PHILIP SMITH MTS

GENERALIZED DESCRIPTION OF MAP UNITS IN THE PHILIP SMITH MOUNTAINS QUADRANGLE, ALASKA

OPEN FILE MAP
SHEET 2 OF 2

Important notes:
1. This portion of the proposed trans-Alaska pipeline route is considered to be subject to a maximum probable earthquake with a Richter magnitude of 5.0.
2. Bedrock in the central part of the Brooks Range has been tightly folded and faulted in numerous places. Many of these faults are thrust faults overthrust to the north. The axes of the folds and the traces of the faults generally trend east-west. Evidence of faulting during Holocene time has not been recognized.
3. Temperature of permafrost just below the zone of seasonal variation is extremely variable.

Map Unit Symbol	Name	Description	Distribution and Thickness	Topography and Vegetation	Permafrost	Susceptibility to Frost Action	Drainage Surface	Drainage Subsurface (if thawed)	Susceptibility to Erosion	Construction Uses	Remarks
Qac	Active flood plain	Coarse, sandy gravel and sand with minor amounts of silt. Gravel clasts subrounded to rounded; locally many scattered boulders. Generally poorly stratified with local beds and lenses of sand.	Occurs along the Sagavanirktok and Atigun rivers in the vicinity of their junction and along the upper reaches of the Atigun and Dietrich rivers and the unnamed fork of the Chandalar River near the southern border of the Philip Smith Mountains quadrangle. Thickness generally less than 50 feet.	Flat plain with complex network of braided channels with local relief of 2 to 10 feet. Generally bare of vegetation.	Permafrost generally absent in proximity to main channels of rivers; possibly present at depth.	Low	Good	Good	High	Excellent for fill, base course, and surface course.	Locally subject to aufeis, flooding, and extensive erosion. Shallow ground-water table restricts depth of excavation. Especially subject to flooding during spring breakup.
Qaf	Alluvial fans	Poorly sorted silty gravel and sand. Deposits coarse grained at apex of fan, but grade to finer-grained material at toe. Most deposits include numerous boulders.	A large fan occurs where the Atigun River joins the Sagavanirktok River and numerous small fans occur along both sides of the major valley through the Brooks Range. Thickness highly variable ranging from a few feet at apex and sides of fan to more than 100 feet in the middle.	Large fan along Atigun River has moderate slopes; small fan in mountains has steep slopes at apex becoming less steep toward toe of fan. Tundra vegetation on large fan; small fans generally bare of vegetation.	Generally present within a few feet of surface. Two well-developed, open-system pingos present at lower end of 2 alluvial fans south of Galbraith Lake.	Generally low	Generally good	Generally good	High along stream courses.	Locally good for fill, base course, and surface course.	Subject to torrential floods, shifting channels, and local icings.
Qc	Colluvium	Unsorted to poorly sorted gravelly, sandy silt with numerous angular rock fragments; in rugged parts of Brooks Range, deposits chiefly rock fragments. Stratification, where present, generally parallels surface at about angle of repose.	Small area occurs at northern edge of Philip Smith Mountains quadrangle; widely distributed within the more rugged parts of the Brooks Range on and at the base of steep slopes.	Very steep to moderately steep mountain slopes. Generally bare of vegetation.	Generally present within a few feet of surface.	Generally low; high locally in fine-grained materials.	Generally good	Generally good	Generally low	Coarse-grained alluvium good for coarse fill and riprap.	Colluvial slopes generally unstable, especially if disturbed by construction.
