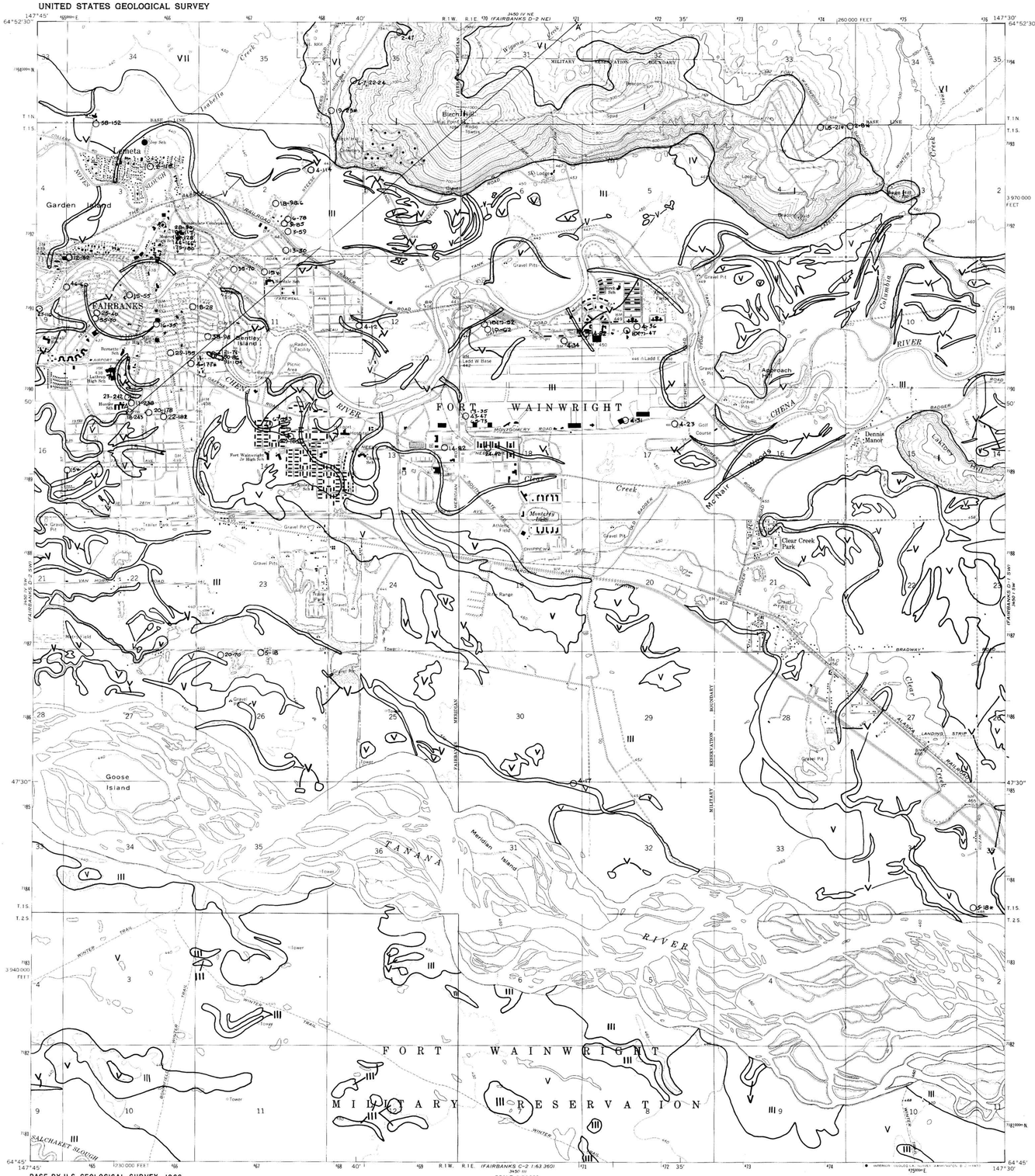
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



BASE BY U.S. GEOLOGICAL SURVEY, 1966

UTM GRID AND 1966 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

MAP SHOWING DISTRIBUTION OF PERMAFROST IN THE FAIRBANKS D-2 SE QUADRANGLE, ALASKA

BY

TROY L. PÉWÉ AND JOHN W. BELL

1975

MISCELLANEOUS FIELD STUDIES
MAP MF- 669A

EXPLANATION

Permafrost is classified below in seven categories arranged in order of increasing ice content. Local variations in extent, thickness, and ice content of permafrost occur. Permafrost is defined here as any material that remains at or below 32° F continuously for more than two years; ice may or may not be present.

Ice content is defined as follows: (1) Low--Ice generally restricted to pore spaces between particles and to thin seams less than 1/16 inch thick in silt and clay

(2) Moderate--Ice generally restricted to pore spaces between particles and to thin seams greater than 1/16 inch and less than 1/4 inch thick in silt and clay

(3) High--Ice generally in seams greater than 1/4 inch thick and (or) large ice masses. As much as 50 percent of the ground may be ice (confined to upper 30 feet).

