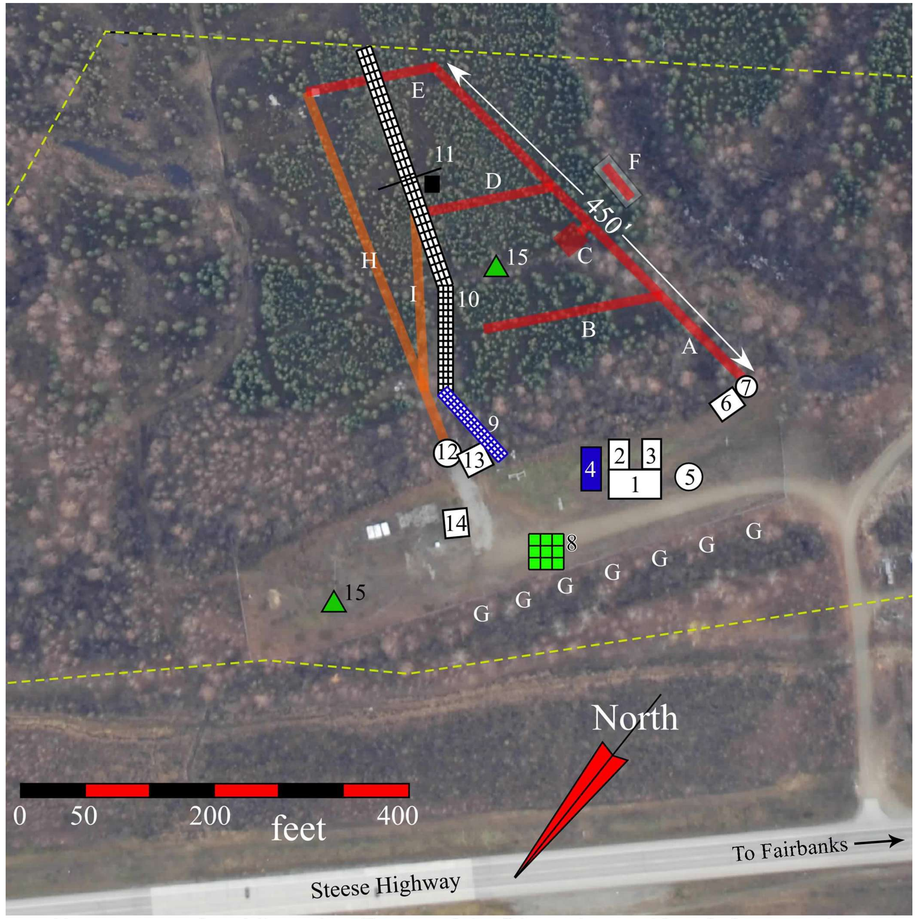
The permafrost tunnel expansion project is in response to the need for more studies as permafrost warms. The main research foci is expected to be on these four critical areas:

1) improving standoff detection technology and surface geophysical methods for monitoring permafrost
2) understanding how permafrost will respond to warming
3) improving estimates of carbon stocks and release rates
4) developing models of permafrost heterogeneity for engineering

Meeting the Needs of the Research

The expanded tunnel will more than double the current tunnel's length, and is designed to directly incorporate research needs. Some design ideas include:

a) detailed 3D map of complex permafrost features
b) extensive baseline mapping and sampling
c) side rooms to allow for permafrost warming experiments
d) boardwalks and gantry above tunnel for test geophysics and remote sensing



Current Tunnel	1 Learning Center	6 Refrigeration	12 Existing Portal
New Expansion	2 Laboratories	7 Portal	13 Existing Refrigeration
Boardwalks	3 Offices	11 Gantry	14 Old Visitors' Center
Stairs	4 Cold Rooms	15 Instrumentation	F Surface Trench

http://permafrosttunnel.crrel.usace.army.mil/

Alaska Permafrost Research Center (APRC)

In addition to the expanded tunnel, a new building will be constructed. The new building will have highly adaptable spaces that function as laboratories, small offices, and a Learning Center. Cold room laboratories and storage will be built into the tunnel itself. A meteorological station outside of the tunnel along with temperature monitoring within the tunnel will telemetry data to the Learning Center. For test geophysics and remote sensing, non-metal stairs and boardwalks will set up over the tunnel to protect the vegetation. Combined, these will form the Alaska Permafrost Research Center (APRC).

Permafrost Tunnel

The Learning Center

The Learning Center will house creative displays explaining permafrost and the climate history of Alaska, including a walk-in freezer for permafrost cores that can be handled. It will have a moveable tables and chairs with a projector and screen, for classes, conferences, or an open space for research set up as needed. Beyond the physical portion of the learning center, there will be distance delivery of educational lessons and videos on permafrost, live data, and a virtual tour of the tunnel.