Description of Map Units

		Description	Distribution and Thickness	Topography and Drainage	Permafrost	Susceptibility to Frost Action	Susceptibility to Erosion	Excavation and Compaction	Suitability for Construction	Remarks
Qgr	Mine tailings	Placer-mine dredge tailings composed of gravel, sand, and silt. Gravel clasts are angular to subrounded pebbles to boulders consisting mostly of quartz, gneiss, and schist.	Occurs only in upper Goldstream Creek and in Engineer Creek, (map A); 1 to 85 m thick.	Steep, imbricate, parabolic, symmetrical gravel piles forming rough terrain with some undrained depressions. Material loose, porous, and slightly compacted. Excellent drainage and permeability.	Permafrost presently forming in these materials. Ground ice present in interbedded dredge pond silt as disseminated ice and as small masses of segregated ice. Ground ice generally absent in gravel.	Low in gravels, high in interbedded dredge pond silts.	Low.	Easily excavated with power equipment except where frozen. Requires ripping or blasting if frozen. Difficult to compact.	Good foundation material for structures if the tailings piles are leveled, unfrozen and kept well drained. Poor for road material because of schist content, which breaks down to silt under traffic and frost action.	Shallow ground water table limits depth of excavation.
Qa	Silty and sandy alluvium of minor streams	Moderately to well stratified brown to dark gray, generally micaceous, silt and very fine sand. Angular to rounded gravel common in places, generally below a depth of 2 to 3 m.	Restricted to smaller valleys; 2 to 10 m thick.	Low relief and gentle slopes, except at stream banks, where streams incised 1 to 3 m may have vertical to near vertical banks. Drainage good on silty natural levees along stream banks, poor away from levees. Subject to flooding.	Depth to permafrost table 0.5 to 1 m. Ground ice may be present, but generally only as small masses of segregated ice.	Moderate to intense.	Highly susceptible to lateral stream erosion near active channels. Locally subject to subsidence upon melting of ice-rich permafrost.	Ripping or blasting required unless thawed. Can be excavated with power equipment if not frozen. Easy to compact.	Minor source of fill due to restricted occurrence.	Shallow ground water table limits depth of excavation.
Qas	Sandy alluvium	Gray to brown well stratified sand and silty sand with minor silt and gravel. Gravel clasts rounded to subrounded, as much as 8 cm in diameter, and of heterogeneous composition. Capped by 1 to 3 m of silt to sandy silt overbank deposits that may contain organic materials. Silts and organic deposits thickest in filled swales and drained flood-plain lakes.	Occurs as channel and flood-plain alluvium of the Tanana River in the Mt. Hayes and Tanacross quadrangles (maps C and D). The deposits are probably thin (10 to 20 m) and overlie glacial gravel in the Mt. Hayes quadrangle (map C) and west of Tok in the Tanacross quadrangle (map D), but may be considereably thicker east of Tok.	Low relief and gentle slopes, except at river banks, which are 1 to 4 m high and vertical to near-vertical. Drainage poor on flood-plain good adjacent to river banks. Subject to flooding.	Permafrost generally absent beneath the river, and beneath lakes and streams on the flood-plain. Elsewhere permafrost is discontinuous and irregular in distribution and depth to the top of frozen ground may be less than 1 m. Low ground ice content, chiefly as segregated ice.	Moderate to high in overbank silts and in lake and swale fillings; low in sand and gravel.	Highly susceptible to lateral erosion near active channels.	Easy to excavate with power equipment if not frozen. Requires ripping or blasting if frozen. Easy to compact.	Possibly suitable for fill in absence of coarser material.	Significant changes in ground response to seismic shaking may occur across boundaries between frozen and unfrozen zones. Shallow ground water table limits depth of excavation.
