DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF – 494

SHEET 2 OF 2

GENERALIZED DESCRIPTION OF MAP UNITS IN THE MT. MICHELSON QUADRANGLE, ALASKA

Map symbol	Name	Description	Distribution and thickness	Topography and vegetation	Permafrost	Susceptibility to frost action	Drainage		Susceptibility to erosion	Suitability for construction uses	Problems
							Surface	Subsurface (if thawed)			
		U N C O N S O L I D A T E D					D E P O S I T S				
Qfg	Flood plain gravel	Gravel and sand with minor amounts of silt and clay. Gravel clasts well rounded to subrounded and of diverse rock types derived from Brooks Range. Imbricate structure of cobbles and pebbles common.	Present along the Kavik and Canning Rivers; thickness unknown.	Flood plain, flat with braided drainage channels; relief generally less than 10 feet. Vegetation generally absent.	Generally free of permafrost near surface Probably present at some (unknown) depth.	Low	Good	Good	High because of proximity to river channels.	Excellent, primarily as coarse aggregate; presence of some chert objectionable.	Subject to erosion and flooding during times of high runoff (spring breakup). Depth of river scour must be determined before burying pipe or cable in gravel. Aufeis conditions occur locally. Shallow ground-water table will be problem during excavation.
Qaf	Alluvial fan	Generally poorly sorted silty, sandy gravel. Clasts angular to subrounded. Boulders common near apex of fans. Cut-and-fill structure common. Rock types representative of local bedrock. Deposited during times of rapid runoff when conditions approaching "sheetflood" occurred.	Common along the sides of the Canning River at the mouths of tributary side canyons. Thickness variable; perhaps as much as 100 feet locally.	Commonly fan shaped with steep slopes near the apex or valley sides, becoming less steep near the toe of the fan. Toes of large fans are generally quite flat where they have spread out on the valley floor; sparse vegetation.	Present within a few feet of the surface.	Low	Good	Good	High, especially near toes of fans and near stream courses.	Good as coarse aggregate.	Subject to torrential flooding and associated erosion.
Qcf	Colluvial fan	Very poorly sorted, angular to subangular sandy gravel. Boulders common. Fan gravels were probably derived principally by colluviation and may represent an intermediate unit between alluvial fans and talus.	Present at a few localities along the sides of the Canning River valley; thickness variable.	Fan shaped with steep slopes near the apex becoming less steep near the toe; little, if any, vegetation.	----------do----------	Low	Good	Good	High	Fair; poor sorting could be a problem.	Subject to river erosion near the toe.
Qta	Talus	Angular to subangular rock fragments up to 2 feet in diameter, locally derived.	Present at a few localities along the sides of the Canning River valley; 5 to 50 feet thick.	Fan shaped with steep slopes near the apex becoming less steep near the toe; little, if any, vegetation.	May be present within a few feet of the surface.	Low	Good	Good	Low, except where deposit borders on present river flood plain.	Possible source for riprap.	Slopes unstable and rocks subject to movement if disturbed.
Qrs	Recent slide	Unsorted, unconsolidated soil and rock rubble; contains some small mudflows; derived from till.	Occurs at one locality on west side of Canning River valley about 3 miles below the mouth of the Marsh Fork; 6 to 15 feet thick.	Hummocky, irregular topography on steeply sloping side of Canning River valley; no vegetation.	Present within 2 feet of surface.	High	Poor	Poor	High; subject to movement when thawed.	Unsuitable	Subject to surface movement during spring and summer thaw.
Qc	Colluvium, undifferentiated	Poorly sorted sand, silt, and clay derived from local upslope sources. May contain minor amounts of coarse material. Generally consists of a mixture of soil and other fine-grained materials that are subject to slow downslope creep when thawed.	Present near the base of slopes bordering the Kavik, Canning, and Marsh Fork of the Canning Rivers; probably less than 20 feet thick.	Generally smooth slopes along the base of steeper slopes; low shrubs and grasses common.	----------do----------	High	Poor	Poor	High	Unsuitable	Occasionally subject to surface movement. Generally this material is present at or near the base of steeper slopes and represents the accumulation of debris derived by slow flowage from upslope.
Qs	Sand and silt	Carbonaceous sand, silt, and clay of multiple origin; primarily residual, eolian, and colluvial in nature.	Present in north part of map area; generally 20 feet thick but locally thicker.	Gentle slopes rising above the flat coastal plain. Streams have cut 6- to 15-foot gullies into the soft sediments; tundra vegetation.	----------do----------	High	Poor	Poor	High; stream gullying.	Unsuitable	High ice content makes this material subject to extreme settlement and flowage even on gentle slopes if enclosed ice melts.
