



MAP SHOWING FOUNDATION CONDITIONS
IN THE FAIRBANKS D-2 NW QUADRANGLE, ALASKA

BY
TROY L. PÉWÉ AND JOHN W. BELL
1975

EXPLANATION

I
BEDROCK
Igneous and metamorphic bedrock, exposed primarily on hillslopes and steep slopes where loess cover is less than 3 feet thick, underlies surficial deposits in all the quadrangle. Upper part is weathered. Where permafrost is present, ice content is low or absent but may be high in weathered bedrock. No subsidence upon thawing of unweathered bedrock but may be slight upon thawing of weathered material. Frost action absent in unweathered bedrock but may be moderate in decayed bedrock. Unweathered bedrock has high bearing strength.

II
TAILINGS
Reworked creek gravel now exposed as placer-mine dredge tailings, 2 to more than 200 feet thick. Not mapped where they may be locally frozen with low ice content. No subsidence upon thawing; not susceptible to frost action. Material is loose but provides high bearing strength. Shown as undredged buried creek gravel in cross section.

III
LOESS
Windblown silt present on middle and upper slopes and on low hillslopes, 2 to more than 200 feet thick. Not mapped where less than 3 feet thick. Generally free of permafrost; north-facing slopes may contain permafrost with little or no ice content. Mildly susceptible to unsuspensible to seasonal frost action. High bearing strength when dry in original position; very low when wet. Will stand in nearly vertical slopes. Extremely susceptible to piling up on the low loess is not differentiated from muck (unit IV) where loess overlies peat.

IV
MUCK
Reworked silt in valley bottoms and on lower slopes; 3-30 feet thick. Permafrost is present to high ice content as seams and lenses; overlies unit V, which has high ice content as seams, lenses, and large foliated ice masses. Low content may be low and permafrost sporadic near unfrozen loess zone up to 100 feet. Great differential subsidence upon thawing. Seasonal frost action intense. Permafrost causes poor drainage. High bearing strength when frozen or dry, very low when wet or thawed. Subject to sloughing and sliding upon thawing. Very susceptible to gully.

SELECTED SUBSURFACE DATA¹

Selected data from borehole and well logs are presented below. Numbered items correspond to numbered circles on map. An asterisk (*) indicates that permafrost persisted to bottom of hole.

1. 0-5 ft loess. Did not reach bedrock. No permafrost.

2. 0-29 ft silt, 29-71 ft creek gravel. Did not reach bedrock. Permafrost 2-71 ft.

3. 0-17 ft silt, 17-71 ft creek gravel. Did not reach bedrock. Permafrost 2-71 ft.

4. 0-28 ft silt, 28-40 ft creek gravel. Bedrock at 40 ft. Permafrost 2-42 ft.

5. 0-46 ft silt, 46-40 ft creek gravel. Did not reach bedrock. Permafrost 2-43 ft.

6. 0-41 ft silt, 41-63 ft creek gravel. Did not reach bedrock. Permafrost 2-46(?) ft.

7. 0-16 ft silt, 16-33 ft creek gravel. Did not reach bedrock. Permafrost 2-63 ft.

8. 0-10 ft silt, 10-33 ft creek gravel. Did not reach bedrock. Permafrost 2-33 ft.

9. 0-13 ft silt, 13-33 ft creek gravel. Did not reach bedrock. Permafrost 2-13 ft.

10. 0-13 ft silt, 13-33 ft creek gravel. Did not reach bedrock. Permafrost 2-13 ft.

11. 0-104 ft silt, 104-193 ft creek gravel. Bedrock at 193 ft. Permafrost 2-198 ft.

12. 0-58 ft silt, 58-161 ft creek gravel. Bedrock at 161 ft. Permafrost 2-167 ft.

13. 0-5 ft loess, 5-245 ft bedrock. No permafrost.

14. 0-6 ft loess, 6-330 ft bedrock. No permafrost.

15. 0-5 ft loess, 5-346 ft bedrock. No permafrost.

16. 0-11 ft silt, 11-43 ft creek gravel. Did not reach bedrock. Permafrost 2-43 ft.

17. 0-103 ft silt, 103-179 ft creek gravel. Did not reach bedrock. Permafrost 2-103(?) ft.

