U. S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PLATE I

EXPLANATION

NON-GLACIAL DEPOSITS

Qx — Talus

Qs — Swamp

Qas — Silty and sandy alluvium

Qag — Gravelly alluvium

Qrs — Rubble sheet

GLACIAL DEPOSITS

Qrg — Rock glacier

Qop — Pitted outwash

Qo — Outwash

Qm — End and lateral moraine complex

Qk — Esker-kame complex

Qc — Channeled till complex

Qts — Sandy till

Qtf — Silty till

Qtb — Till on bedrock

br — Bedrock

QUATERNARY

PRE-QUATERNARY

GEOLOGIC CONTACTS

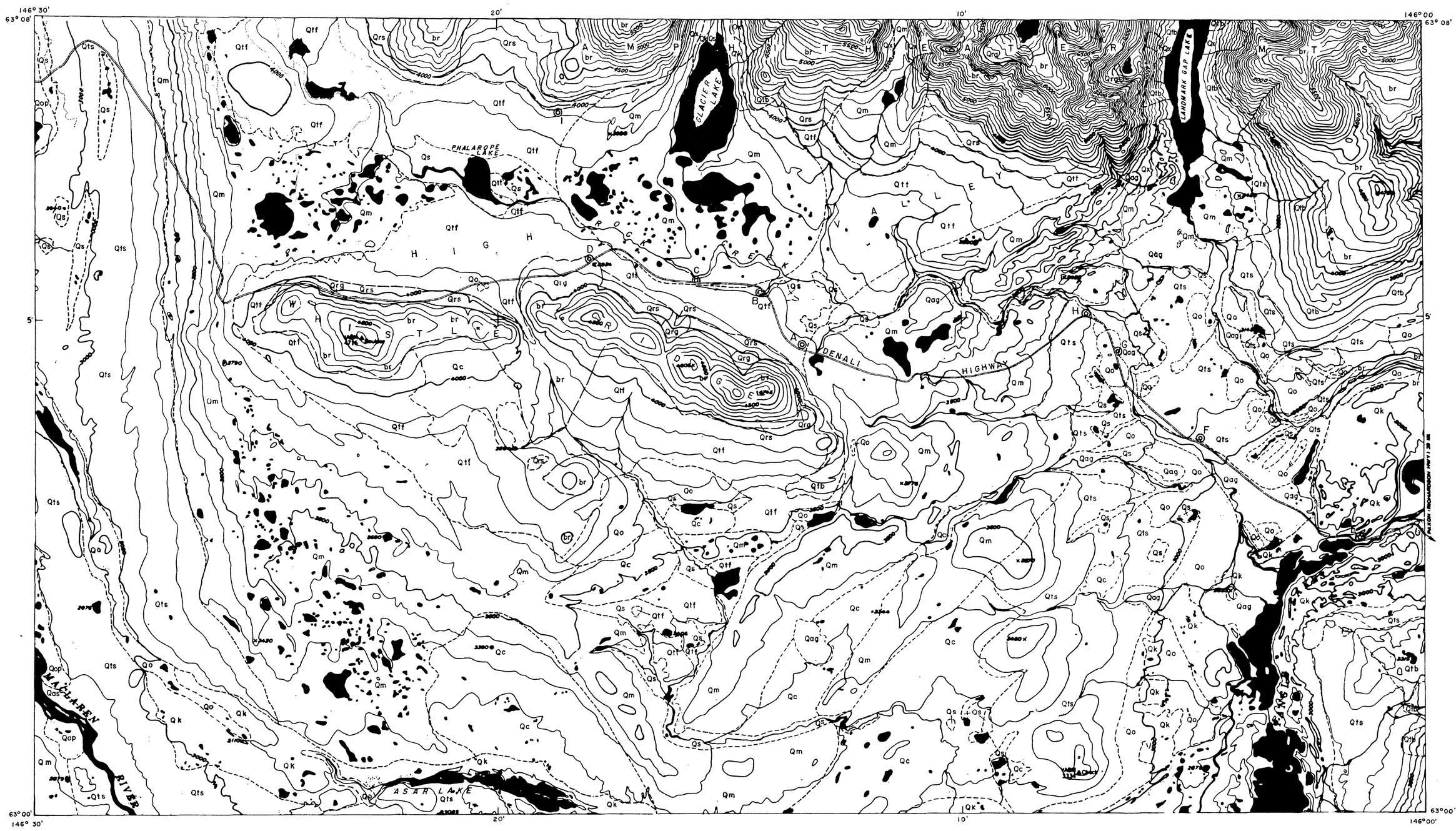
(Definite contact)

(Includes gradational contacts, inferred contacts, and indefinite boundaries of surficial deposits)