Qag	Gravelly alluvium	Well stratified gravel and sand with minor beds and lenses of silt. Gravel clasts rounded to subrounded and of heterogeneous composition. Cobbles and boulders common in glacier-fed tributaries of the Tanana River, and where the river is adjacent to till. Elsewhere cobbles are rare to common and boulders are rare. Away from active channels, gravel is capped by 1 to 3 m of alluvial silt and very fine sand that may contain organic deposits. Silt and organic deposits thickest in topographic depressions.	Occurs as channel and flood-plain deposits of the Tanana River and major tributaries in the Fairbanks, Big Delta and Mt. Hayes quadrangles (maps A,B, and C), and in the western part of the Tanacross quadrangle (map D). Thickness not known but is as much as 230 m near the Tanana River in the Fairbanks quadrangle.	Low relief and gentle slopes except at river banks, which are 1 to 4 m high and vertical to near vertical. Drainage poor to good on flood-plain, good adjacent to river banks. Subject to flooding.	Discontinuous and irregular in distribution; absent beneath large lakes and streams. Interspersed vertically and horizontally with unfrozen lenses, layers and zones. May occur at depths of less than 1 m in thickly vegetated overbank deposits. Depth to top of permafrost 8 to 15 m in some cleared areas. Permafrost is 1 to more than 85 m thick in the Fairbanks quadrangle (map A). Low ground ice content except in older parts of flood-plain where overbank deposits may contain significant amounts of segregated ice.	Low in gravel and sand, moderate to high in overbank deposits.	Highly susceptible to lateral erosion near active channels.	Easily excavated with power equipment if not frozen. Requires ripping or blasting if frozen. Easy to compact.	Where schist content not too high, good source of gravel for base course material and, if crushed and screened for road metal. Possible source of concrete aggregate where free of schist, chert, and coal fragments.	Shallow ground water table limits depth of excavation.
Qfl	Fluvial and lacustrine sand, silt, and clay	Stratified, gray to dark brown, very fine sand, silt and minor clay deposited by low gradient streams and in thaw lakes. Locally includes abundant organic matter.	Occurs along the Chisana River (maps D and E), and in the valley of Scottie Creek (map E). As much as 35 m thick near Scottie Creek.	Flat slopes with low relief except at stream and lake banks which are as high as 3 m and vertical to near vertical. Drainage poor, with many lakes, ponds and bogs.	Depth to permafrost table generally less than 1 m. Absent beneath streams and large lakes. Ice rich; large ice masses may be present.	High	Highly susceptible to lateral erosion near active channels. Subject to subsidence upon melting of ice-rich permafrost.	Difficult to excavate with power equipment. Difficult to rip; blasting only moderately effective. When sides of excavation thaw viscous mud slides into work area. Difficult to compact.	Poor foundation material. Poor source of fines because of high organic content.	Significant changes in ground response to seismic shaking may occur across boundaries between frozen and unfrozen zones. Where unfrozen, shallow water table limits depth of excavation. Thawing of permafrost will occur if vegetation mat is removed.
Qsp	Silt and peat	Poorly stratified layers and lenses of organic-rich, dark brown to dark gray, alluvial and bog silt. Locally with 10 to 30 percent clay-size particles. Peat layers present in places.	Occurs in many topographic depressions throughout the mapped area. Thickness generally about 1 m, and rarely more than 2 m. many small occurrences not mapped, particularly in Qag and Qas units.	Flat surfaces with very poor drainage. Marshy and boggy throughout the summer.	Depth to permafrost table less than 1 m. May contain significant amounts of interstitial ice and segregated ice.	High	Susceptible to lateral erosion adjacent to active stream channels. Subject to subsidence upon melting of ice-rich permafrost.	Difficult to excavate with power equipment. Blasting or ripping generally required. Difficult to compact.	Not suitable for construction use. Should be removed if possible prior to construction.	
Qls	Landslide deposits	Clayey to sandy rubble, with boulders of gneiss and granite. Derived from till and possesses till-like lithologic characteristics; unstratified and poorly sorted. Capped by a veneer of alluvial fan deposits.	Present only in the western part of the Tanacross quadrangle (map D), about 15 km west of Tok. Thickness unknown.	Slopes from the mountain front to the valley floor. Total relief of about 50 m across the 0.7 km wide deposit. Original hummocky topography smoothed somewhat by covering of alluvial fan deposits.	Depth to permafrost table probably about 1 m in depressions and muskeg covered slopes; perhaps 8 m on dry slopes. Ice content low to high; where high consists of interstitial and segregated ice.	Moderate	Low when slopes frozen or dry; subject to sloughing, and solifluction when thawed.	Easy to excavate with power equipment where unfrozen, except for handling large boulders. Ripping or blasting required where frozen. Easy to compact if boulders are removed.	Poor to good foundation material and source of fill.	Ancient (probably Pleistocene) landslide deposit rests upon the valley floor and was derived from till. Landslide probably stable as a whole unless toe is removed, but slopes of knobs and hillocks are subject to sloughing and solifluction.