Qvg	Vegetated gravel	Gravel and sand with minor amounts of silt and clay. Gravel clasts well rounded to subrounded. Commonly mantled with 1 to 3 feet of carbonaceous silt.	Extensive deposits along the major rivers; probably less than 50 feet thick.	Low, flat terraces bordering and occasionally surrounded by younger flood plain gravels (Qfg). Covered almost everywhere by tundra or low brush vegetation.	----------do----------	Low, except in silt-rich cover	Good	Good	High because of proximity to major rivers.	Good when stripped of thin silt overburden; however, materials generally must be thawed before being excavated. Presence of some chert objectionable.	Flooding and erosion common during high runoff. Shallow ground-water table limits depth of excavation.
Qtg	Terrace gravel	Gravel and sand with minor amounts of silt and clay. Gravel clasts well rounded to subrounded. Generally mantled with 1 to 5 feet of carbonaceous silt.	Occurs as low terraces bordering the Kavik and Canning Rivers; probably 10 to 20 feet thick.	Generally flat terrace bounded by scarps 4 to 10 feet high; tundra and brush vegetation.	----------do----------	High in silty overburden; low in underlying gravel and sand.	Fair to poor	Good	High in areas next to river flood plains.	Fair; silty overburden and permafrost pose problems.	Flooding and erosion in areas near river flood plains. Shallow ground-water table limits depth of excavation.
Qt_5	Till, cirque glaciation	Unsorted, bouldery gravel with minor amounts of silt and clay. Gravel clasts angular to subangular.	Occurs in three small cirques approximately 2 miles west of the Canning River and 3 miles north of the mouth of the Marsh Fork; probably less than 20 feet thick.	Hummocky, steep topography; tundra vegetation	----------do----------	Moderate	Fair	Fair	Moderate	Unsuitable	Ice-rich permafrost would cause severe differential settling if thawed.
Qog_4	Outwash gravel	Gravel and sand with minor amounts of silt and clay. Gravel clasts well rounded to subrounded. Mantled with 1 to 3 feet of carbonaceous silt.	Occurs as two small terraces on the east side of the Marsh Fork about 10 miles upstream from the mouth of the Marsh Fork; 20 to 40 feet thick.	Flat terrace bounded by scarps 6 to 15 feet high; tundra vegetation.	----------do----------	Low, except in silt-rich cover.	Good	Good	High proximal to Marsh Fork.	Good, but of very limited amount.	Permafrost must be thawed before gravel can be excavated.
Qog_3	Outwash gravel	Gravel and sand with minor amounts of silt and clay. Gravel clasts well rounded to subrounded. Mantled with 1 to 3 feet of carbonaceous silt.	Occurs as four separate terrace remnants on both sides of the Marsh Fork approximately 10 miles upstream from the mouth of the Marsh Fork. Terraces are traceable directly into till (Qt_3); 30 to 100 feet thick.	Flat terraces bounded by scarps 20 to 80 feet high; tundra vegetation.	----------do----------	-------do-------	Good	Good	----------do----------	Good	----------do----------
Qt_3	Till	Sandy, bouldery gravel. Gravel clasts subrounded to subangular.	Occurs as remnants of a terminal moraine about 10 miles up the Marsh Fork; thickness is extremely variable but may be as much as 100 feet locally.	Hummocky, morainic topography dissected by tributary streams that in places have cut through till into underlying bedrock; tundra vegetation.	Present within 2 feet of surface.	Low	Good	Good	Moderate	Fair	Permafrost must be thawed before gravel can be excavated.
Qog_2	Outwash gravel	Gravel and sand with minor amounts of silt and clay. Gravel clasts well rounded to subrounded; covered with 1 to 5 feet of carbonaceous silt.	Present at a single locality on the west side of the Canning River opposite Shublik Island; thickness unknown.	Flat terrace bounded by scarp 40 to 80 feet high; tundra vegetation.	----------do----------	Low	Good	Good	Moderate	Good but of limited volume.	----------do----------
Qt_2	Till	Sandy, bouldery gravel. Gravel clasts subrounded to subangular. Generally covered with 1 to 5 feet of carbonaceous silt.	Occurs mainly as a ground moraine within the Canning and Marsh Fork valleys; probably 5 to 50 feet thick.	Subdued hummocky topography; smooth slopes with some lakes; tundra vegetation.	Present within 2 feet of surface; ice wedge(?) polygons observable on the flat valley floor where valley widens at Mt. Front.	High in silty overburden	Fair to poor	Good	High	Fair; silty overburden and permafrost are problems.	Thermal erosion prevalent where overlying vegetation mat is removed or disturbed.