Qty	Young alluvial terraces	Coarse, sandy gravel and sand with minor amounts of silt. Gravel clasts subrounded to rounded; locally many scattered boulders. Generally poorly stratified with local beds and lenses of sand. Commonly mantled by 1/2 to 3 feet of organic-rich silty sand.	Extensive deposits occur along the Sagavanirktok from the north edge of the Philip Smith quadrangle southward for a distance of about 30 miles. Thickness quite variable but generally less than 50 feet.	Series of flat-topped terraces separated from one another and from the active flood plain by small scarps. Low brush or tundra vegetation.	Generally present within a few feet of the surface, except in proximity to active flood plain. Ice coats particles and fills voids in gravel. Ice wedges present locally.	Generally low, but high in silty overburden.	Generally good near active flood plain, but poor away from it.	Good	Generally low, but moderately high for silty overburden.	Sand and gravel excellent for fill, base course, and surface course.	Shallow ground-water table under low terraces limits depth of excavation. Low terraces near active flood plain are subject to bank erosion and occasional flooding. In many places materials would have to be thawed before they could be excavated for borrow. Locally ice-rich permafrost could cause severe differential settlement if allowed to thaw.
Qls	Landslides	Unsorted masses of extremely coarse rock rubble with minor amounts of gravelly sandy silt in lower part of deposit.	Small landslides occur in the deep canyon cut by the Atigun River and along the steep valley walls near the head of Atigun River. Thickness generally less than 50 feet.	Slump blocks with steep slopes. Generally bare of vegetation.	Generally present within a few feet of the surface.	Generally low	Good	Generally good	Generally low	Rubble of competent rock good for riprap and coarse fill.	Landslide areas potentially unstable, especially if disturbed by construction.
Qas	Fine-grained alluvium and eolian sand	Well stratified silty sand with numerous beds of organic-rich material; local beds and lenses of pebble gravel. At several places along the Atigun River, especially near Galbraith Lake, overlain by well-developed cliff-head sand dunes.	Occurs in the valley of Atigun River south of Galbraith Lake. Maximum thickness more than 50 feet.	Flat to gently sloping terrain dotted by deeply subsided thaw lakes. Conspicuous cliff-head sand dunes present locally. Tundra vegetation.	Generally present within 2 feet of surface and generally extremely ice rich. Ice wedges common.	Moderate	Fair to poor	Generally good	Generally high	Generally unsuited for most construction purposes.	In many places ice-rich permafrost could cause severe differential settlement if allowed to thaw.
Qmy	Young moraine	Unsorted, heterogeneous mixture of gravel, sand, and silt, generally ranging from gravelly sandy silt to silty, sandy gravel. Gravel clasts generally subrounded to subangular; locally includes numerous boulders. Deposits include irregular lenses and pockets of sandy gravel and gravelly sand.	Is widespread between the Oksrukuyik and the confluence of the Sagavanirktok and Atigun rivers; a few isolated areas occur in major valleys on either side of the summit of the Brooks Range. Thickness quite variable ranging from a few feet to more than 50 feet.	Moderate to moderately steep slopes of partially subdued hummocky terrain. Tundra vegetation.	Generally present within 2 feet of surface and locally ice-rich. Conspicuous ice wedges present locally in depressions.	Moderate	Fair	Fair	Moderate	"	"
Qto	Old alluvial terraces	Coarse, sandy gravel and sand with minor amounts of silt. Gravel clasts subrounded to rounded. Generally poorly stratified with local lenses and beds of sand. Commonly mantled by 2 to 10 feet of organic-rich silty sand.	Occurs discontinuously along the Sagavanirktok River and a small area along the unnamed fork of the Chandalar River south of the divide. Thickness slightly greater than the thickness of young terraces (map unit Qty).	Series of flat-topped terraces separated from one another and from the young terraces by small scarps. Tundra vegetation.	Generally present within 2 feet of the surface. Ice commonly coats particles and fills voids. Ice wedges generally present.	Generally low, but high in silty overburden.	Generally poor	Good	Generally low, but moderately high for silty overburden.	Generally unsuited for most construction where overburden is thick. Locally suitable for fill, base course, and surface course.	"