Qe	Eolian sand	Brown to gray, well sorted, fine to medium grained sand. In the Big Delta and Mt. Hayes quadrangles (maps B and C) consists largely of quartz; in the Tanacross and Nabesna quadrangles (maps D and E) contains abundant volcanic lithic fragments.	North of Shaw Creek Flats and in the vicinity of Big Delta (map B); northeast of Sawmill Creek (map C); widespread along the north side of the Tanana Valley in the Tanacross and Nabesna quadrangles (maps D and E). Thickness locally exceeds 50 m. Unmapped formless thin sheets of eolian sand occur in the Mt. Hayes quadrangle (map C) on the unit mapped as glacial and non-glacial gravel undifferentiated (Qg).	Stabilized dunes with relief ranging up to 50 m. Numerous closed depressions. Slopes up to 60 percent on stabilized slip faces. Well drained with little standing water on maps B and C. Well to poorly drained on maps D and E, and lakes are present in some interdune depressions.	Generally absent north of Shaw Creek Flats except near the margin of the deposits. Permafrost probably present within a meter or so of the surface in the Tanacross and Nabesna quadrangles. Generally low ice content. Large ground ice masses locally present between Bitters Creek and Mi0way Lake (map D).	Low	Natural slopes stable if vegetated, but susceptible to gullying if runoff is channelized. Susceptible to intense rapid gullying where ground ice is present. Subject to subsidence upon melting of ice-rich permafrost. Barren slopes subject to deflation.	Easily excavated with power equipment if not frozen. Requires ripping or blasting if frozen. Difficult to compact.	Good source of poorly graded sand for blending. Requires binder for use as surfacing material.	Cut slopes not adequately stabilized will be deflated rapidly.
Ql	Eolian silt	Blanket of massive, homogeneous eolian silt; well sorted, locally calcareous, locally cemented by iron oxide. Consists mostly of quartz, feldspar, and mica. Color buff to gray when dry, brown when wet; locally mottled by iron staining and carbonaceous material.	Widespread on upper and middle hill slopes in the Fairbanks and Big Delta quadrangles (maps A and B). Thickness ranges from 1 to 10 m on upper hill slopes and low hill tops, and is as much as 65 m on middle hill slopes. Not mapped where thickness is less than 1 m. In the area of maps C,D, and E, loess is thin and is included within the unit designated Qsu.	Gently rolling hill slopes and low rounded hills; old, subdued parallel gullies and ridges perpendicular to contours characteristic of many upper slopes. Drainage generally good.	Absent on top of hills and upper slopes and generally absent throughout well-drained south facing slopes. Ground ice masses present locally under north facing slopes and poorly drained areas.	Moderate to low; locally high if drainage poor.	Highly susceptible to gullying; subject to piping and hydroconsolidation. Barren slopes susceptible to deflation. Subject to subsidence upon melting of ice-rich permafrost that is locally present under north facing slopes and in poorly drained areas.	Easy to excavate with power equipment except where frozen. Ripping or blasting required where frozen. Difficult to compact.	Good foundation material if protected against wetting. Unsurfaced roads built on eolian silt are muddy when wet and dusty when dry. Possible source of fines for blending.	Vertical to near vertical artificial cuts will be stable if adequate drainage is provided.