Qog_1	Outwash gravel	Coarse, sandy gravel with minor amounts of silt. Gravel clasts subrounded to well rounded. Locally mantled with 1 to 5 feet of carbonaceous silty sand and silt.	Terraces bordering Kavik River; 5 to 50 feet thick.	Gently sloping terrace moderately dissected by small streams; tundra vegetation.	Present within 2 feet of surface.	Low	Poor	Good	Low	Good; however, materials must be thawed prior to excavation.	Except for the presence of permafrost and occasional thick silty cover, would be well-drained material of potential use as aggregate.
Qt_1	Till	Sandy, bouldery gravel. Gravel clasts subrounded. Locally covered with 1 to 5 feet of carbonaceous silt.	Widespread on the gentle slopes bordering the Kavik River extending up to the divide between the Canning and Kavik Rivers; 5 to 50 feet thick.	Very subdued morainic forms; smooth slopes. Dissected by present drainages, exposing underlying bedrock; tundra vegetation.	----------do----------	High in silty overburden	Fair	Good	High	Fair; silty overburden and permafrost are problems.	Thermal erosion prevalent where overlying vegetation mat is removed or disturbed.
		B E D R O C K									
Ts	Siltstone, sandstone, and conglomerate	Poorly consolidated conglomerate, sandstone, and siltstone, with some low-grade coal beds. Characterized by high content of resistant rock types--quartz, chert, and quartzite.	Present in two localities bordering the Kavik River near the north edge of map area. Thickness unknown.	Gentle to steep slopes; tundra vegetation.	Present within 2 feet of surface.	Low	Good	Good	Low	Coarse-grained fraction good for coarse aggregate. Fine-grained material too variable in texture and composition; presence of coal and chert objectionable.	Exact position of contact with Cretaceous rocks somewhat doubtful as lithologies of the two units are similar near the contact.
Kss	Sandstone and shale	Sandstone, siltstone, shale, coal; some conglomerate; salt and pepper sandstone with wood fragments and coal; weathers gray to brown.	Present as large outcrop southwest of Kavik River in the northwest part of map; also exposed as small outcrops where overlying till (Qt_1) has been eroded; thickness unknown.	Gentle to steep slopes, in foothill zone of the Brooks Range; tundra vegetation.	Where soils are more than 2 feet thick, ice-rich permafrost is probably present. Ice in voids and fractures in consolidated rock.	Low	Good	Good	Low	Sandstone and conglomerate good for riprap and coarse fill.	Shales underlying steep slopes may be susceptible to landsliding if thawed.
Ks — Kn	Sedimentary rocks, undivided — Nanushuk Group	Sandstone, wacke, siltstone and shale, thin- to medium-bedded; flutes, grooves and load casts; minor cross-beds; weathers yellow and orange.	Present as two small outcrops on east side of Kavik River about middle of map area; thickness unknown.	----------do----------	---------do----------	Low	Good	Good	Low	Sandstone good for riprap and coarse fill.	----------do----------
Ks — Kk	Sedimentary rocks, undivided — Kemik Sandstone Member of Okpikruak Formation	Subgraywacke and arenaceous sandstone; chert- and quartz-pebble conglomerate; thin to medium beds; weathers gray to reddish brown.	Present as isolated small outcrops in foothill region of Brooks Range (near center of map area) where overlying till has been eroded; thickness unknown.	----------do----------	---------do----------	Low	Good	Good	Low	----------do----------	
Jk	Kingak Shale	Upper part: clay shale, silty shale, and siltstone with rusty-weathering ironstone beds; pyrite abundant locally. Lower part: dark-gray to black fissile paper shale; abundant large ironstone concretions.	----------do----------	----------do----------	---------do----------	Low	Good	Good	Low	Unsuitable	Shales underlying steep slopes may be susceptible to landsliding if thawed.