18. 0-90 ft silt, 90-143 ft creek gravel. Did not reach bedrock. Permafrost 2-143 ft.

19. 0-18 ft silt, 18-33 ft creek gravel. Did not reach bedrock. Permafrost 2-33 ft.

20. 0-19 ft organic silt, 19-93 ft creek gravel, 93-58 ft bedrock. Permafrost 2-58 ft.

21. 0-22 ft silt, 22-90 ft creek gravel. Bedrock at 90 ft. Permafrost 2-90 ft.

22. 0-15 ft silt, 15-28 ft creek gravel. Bedrock at 28 ft. Permafrost 2-28 ft.

23. 0-13 ft silt, 13-33 ft creek gravel. Did not reach bedrock. Permafrost 2-33 ft.

24. 0-27 ft organic silt, 27-161 ft creek gravel, 161-151 ft bedrock. Permafrost 2-151 ft.

25. 0-8 ft peat, 8-13 ft silt. Did not reach bedrock. Permafrost 1-8 ft.

26. 0-13 ft silt, 13-33 ft creek gravel. Did not reach bedrock. Permafrost 2-33 ft.

27. 0-8 ft peat, 8-13 ft silt. Did not reach bedrock. Permafrost 1-8 ft.

28. 0-1 ft loess, 1-330 ft schist. No permafrost.

29. 0-1 ft loess, 1-330 ft schist. No permafrost.

30. 0-1 ft loess, 1-330 ft schist. No permafrost.

31. 0-1 ft loess, 1-330 ft schist. No permafrost.

32. 0-1 ft loess, 1-330 ft schist. No permafrost.

33. 0-5 ft loess, 5-280 ft schist. No permafrost.

34. 0-5 ft loess, 5-280 ft schist. No permafrost.

35. 0-3 ft loess, 3-330 ft schist. No permafrost.

36. 0-60 ft loess, 60-245 ft schist. No permafrost.

37. 0-30 ft loess, 30-210 ft schist. No permafrost.

38. 0-30 ft loess, 30-210 ft schist. No permafrost.

39. 0-28 ft silt, 28-34 ft fractured bedrock. Bedrock at 34 ft. Permafrost 4-38 ft.

40. 0-24 ft silt, 24-34 ft fractured bedrock. Bedrock at 34 ft. Permafrost 4-38 ft.

41. 0-18 ft silt, 18-33 ft creek gravel. Did not reach bedrock. Permafrost 11-18 ft.

42. 0-19 ft silt, 19-33 ft creek gravel. Did not reach bedrock. Permafrost 3-19 ft.

43. 0-25 ft silt, 25-33 ft creek gravel. Did not reach bedrock. Permafrost 13-25 ft.

44. 0-25 ft silt, 25-33 ft creek gravel. Did not reach bedrock. Permafrost 13-25 ft.

45. 0-51 ft silt, 51-120 ft creek gravel. Did not reach bedrock. Permafrost 2-120 ft.

46. 0-60 ft silt, 60-120 ft creek gravel. Did not reach bedrock. Permafrost 2-120 ft.

47. 0-33 ft silt, 33-120 ft creek gravel. Did not reach bedrock. Permafrost 12-33 ft.

48. 0-16 ft silt, 16-20 ft peat. Did not reach bedrock. Permafrost 3-20 ft.

49. 0-28 ft silt, 28-33 ft creek gravel. Did not reach bedrock. Permafrost 2-28 ft.

50. 0-12 ft organic silt, 12-120 ft creek gravel. Did not reach bedrock. Permafrost 25-137 ft.

51. 0-48 ft silt, 48-119 ft creek gravel, 119-128 ft bedrock. Permafrost 2-128 ft.

52. 0-122 ft organic silt, 122-250 ft creek gravel. Bedrock at 250 ft. Permafrost 4-98 ft.

53. 0-28 ft silt, 28-34 ft fractured bedrock. Bedrock at 34 ft. Permafrost 3-16 ft; 36-43 ft.

54. 0-74 ft silt, 74-114 ft creek gravel. Did not reach bedrock. Permafrost 10-74 ft.