Qsu	Silt, undifferentiated	Massive buff to grayish black silt and very fine sand of alluvial, colluvial, and eolian origin. Consists largely of quartz, feldspar, and mica, locally cemented by iron oxides. Contains organic material, especially in valley bottoms. In the Fairbanks and Big Delta quadrangles consists mostly of retransported eolian silt. In the Mt. Hayes, Tanacross and Nabesna quadrangles very fine sand is locally abundant. Throughout mapped area unit includes minor quantities of angular alluvial and colluvial gravel in valley heads and reintrants and subrounded alluvial gravel in valley bottoms.	Occurs on valley sides and valley bottoms in the Yukon Tanana Upland throughout the mapped area. Thickness ranges from 1 m to about 100 m, but is generally less than 50 m.	Gently sloping footslopes, alluvial fan surfaces and valley bottoms, with generally minor relief. Irregular topography developed where ground ice has melted. Poor drainage due to permafrost conditions. Marshy in summer. Clearing produces quagmire in valley bottoms.	Depth to permafrost table generally less than 1 m, but may be as much as 5 to 7 m near contact with loess. Permafrost 1 to at least 110 m thick; wedges out up slopes. Continuous except under lakes and near contact with loess. Abundant large masses of ground ice as horizontal sheets, vertical sheets, wedges, and saucer shaped and irregular masses up to 15 m in diameter. Ground ice commonly occurs in a polygonal network.	High	Low when vegetated. Exceptionally high when protective vegetation is removed. Subject to subsidence upon melting of ice-rich permafrost.	Very difficult to excavate with power equipment. Difficult to rip; blasting only moderately effective. When sides of excavation thaw, viscous mud slides into work area. Difficult to compact.	Not suitable for construction uses.	Artificial cuts are unstable. If disruption of natural drainage causes ponding, thawing of permafrost will occur. Thawing also will occur if vegetation mat is removed. Exceptional differential ground settlement can occur during and after thawing; formation of thermokarst pits 1 to 10 m in diameter and 1 to 7 m deep, and thermokarst mounds 5 to 15 m in diameter and 1 to 3 m high. If thawing is induced, significant changes in ground response to seismic shaking may occur across boundaries between frozen and unfrozen zones.
Qts	Terrace gravel and silt	Brown to yellowish brown well stratified gravel, sand and minor silt overlain by yellowish red to olive brown alluvial and eolian silt with minor sand and gravel channel fills. Gravel clasts are moderately to well rounded and of various lithologies.	Borders the Delta River and occurs along the Tanana River in the Big Delta, Mt. Hayes and western part of the Tanacross quadrangles (maps B,C, and D). Thickness of the gravel and sand is unknown, but the overlying silt ranges from 3 to 7 m thick.	Gentle slopes with low relief. Drainage poor except for the vicinity of Delta Junction north to the Tanana River, where drainage is fair.	Between the Tanana River and Delta Junction permafrost is discontinuous and irregular. Frozen zones are common 1 m the silt within 1 m of the surface, and in places the entire silt cap may be frozen. Elsewhere, depth to permafrost generally less than 1 m and frozen ground extends to depths of several tens of meters. Ground ice content low in gravel but disseminated ice and small ice masses locally present in the silt cap, especially north of the Tanana River in map B.	Silt high; gravel low.	Highly susceptible to lateral stream erosion along the Tanana and Delta Rivers. Subject to subsidence upon melting of ice-rich permafrost.	Easily excavated with power equipment except where frozen. Generally rippable where frozen, but may require blasting where silt cap has high ice content. Gravel easy to compact; silt difficult to compact.	Poor foundation material where silt cap is frozen; good where silt is thawed. Underlying gravel is generally an uneconomical source of construction material due to thickness of silt overburden.	Signifiçant changes in ground response to seismic shaking may occur across boundaries between frozen and unfrozen zones.
Qaf	Alluvial fan deposits	Well to poorly stratified gravel, sand and rubble, commonly with cobbles and boulders. Gravel clasts are predominantly gneiss and schist, but from Yerrick Creek east (map D) granitic clasts also are present. Includes outwash and probably some mudflow deposits of unsorted silty, bouldery material.	Extends from near Roberston River southeast along the front of the Alaska Range (map D).	Moderate to steeply sloping coalescent alluvial fans. Drainage generally good except in frozen bogs near toes of fans.	Discontinuous and irregular. In places frozen from within 1 m of the surface to depths of at least 40 m. Near Tok, thin, isolated masses of permafrost occur in the upper 10 to 15 m. Low ground ice content.	Generally low, but may be high locally in the upper few meters and near toes of fans.	Highly susceptible to lateral stream erosion and to burial by fresh alluvium throughout the area of the deposit because of the possibility of rapid shifts in the positions of active stream channels. Subject to burial by mudflow deposits near the heads of alluvial fans.	Where thawed, easily excavated with power equipment except for handling boulders. Difficult to compact unless boulders removed.	Generally good foundation conditions and good to fair source of fill. Gravel and rubble suitable for base course material, and if crushed and screened, for road metal.	Subject to torrential flooding and erosion.