◎A — Location of sample shown on Figure 2

SUMMARY OF CHARACTERISTICS OF MAP UNITS

NAME	MATERIAL	TOPOGRAPHY	DRAINAGE	PERMAFROST	SUSCEPTIBILITY TO FROST ACTION	SUITABILITY FOR SUB-GRADE BORROW	SUITABILITY AS ROAD FOUNDATION
Talus (Qx)	Loose unsorted rock debris a few inches to 10' in diameter	Aprons and cones lying at base of steep slopes and cliffs	Good	Lacking or very deep	Unsusceptible	Good if crushed; however deposits difficult to handle due to abundant coarse material	Poor due to instability of material.
Swamp (Qs)	Peat, muck and silt	Flat or very gently sloping surfaces	Very poor	Generally present at 2'-3'; Subject to collaspe and flowage upon thawing	Intense	Unsuitable	Unsuitable
Silty and Sandy Alluvium (Qas)	Primarily silt and sand, local lenses of sand and gravel	Flat, marshy surface crossed by winding sloughs and minor streams	Poor, occasional flooding	Generally lacking; locally may be present at depths of 2'-3'	Generally intense	Generally unsuitable; locally fair in gravel lenses	Unsuitable
Gravelly Alluvium (Qag)	Interfingered lenses of clean sandy cobble gravel and sand and silt	Alluvial fans, flood plains and terraces of small streams	Generally good	Lacking or very deep	Very mild to unsusceptible	Good	Good
Rubble sheet (Qrs)	Coarse angular debris; boulders to 3' common average 4 inches, very little fine material.	Sheets of rubble 2'-10' thick overlying silty till; generally sloping 10° from bedrock source	Good	Generally lacking	Unsusceptible	Good if crushed	Good if rubble is more than 4' thick
Rock glacier (Qrg)	Angular rock debris 1/2'-6' imbedded in mud and interstitial ice. Finer material at depth	Tongue shaped or lobate in ground plan. Front and sides generally steep- 5' to 150' high. Surface is hummocky	Surface: good	In active rock glacier, ice present at 6'-10'. In inactive rock glacier generally lacking.	Active glacier: None Inactive glacier: None	Active glacier: Poor Inactive glacier; Good if crushed	Unsuitable if active rock glacier Good if inactive rock glacier
Pitted outwash (Qop)	Sandy gravel	Flat, plateau-like surface with kettle holes 10'-100' deep; escarpments 10'-100' high common	Good	Lacking or very deep	Unsusceptible	Good	Good
Outwash (Qo)	Well rounded gravel with sandy matrix, locally silty; locally thin veneer over silty or sandy till	Flat surfaces or broad troughlike channel. Local relief of 3'-10'	Generally good; locally only fair	Generally lacking or very deep, locally, where outwash is veneer underlying sandy till and silty till may contain permafrost	Unsusceptible	Good	Good
End and lateral Moraine Complex (Qm)	Sandy till and gravel; locally silty till in swales	Ridges 20' to 100' high, separated by swales, small swamps and kettle holes	Generally good; locally poor	At depths of 1'-3' in swales. In good drainage areas generally lacking or at depths of 5'	Till: Mild Gravel: Unsusceptible Swales: Mild to intense	Till: poor to fair Gravel: Good, however in small quantities	Fair to good
Esker-kame Complex (Qk)	Stratified, sub-rounded to rounded sand and gravel	Long sinuous ridges 5'-150 high and hillocks 5'-100' high	Good	Lacking or very deep	Unsusceptible	Excellent	Good to excellent; this type deposit gives best foundation in area.
Channeled-till Complex (Qc)	Sand and gravel 6" to 6' thick overlying sandy till	Discontinuous channels and terraces; regional slope 5°-20° oblique or right angles to channels and terraces	Generally good; locally poor	Generally lacking; locally at depths of 2'	Gravel: Unsusceptible Till: Mild to intense	Gravel: Locally good, however, material too coarse Till: Poor	Fair to good, locally poor
Sandy till (Qts)	Less than 10% silt, 50-70 % sand; 20-50% gravel; poorly sorted rocks from 1/4"-6"	Long, broad, smooth ridges and swales	Good, but poor in swales	Generally lacking; present at 2'-3' in swales; may be present at 5' elsewhere	Mild	Poor within 2' of surfaces. Fair at greater depths	Fair
Silty till (Qtf)	10-36 % silt, 25-40% sand, 30-45% gravel; poorly sorted rocks from 1/4"-6"	Long, broad, gently undulating surfaces, generally in valley floors	Fair to poor	Generally present at 1'-3'. Extends to unknown depth. Subject to collapse and flowage upon thawing.	Intense	Poor	Poor
Till on bedrock (Qtb)	Scattered patches of till to 3' thick on bedrock	Slightly modified bedrock slopes	Good	Lacking or very deep	Unsusceptible	Good if crushed but not present near alignment	Good but difficult to excavate
Bedrock (br)	Amygdoloidal lava flows (diabase and basalt); locally quartz diorite and hornblende diorite	Rugged hills and gentle slopes; locally in stream cuts	Good	Lacking or very deep	Unsusceptible	Good if crushed	Good, but difficult to excavate



Base on U. S. Geological Survey
Mt. Hayes A-5 Multiplex compilation

5000 0 5000 10 000 15000 FEET

1 1/2 0 1 2 3 MILES

CONTOUR INTERVAL 100 FEET
Datum is mean sea level

30 1/2° TRUE NORTH MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION 1952

Geology by Reuben Kachadoorian, T. L. Pèwè and D. D. Smith; 1954

ENGINEERING GEOLOGY OF THE SOUTHERN HALF OF MT. HAYES A-5 QUADRANGLE, ALASKA