55. 0-7 ft silt, 7-36 ft creek gravel. Bedrock at 36 ft. Permafrost 2-36 ft.

56. 0-38 ft silt, 38-65 ft creek gravel. Did not reach bedrock. Permafrost present.

57. 0-47 ft silt, 47-82 ft creek gravel. Did not reach bedrock. Permafrost 2-82 ft.

58. 0-41 ft silt, 41-90 ft creek gravel. Bedrock at 90 ft. Permafrost 2-10 ft.

59. 0-8 ft silt, 8-24 ft ft creek gravel. Bedrock at 24 ft. Permafrost 2-24 ft.

60. 0-8 ft silt, 8-24 ft ft creek gravel. Bedrock at 24 ft. Permafrost 2-24 ft.

61. 0-118 ft silt, 118-164 ft creek gravel. Bedrock at 164 ft. Permafrost 43-99 ft.

62. 0-118 ft silt, 118-200 schist. Permafrost 12-118(?) ft.

63. 0-85 ft silt, 85-343 ft creek gravel, 343-355 ft bedrock. Permafrost 2-62 ft.

64. 0-15 ft silt, 15-20 ft peat. Did not reach bedrock. Permafrost 2-15 ft.

65. 0-14 ft silt, 14-27 ft ice. Did not reach bedrock. Permafrost 2-12; 14-27 ft.

66. 0-40 ft silt, 40-120 ft creek gravel. Permafrost 2-12; 20-27; 30-40 ft.

67. 0-13 ft silt, 13-33 ft creek gravel. Did not reach bedrock. Permafrost 6-13 ft.

68. 0-4 ft silt, 4-33 ft creek gravel. Did not reach bedrock. Permafrost 5-4 ft.

69. 0-40 ft silt, 40-152 ft creek gravel. Bedrock at 152 ft. Permafrost 2-152 ft.

70. 0-13 ft silt, 13-33 ft creek gravel. Did not reach bedrock. Permafrost 2-40 ft.

71. 0-50 ft silt, 50-136 ft creek gravel. Bedrock at 136 ft. Permafrost 2-144 ft.

72. 0-65 ft loess, 65-85 graphic schist. No permafrost.

73. 0-16 ft loess, 16-240 ft schist. No permafrost.

74. 0-12 ft loess, 12-400 ft schist. No permafrost.

75. 0-15 ft loess, 15-315 ft schist. No permafrost.

76. 0-86 ft loess, 86-90 ft clay, 90-161 ft bedrock. No permafrost.

77. 0-1 ft loess, 1-338 ft schist. No permafrost.

78. 0-4 ft loess, 4-250(?) ft schist. No permafrost.

79. 0-1 ft loess, 1-250 ft schist. No permafrost.

80. 0-3 ft loess, 3-348 ft schist. No permafrost.

81. 0-10 ft loess, 10-280 ft schist. No permafrost.

VI
PEAT MUCK
Reworked organic silt in valley bottoms; 10 to more than 300 feet thick. Permafrost is present to high ice content as ice seams, lenses, and large foliated ice masses. Large ice masses near surface result in large polygonal patterns of troughs. Great differential subsidence upon thawing. Seasonal frost action intense. Permafrost results in poor drainage. High bearing strength when frozen; very low when thawed. Slopes in cuts subject to sloughing and landsliding upon thawing. Where peat muck overlies loess unit, both deposits mapped as muck (unit IV).

VI
PEAT
Sphagnum-moss peat in valley bottoms; as much as 20 feet thick. Permafrost is present to high ice content as ice seams and lenses and large foliated ice masses in underlying silt. Great differential subsidence upon thawing. Seasonal frost action intense. Peat and permafrost prevent good drainage. High bearing strength when frozen; very low when thawed. Slopes in cuts subject to sloughing and landsliding upon thawing. Generally poor for any sort of construction.

SYMBOLS

Contact
Generally indefinite or gradational

Gravel pit

Pingo

Site of subsurface data

Sample site

88. 0-1 ft loess, 1-220 ft schist. No permafrost.

89. 0-2 ft loess, 2-300 ft schist. No permafrost.

90. 0-40 ft loess, 40-152 ft bedrock. No permafrost.

91. 0-42 ft loess, 42-121 ft schist. No permafrost.