Qag	Glacial and nonglacial gravel, undifferentiated	Well stratified, moderately to well rounded, yellowish brown to gray gravel with minor sand and very minor silt. Clasts of heterogeneous composition, but mostly consist of granite, gneiss and schist. In the Tok vicinity, many clasts are volcanic rocks from outside the map area. Maximum clast size about 30 cm in longest dimension but most less than 10 cm. Locally overlain by 1 to 2 m of eolian sand and silt.	Widespread along the southern margin of the Tanana Valley 1 n map C and in the western part of map D. Thickness unknown and probably highly variable; at least 27 m thick west of Gerstle River where it is underlain by frozen sand and till; in excess of 40 m thick in the vicinity of Tok.	Gentle piedmont slopes and broad fan-shaped slopes with minor relief. Drainage good except in frozen bogs. Subject to flooding between Tok and the Tok River.	Discontinuous and irregular. Permafrost table usually at least 5 to 10 m below the surface except in frozen bogs. Low ground ice content.	Low except locally in the upper 1 m where it may be high.	Susceptible to lateral stream erosion near active channels.	Easily excavated with power equipment except where perennially frozen. Rippable where frozen. Easy to compact.	Good foundation for structures. Where schist content not too high good source of gravel for base course and, if crushed and screened, for road metal. Possible source of concrete aggregate where free of schist, chert, and coal fragments.	
Qo	Glaciofluvial gravel	Gray to reddish brown moderately well stratified sandy to silty gravel with beds and lenses of sand and silt. Gravel clasts of heterogeneous composition; commonly as much as 50 cm in diameter near moraines. West of Dot lake (map C) boulders up to 1.5 m in diameter occur. Gravel adjacent to older moraines thoroughly weathered in the upper 1 m, and many granitic clasts can be crumbled by hand. Locally mantled by silt up to 1 m thick.	Occurs on map C and on map B south of the Tanana River. Thickness generally unknown; gravelly material is more than 150 m thick at Fort Greely (map C), but this thickness may include one or more layers of till.	Gently sloping plains extending from end moraines. Drainage good.	Discontinous and irregular. In places frozen from within 1 m of the surface to depths of at least 40 m. Near Tok, thin, isolated masses of permafrost occur in the upper 10 to 15 m. Low ground ice content.	Low.	Susceptible to lateral stream erosion near active channels.	Easily excavated with power equipment except where perennially frozen. Rippable where frozen. Easy to compact.	Good foundation for structures. Where schist content not too high good source of gravel for base course and, if crushed and screened, for road metal. Possible source of concrete aggregate where free of schist, chert, and coal fragments.	
Qm/Qma	Younger till	Unstratified, poorly sorted gray to light yellowish brown sandy, silty and clayey till. Coarse particles are of heterogeneous lithology and range from rounded to angular, and from less than 1 cm to a few meters in diameter. Includes lenses of sandy to gravelly stratified drift.	Present on map C and the western part of map D. As much as 50 m thick.	Forms end moraines and ground moraines near the mouths of major tributaries to the Tanana River. Knob and kettle topography with steep slopes and local relief of 40 m; many lakes. Area near Robertson River designated Qma has subdued relief due to alteration by fluvial activity. Drainage good on knobs, poor in depressions.	Permafrost table probably less than 1 m deep in depressions, perhaps 5 to 7 m deep or more beneath dry slopes and knobs. Ice content low to high.	Moderate on hills, high in depressions.	Low when slopes frozen or dry; subject to sloughing, solifluction, and landsliding when thawed. Locally subject to subsidence upon melting of ice-rich permafrost.	Easy to excavate with power equipment where unfrozen, except for handling large boulders. Ripping or blasting required where frozen. Easy to compact if boulders are removed.	Knobs and hummocks good to poor for foundation material and source of fill. Swales and depressions poorly suited for construction uses.	