I

FREE OF PERMAFROST

BEDROCK

Permafrost with low ice content
Fresh and decayed bedrock are perennially frozen on slopes facing directly north; permafrost probably discontinuous on northeast- and northwest-facing slopes. Contains little or no ice; ice content may be high in fractured or decayed bedrock. Ice is mainly restricted to pore spaces. Depth to permafrost 1-4 feet. Thickness of permafrost 1-100 feet. Seasonal frost action absent in fresh bedrock but may be moderate in decayed material. No subsidence upon thawing of fresh bedrock but moderate subsidence may occur upon thawing of decayed material. Locally, frozen bedrock may be overlain by loess that may also be perennially frozen and contain little or no ice

III

FLOOD-PLAIN SILT, SAND, AND GRAVEL

Permafrost with low ice content
Permafrost is discontinuous in many areas such as beneath lakes, rivers, and creeks. If frozen, 1-15 feet of silt overlying sand and gravel may have low to moderate ice content in the form of thin seams; underlying sand and gravel have low ground-ice content that is primarily restricted to pore spaces. Depth to permafrost 2-4 feet in older parts of flood plain and more than 4 feet on inside of meander curves near river. Depth to permafrost 25-40 feet in clear areas. Seasonal frost layer 2-9 feet thick. Permafrost 5-275 feet thick. Silt will show some subsidence upon thawing; sand and gravel will show no subsidence upon thawing. Silts may undergo intense seasonal frost action but sand and gravel will undergo none

IV

ALLUVIAL-FAN SILT

Permafrost with moderate ice content
Alluvial silt fans overlying flood-plain sand and gravel have discontinuous permafrost with moderate to low ice content primarily as pore ice but may contain ice seams and lenses. No large ice masses. Depth to permafrost 3-25 feet; seasonal frost layer 3-4 feet; thickness of permafrost 2-155 feet. Little to moderate subsidence upon thawing. Seasonal frost action moderate to intense

V

FLOOD-PLAIN SLOUGH AND SWALE DEPOSITS

Permafrost with moderate to high ice content
Broad basinlike areas and elongate, sinuous meander scars may be perennially frozen. Permafrost is discontinuous; young sloughs and swales, especially those with intermittent streams, generally contain no permafrost. If frozen, thickness of permafrost 5-30 feet with moderate to high ice content as thin seams and small lenses. Depth to permafrost 1 1/2-4 feet; seasonal frost layer 1 1/2-4 feet. Seasonal frost action intense. Moderate to great subsidence upon thawing

VI

VALLEY-BOTTOM MUCK

Permafrost with high ice content
Silt on lower slopes and in valley bottoms is perennially frozen. Top layer (3-30 feet thick) has moderate to high ice content in the form of seams and lenses; lower layer contains abundant ice as seams, horizontal sheets, vertical sheets, wedges, and saucer-shaped and irregular masses 1-50 feet in diameter. Near the contact with the unfrozen silts zone upslope, ice content may be low and permafrost sporadic. Depth to permafrost 1 1/2-3 feet on lower slopes and valley bottoms; 3-20 feet near contact with unfrozen silt zone; 10-25 feet under cleared areas. Seasonal frost layer 1 1/2-3 feet thick. Thickness of permafrost 3-175 feet. Seasonal frost action intense. Great subsidence upon thawing of permafrost. Average temperature of permafrost 31-32° F

VII

VALLEY-BOTTOM PEAT-MUCK

Permafrost with high ice content
Organic silt containing peat beds in valley bottoms and low, flat areas is perennially frozen. Ground ice is abundant as seams, horizontal sheets, vertical sheets, wedges, and saucer-shaped and irregular masses, all of which range from 1-50 feet in diameter. Massive ice close to the surface results in large (25-100 feet in diameter) polygonal pattern on the surface. Depth to permafrost 1 1/2-3 feet. Seasonal frost layer 1 1/2-3 feet thick. Thickness of permafrost 1-140 feet. Seasonal frost action intense. Great subsidence upon thawing

SYMBOLS

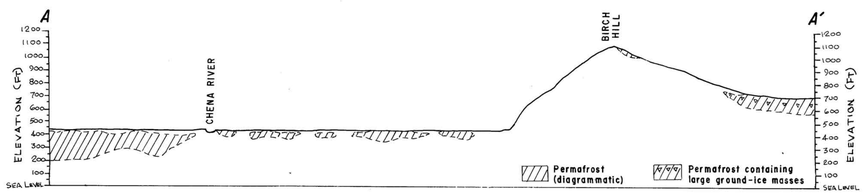
Contact
Contacts generally indefinite or gradational

2-45*

Borehole location

First number indicates depth to top of permafrost; second number indicates depth to bottom of permafrost or to bottom of hole if bottomed in permafrost. The notation "Pf" indicates permafrost present but depth unknown. * indicates that hole bottomed in permafrost

Detailed subsurface information may be obtained from the geologic map (Péwé and others, in press) and from the map showing foundation conditions in the Fairbanks D-2 SE quadrangle, Alaska (MF-669D, Péwé and Bell, 1975c)



VERTICAL EXAGGERATION X 4

GENERALIZED CROSS SECTION

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