92. 0-58 ft loess, 58-120 ft schist. No permafrost.

93. 0-50 ft loess, 50-112 ft schist. No permafrost.

94. 0-1 ft loess, 1-565 ft schist. Permafrost 10-110 ft.

95. 0-15 ft silt, 15-146 ft organic silt, 146-209 ft organic silt with schist fragments, 209-228 ft schist and quartz.

96. 0-28 ft silt, 28-34 ft fractured bedrock, 34-151 ft schist. Permafrost 38-71(?) ft.

97. 0-100(?) ft silt, 100-200 ft schist. Permafrost 10-92 ft.

98. 0-40 ft loess, 40-108 ft schist. No permafrost.

99. 0-40 ft loess, 40-108 ft schist. No permafrost.

100. 0-7 ft loess, 7-215 ft schist. No permafrost.

101. 0-7 ft loess, 7-215 ft schist. No permafrost.

102. 0-96 ft loess, 96-180 ft schist. No permafrost.

103. 0-22 ft loess, 22-240 ft schist. No permafrost.

104. 0-77 ft loess, 77-240 ft schist. No permafrost.

105. 0-25 ft loess, 25-35 ft weathered schist, 35-240 ft schist. No permafrost.

106. 0-104 ft silt, 104-150 ft weathered bedrock, 150-167 ft bedrock. Permafrost 13-70 ft.

107. 0-80 ft silt, 80-236 ft creek gravel, 236-246 ft bedrock. Permafrost 2-31 ft.

108. 0-188 ft silt, 188-368 ft creek gravel. Bedrock at 368 ft. Permafrost 2-128 ft.

109. 0-156 ft silt, 156-193 ft creek gravel, 193-170 ft creek gravel. Bedrock at 170 ft. Permafrost 8-68 ft.

110. 0-68 ft silt, 68-94 ft creek gravel, 94-107 ft bedrock. Permafrost 17-77 ft.

111. 0-120 ft silt, 120-150 ft weathered bedrock. Bedrock at 150 ft. Permafrost 2-94 ft.

112. 0-143 ft silt, 143-161 ft weathered bedrock, 161-170 ft creek gravel. Bedrock at 170 ft. Permafrost 2-116 ft.

113. 0-180 ft silt, 180-434 ft creek gravel. Did not reach bedrock. Permafrost 10-85 ft.

114. 0-21 ft silt, 21-33 ft creek gravel. Did not reach bedrock. Permafrost 20-23 ft.

115. 0-8 ft silt, 8-13 ft peat. Did not reach bedrock. Permafrost 4-8 ft.

116. 0-10 ft silt, 10-25 ft organic silt, 25-88 ft schist. No permafrost recorded.

117. 0-105 ft loess, 105-138 ft schist. No permafrost.

118. 0-70 ft loess, 70-192 ft schist. No permafrost.

119. 0-137 ft silt, 137-203 ft schist. Permafrost present.

120. 0-137 ft silt, 137-167 ft slaty schist. Permafrost 15-137 ft.

121. 0-225(?) ft silt, 225-233 ft schist. Permafrost 20-40 ft.

122. 0-155 ft loess, 155-174 ft schist. No permafrost.

123. 0-70 (?) ft loess, 70-150 ft schist. No permafrost.

124. 0-50 ft loess, 50-140 ft schist. No permafrost.

125. 0-15 ft loess, 15-233 ft schist. No permafrost.

126. 0-25(?) ft loess, 25-300 ft schist. No permafrost.

127. 0-25(?) ft loess, 25-300 ft schist. No permafrost.

128. 0-45 ft loess, 45-200 ft schist. No permafrost.

129. 0-25 ft loess, 25-300 ft schist. No permafrost.

130. 0-75 ft loess, 75-120 ft schist. No permafrost.

131. 0-170 ft loess, 170-195 ft schist. No permafrost.

132. 0-13 ft silt, 13-33 ft creek gravel. Did not reach bedrock. Permafrost 9-13 ft.

133. 0-110 ft loess, 110-170 ft schist. No permafrost.

134. 0-70 ft loess, 70-150 ft schist. No permafrost.

135. 0-120 ft loess, 120-200 ft schist. No permafrost.