Qmo	Older till	Massive, poorly sorted, yellowish brown to reddish brown, sandy to clayey till. Coarse clasts are angular to rounded and range in size from less than 1 cm to several meters; various lithologies present. Includes sandy to gravelly stratified drift. Surface depressions may contain several meters of silt, peat, and silty colluvium. Thin loess cover present locally.	Occurs as end moraines near Delta Junction on maps B and C and between Gerstle and Little Gerstle Rivers on map C; as an isolated patch east of Tok on map D, and as an isolated remnant in the center of the Tanana Valley northeast of Dot Lake in the Mt. Hayes and Tanacross quadrangles (maps C and D), and as a remnant along the valley side west of Dot Lake. Thickness as much as 40 to 70 m.	End moraines retain hummocky topography despite modification by colluvial, lacustrine, fluvial and eolian processes; many shallow lakes. Knobs and hummocks are well drained; depressions poorly drained and boggy. The patch of till east of Tok and the till remnants west and northeast of Dot Lake have smooth to gently undulating surfaces with minor relief and are well drained	Depth to permafrost table may be less than 1 m in swales and filled kettles; probably 7 m or more on dry slopes and knobs. Ice content low to high.	Moderate on hills, high in depressions.	Low when slopes frozen or dry; subject to sloughing, solifluction, and landsliding when thawed. Locally subject to subsidence upon melting of ice-rich permafrost.	Easy to excavate with power equipment where unfrozen, except for handling large boulders. Ripping or blasting necessary where frozen. Easy to compact if boulders are removed.	Knobs and hummocks good to poor for foundation material and source of fill. Swales and depressions poorly suited for construction uses.	
ba	Basalt	Dark gray basalt; including pillow lavas, vesicular, columnar, and massive basalt. Weathered zone usually less than 1 m thick, but pillow lavas have been extensively altered.	North and east of Fort Wainwright on map A and about 10 km northwest of Tok on map D. Thickness unknown.	Forms parts of small, low hills. Drainage good.	Probably present but deep on south-facing slopes. Low ice content.	Low in fresh rock, moderate in weathered rock.	Low	Columnar, massive, and vesicular basalt require blasting, but pillow lavas can be excavated with power equipment. Difficult to compact.	Pillow lavas good for base course, or pervious fill without crushing. Suitable for road metal and concrete aggregate if crushed. Columnar, massive, and vesicular basalt requires crushing for most uses. Columnar and massive basalt good for riprap.	
fe	Felsic extrusive rocks	Gray volcanic rock with glassy quartz phenocrysts. Poorly exposed. Depth of weathered zone unknown but probably shallow.	Isolated occurrence west of Beaver Creek on map D. Thickness unknown.	Forms small part of a valley side. Drainage good.	Probably present but deep on south-facing slopes. Low ice content.	Low.	Low	Requires blasting. Difficult to compact.	Of too limited extent for use.	
fi	Felsic intrusive rocks	Brown to gray felsite dikes and irregular bodies. Porphyritic in places. Contains granitic dikes, sills and inclusions at Paradise Hill. Altered and weathered to unknown depths.	North of Fairbanks (map A) about 1.5 km northwest of Dot Lake on map C, and at Paradise Hill, map E.	Forms parts of a low hills. Drainage good.	Probably present but deep on south-facing slopes. Low ice content.	Low in fresh rock, moderate in weathered rock.	Low.	Weathered rock generally rippable. Fresh rock requires blasting. Difficult to compact.	Source of road metal and base course material. Not suitable for riprap.	
mi	Mafic intrusive rocks	Coarse grained hornblende gabbro. Poorly exposed. Depth of weathered zone unknown but probably shallow.	Two occurrences near Terlin Junction on map D.	Forms two small low, rounded hills. Drainage good.	Probably present but deep on south-facing slopes. Low ice content.	Low.	Low.	Requires blasting. Difficult to compact.	Possible local source of road metal, base course, or pervious fill if crushed. Possible source of riprap.	