Qmo	Old moraine	Unsorted heterogeneous mixture of gravel, sand, silt, and clay, generally ranging from gravelly, sandy silt to silty, sandy gravel. Gravel clasts generally subrounded to subangular; locally includes numerous boulders. Deposits include irregular lenses and pockets of sandy gravel and gravelly sand.	Occurs between northern border of Philip Smith Mountains quadrangle and a point about 20 miles to the south. Thickness highly variable ranging from a few feet to more than 50 feet.	Moderate slopes of subdued hummocky terrain. Tundra vegetation.	Generally present within 2 feet of the surface; locally ice rich. Ice wedges common in depressions.	Moderate	Fair	Fair	Moderate	Generally unsuited for most construction purposes.	"
Ksc	Cretaceous sandstone and conglomerate	Generally well-indurated sandstone and conglomerate; chiefly conglomerate. Bedrock generally mantled by unconsolidated, gravelly, sandy silt and silty sand.	Occurs on both sides of the Sagavanirktok River at the northern border of the Philip Smith Mountains quadrangle. Mantle of fine-grained material is quite variable in thickness from a few feet to more than 50 feet.	Generally moderate slopes, but locally steep. Tundra vegetation.	Generally present at variable depths depending on soil and vegetation cover, and exposure to solar radiation. Voids and fractures filled with ice. Mantle of fine-grained materials generally extremely ice rich.	Bedrock low; fine-grained mantle high.	Bedrock good; fine-grained mantle poor.	Bedrock good; fine-grained mantle poor.	Bedrock low; fine-grained mantle high.	Bedrock, where well indurated, good for riprap and coarse fill; fine-grained mantle generally unsuited for most construction purposes.	"
KJ	Cretaceous and Jurassic shale, sandstone, and conglomerate.	Chiefly well-indurated sandstone and conglomerate; shale generally soft and fissile.	Underlies mountains on both sides of Sagavanirktok River between Ribdon River and Galbraith Lake, in northern half of Philip Smith Mountains quadrangle. Shale crops out at river level about 5 miles north of the junction of Atigun River.	Generally steep to moderately steep mountainous slopes. Generally bare of vegetation.	"	Low	Good	Good	Low	Sandstone and conglomerate good for riprap and coarse fill; shale generally unsuited for most construction purposes.	Under certain conditions, shale underlying steep slopes susceptible to landsliding.
TrP	Triassic and Permian shale, siltstone, sandstone, and limestone.	Soft shale and siltstone with minor amounts of generally hard, well-indurated limestone and sandstone.	Underlies steep slopes on both sides of Atigun River just east of Galbraith Lake.	Generally steep to moderately steep slopes on both sides of Atigun River canyon. Generally bare of vegetation.	"	Low	Good	Good	Low	Limestone and sandstone good for riprap and coarse fill; shale and siltstone generally unsuited for most construction purposes.	"
Ml	Mississippian limestone, dolomite, chert, and shale.	Chiefly, hard, well-indurated limestone with minor amounts of dolomite, chert, and shale; shale soft.	Underlies high mountains south of Atigun River canyon and Galbraith Lake.	Generally very steep to moderately steep slopes of high, rugged mountainous terrain. Generally bare of vegetation.	"	Low	Good	Good	Low	Limestone generally excellent for riprap, coarse fill, base course, and surface course.	Several thrust faults present.
Dk	Devonian conglomerate	Hard, well-indurated conglomerate.	Underlies high mountains between a point a few miles south of Galbraith Lake and the south side of the continental divide.	"	"	Low	Good	Good	Low	Conglomerate generally good for riprap and coarse fill.	"
Ds	Devonian slate and sandstone.	Hard, well indurated sandstone; slate fissile and readily breaks into small, flat, angular fragments.	Underlies high mountains between continental divide and the southern border of the Philip Smith Mountains quadrangle.	"	"	Moderate	Good	Good	Low	Sandstone generally good for riprap and coarse fill; slate generally unsuited for most construction purposes.	Slate bedrock, which underlies divide between the Dietrich River drainage and the drainage of the unnamed fork of the Chandalar River, readily disintegrates into small, platy angular rock fragments.