136. 0-128 ft loess, 128-175 ft schist. No permafrost.

137. 0-50 ft loess, 50-105 ft schist. No permafrost.

138. 0-90 ft loess, 90-170 ft schist. No permafrost.

139. 0-258 ft organic silt, 258-75 ft schist. Permafrost present.

140. 0-258 ft organic silt, 258-75 ft schist. Permafrost present.

141. 0-158 ft organic silt, 158-280 ft schist. Permafrost 10-100 ft.

142. 0-158 ft organic silt, 158-280 ft schist. Permafrost 25-90 ft.

143. 0-15 ft silt, 15-169 ft organic silt, 169-176 ft fractured schist, 176-245 ft organic silt and schist fragments.

144. 0-22 ft silt, 22-75 ft organic silt, 75-128 ft weathered bedrock, 128-136 ft schist. Permafrost 25-65 ft.

145. 0-77 ft loess, 77-110 ft schist. No permafrost.

146. 0-21 ft loess, 21-212 ft schist. No permafrost.

147. 0-40 ft loess, 40-109 ft schist. No permafrost.

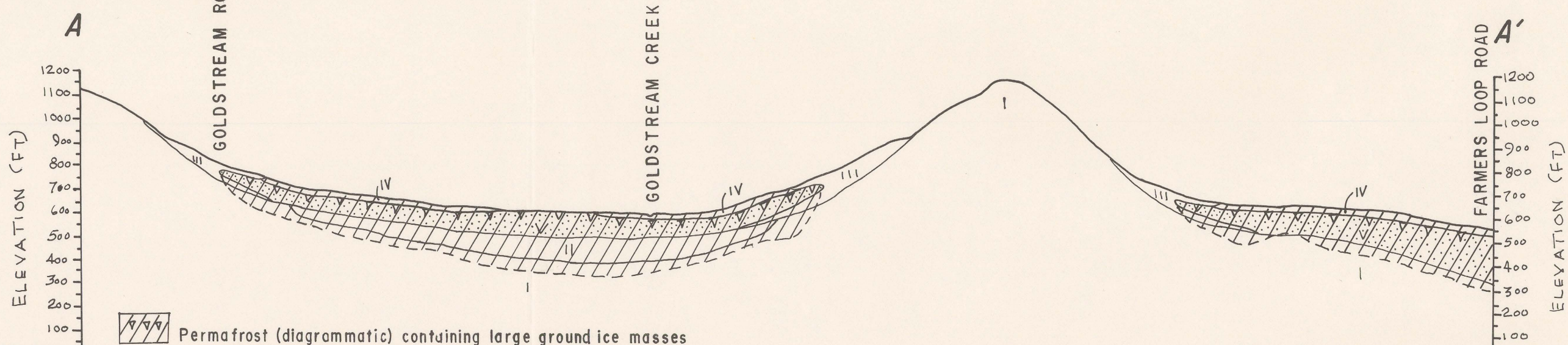
148. 0-10 ft loess, 10-24 ft organic silt, 24-123 ft schist. No permafrost recorded.

149. 0-40 ft loess, 40-93 ft organic silt, 93-97 ft mica schist, 97-103 ft quartz schist. No permafrost.

150. 0-80 ft loess, 80-120 ft schist. No permafrost.

151. 0-25 ft loess, 25-45 ft organic silt, 45-80 ft schist. No permafrost.

¹ Selected subsurface data were obtained from Reid (1983); United States Smelting, Refining, and Mining Co.; Water Resources Branch of the U.S. Geological Survey; R&M Engineering and Geological Consultants; Arctic Alaska Testing Laboratories; State of Alaska Department of Highways; local well drillers and residents.



VERTICAL EXAGGERATION X 4

2000 1000 0 2000 4000 6000 FEET

GENERALIZED CROSS SECTION

For sale by U.S. Geological Survey, price \$1.00

50. S. GOVERNMENT PRINTING OFFICE: 1975-6-690-036/57

Alaska (Fairbanks D-2 NW quad) Engineering Sheet 1: 24,000, 1975

Sheet 1 of 1



3 1818 00180738 5

M(200)
MF 668-D
Sheet 1
01