gri	Granitic and intermediate intrusive rocks	Quartz monzonite, granodiorite, quartz diorite, some monzonite and diorite. Locally weathered to depths of several tens of meters in the eastern part of the Tanacross quadrangle (map D) and in the Nabesna quadrangle (map E).	Near Gilmore Dome and near Fort Wainwright (map A). Widespread in the eastern part of the Mt. Hayes quadrangle (map C) and in the Tanacross and Nabesna quadrangles (maps D and E).	Forms high rolling hills. Excellent surface drainage, fair permeability.	Probably present but deep on south-facing slopes. Low ice content.	Low in fresh rock, moderate in deeply weathered rock.	Fresh rock low; deeply weathered rock susceptible to lateral stream erosion near active channels.	Fresh rock requires blasting. Weathered rock generally rippable. Difficult to compact.	Weathered rock suitable for base course, road metal, and concrete aggregate without crushing. Fresh rock good for riprap or pervious fill.	
gs	Greenstone	Massive greenstone consisting chiefly of fine-grained epidote, chlorite, and altered feldspar. Poorly exposed. Thickness of weathered zone unknown.	South of Scottie Creek (map E). Thickness unknown.	Forms moderately high, rounded hills. Good to excellent surface drainage.	Probably present but deep on south-facing slopes. Low ice content.	Low in fresh rock, moderate in deeply weathered rock.	Low.	Requires blasting but locally may be rippable if deeply weathered. Difficult to compact.	Not suited for use due to content of chlorite and altered feldspar.	
sq	Schist and quartzite	Primarily quartzite and quartz-mica schist. Common calcareous schist, and some gneiss and amphibolite. Minor carbonaceous and graphitic schists. Weathered zone in quartzite usually less than 1 m thick; locally highly fractured. Schist weathered in places to depths of more than 17 m; locally severely fractured.	Widespread on map A; occurs on the northern half of map B, near Beaver Creek on map D, and near Scottie Creek on map E.	Forms moderately high rolling hills. Good to excellent surface drainage; joints, faults, fracture cleavage, foliation result in poor to good permeability; upper weathered layer has low permeability.	Probably present but deep on south-facing slopes. Low ice content.	Low in fesh rock, moderate in weathered schist.	Quartzite and unweathered schist low. Weathered or severely fractured schist susceptible to gullying, lateral stream erosion, rock sliding, and landsliding.	Quartzite generally requires blasting. Schist can be excavated with power equipment with little or no blasting. Difficult to compact.	Schist poor to fair for road material because it breaks down to silt under traffic and frost action; poor for riprap. Quartzite good for riprap, and coarse aggregate; if crushed suitable for base course and road metal.	Artificial cuts in micaceous schist which expose joint, cleavage, foliation, or bedding planes inclined toward the cut are susceptible to rock-sliding and slumping.
gn	Gneiss and schist	Chiefly quartz-biotite gneiss and schist. Common augen gneiss, minor amphibolite and hornfels. Zone of weathering in gneiss generally less than 1 m thick, but fractured zones may be more deeply weathered. Schist weathered in places to depths of more than 17 m; locally severely fractured.	Occurs on the southern half of map E, and the eastern half of map C; widespread on map D.	Forms moderately high rolling hills to rugged mountain slopes. Excellent surface drainage; poor to good permeability.	Probably present but deep on south-facing slopes. Low ice content.	Low in fresh rock, moderate in weathered schist.	Gneiss and unweathered schist low. Weathered or severly fractured schist susceptible to gullying, lateral stream erosion, rock sliding, and landsliding.	Gneiss requires blasting. Schist can be excavated with power equipment with little to moderate blasting. Difficult to compact.	Gneiss suitable for riprap, and coarse aggregate; if crushed may be used for base course and road metal; not well suited for concrete aggregate. Schist poor to fair for road material because it breaks down to silt under traffic and frost action; poor for riprap.	Artificial cuts in micaceous schist which expose joint, cleavage, foliation, or bedding planes inclined toward the cut are susceptible to rock-sliding and slumping.

This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards and nomenclature.

To Accompany

PRELIMINARY ENGINEERING GEOLOGIC MAPS OF THE PROPOSED NATURAL GAS PIPELINE ROUTE IN THE TANANA RIVER VALLEY, ALASKA

Compiled by L. David Carter and John P. Galloway