Ps	Shublik Formation	Dark-gray fine-grained quartzitic sandstone and siltstone; locally calcareous or dolomitic; phosphatic nodules common; interbedded black calcareous siltstone and limestone.	A few small outcrops present west of the Canning River near center of map area; thickness unknown.	Gentle to steep slopes; tundra vegetation.	---------do----------	Low	Good	Good	Low	Sandstone fair for riprap; of limited extent.	
PPs	Sadlerochit Formation	Massive gray to tan quartzitic sandstone and conglomerate; siltstone and shales; limonite and pyrite; weathers rusty brown; lower part: massive dark-gray quartzite and quartzitic siltstone; locally calcareous. Channel conglomerate at base locally.	Forms moderately broad outcrop band across map at two separate places within Brooks Range in south half of map area; thickness unknown.	Massive sandstone forms cuestas.	---------do----------	Low	Good	Good	Low	Sandstone and conglomerate good for riprap and coarse fill.	Shales underlying steep slopes may be susceptible to landsliding if thawed.
PMl — Pw	Lisburne Group — Wahoo Limestone	Fine-grained limestone, oolitic limestone, glauconitic limestone; weathers light gray and creamy.	Forms broad outcrop bands trending generally normal to the Canning and Marsh Fork Rivers within the Brooks Range; thickness unknown.	Very steep to moderately steep slopes of high, rugged mountainous terrain; generally bare of vegetation.	---------do----------	Low	Good	Good	Low	Limestone excellent for riprap, coarse fill, base course and surface course.	Numerous tight folds, overturned folds, and some thrust faults are present.
PMl — Ma	Lisburne Group — Alapah Limestone	Bioclastic limestone, dolomite, black chert. Weathers gray to dark gray.	----------do----------	----------do----------	---------do----------	Low	Good	Good	Low	----------do----------	----------do----------
Mss — Mky	Shale and sandstone — Kayak(?) Shale	Dark-gray to black shale; local interbedded limestone.	Occurs as narrow outcrop bands in high parts of Brooks Range; thickness unknown.	----------do----------	---------do----------	Low	Good	Good	Low	Unsuitable	
Mss — Mkt	Shale and sandstone — Kekiktuk Conglomerate	Quartzite and quartz and chert-pebble conglomerate; local anthracite coal.	----------do----------	----------do----------	---------do----------	Low	Good	Good	Low	Conglomerate good for riprap and coarse fill.	
O€cp	Neruokpuk Formation — Chert and phyllite	Dark-gray to black and red phyllite; thin-bedded glassy gray to black chert; minor red and green chert.	Present in the high parts of the Brooks Range at the south edge of map area; thickness unknown.	----------do----------	---------do----------	Low	Good	Good	Low	Could be used locally for riprap and coarse fill.	
€ld	Neruokpuk Formation — Limestone and dolomite	Limestone and dolomite; partly oolitic.	Occurs locally within the rugged mountainous parts of the Brooks Range; thickness unknown.	----------do----------	---------do----------	Low	Good	Good	Low	Limestone generally excellent for riprap, coarse fill, base course, and surface course.	
€v	Neruokpuk Formation — Flows, tuffs, and volcaniclastic rocks	Flows and(or) sills, tuffs, volcaniclastic rocks, agglomerate.	Occurs as only small outcrops near southern boundary of map area; thickness unknown.	----------do----------	---------do----------	Low	Good	Good	Low	Too limited in lateral extent to be of much use.	
€cs	Neruokpuk Formation — Calcareous siltstone and sandstone	Ferruginous, micaceous, calcareous siltstone, shale, and thin cross-bedded sandstone.	Forms broad outcrop band trending normal to Canning River just north of the junction of Canning and Marsh Fork Rivers; thickness unknown.	----------do----------	---------do----------	Low	Good	Good	Low	Sandstone good for riprap and coarse fill.	
€ch	Neruokpuk Formation — Chert and phyllite	Thin- to medium-bedded chert, mostly black; black, green, and purple phyllite.	Occurs as small outcrops within and adjacent to areas mapped as €cs; less than 500 feet thick.	----------do----------	---------do----------	Low	Good	Good	Low	Could be used locally for riprap and coarse fill.	
p€ng	Neruokpuk Formation — Quartzwacke and semischist	Quartzwacke and semischist; locally includes maroon and green phyllite and argillite.	Occurs as a broad outcrop band trending approximately east-west in vicinity of junction of Canning and Marsh Fork Rivers; thickness unknown.	----------do----------	---------do----------	Low	Good	Good	Low	Usable as riprap and coarse fill.	