DEPARTMENT OF THE INTERIOR
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SHEET 2 OF 2

DESCRIPTION OF MAP UNITS

	Description of materials	Distribution and thickness	Topography and drainage	Permafrost	Susceptibility to frost action	Suitability for construction	Special problems
Qal Alluvium	Generally well sorted, stratified to lenticular deposits of gravel, sand, and silt, generally becoming finer downstream. Medium to coarse sandy gravel, some fine gravel, and coarse to fine sand, minor medium and fine sand, and silt (present only along Colville Riv., southwest corner of map). Fine to medium sand, some coarse sand and fine gravel in local lenses; minor silty sand and silt. Gravel is subrounded to angular depending on its source; in marine and fluvial gravel subrounded, in broken and weathered bedrock angular. Silt and organic lenses common, particularly as overbank deposits on flood plain and low terrace alluvium. Representative lithologic types are graywacke, chert, diabase, sandstone, conglomerate, limestone, and quartz monzonite in Colville River valley, and sandstone, siltstone, chert, quartz, and coal in the coastal plain.	Includes floodplain and low terraces (less than 3 m high) bordering streams. Thickness in Colville River area 1 to 10 m. In Meade-Avalik area streams in many places scouring bedrock, and fluvial deposits may be less than 1 m thick.	Forms terraced plain, part of which is occupied by stream channel and bars, the rest by terraces. Old stream meander scrolls on the lower terraces have been widened by thaw lake processes, and on the higher terraces the meander scroll pattern has been nearly or completely obliterated by thaw lake activity. Drainage generally poor. Subject to seasonal flooding to 6 or 8 m above low water on many rivers.	Perennially frozen except for a 2 to 6 m thick unfrozen layer beneath some of the larger channels. Elsewhere active layer about 0.5 m thick. Ice content of permafrost in granular deposits probably less in finer materials, even though ice wedges are well developed, especially on terraces. Ice content not known.	Overbank silt deposits and silty lenses in alluvial deposits are frost susceptible, but granular materials are not.	Provides good foundations in channel and bar areas, and moderately good foundations on silty overbank deposits that mantle older parts of floodplain and terraces. Except where poorly graded in pit run, provides excellent source of gravel in southwest corner of quadrangle along the Colville River; gravel generally suitable for fill, base course, surface course, but presence of chert and coal limit its usefulness as aggregate. In coastal plain, gravel deposits are discontinuous and of small volume; they commonly form armor above clay and sandstone bedrock or weathered bedrock.	Subject to river erosion, and on some streams, to burial by ice and channel shifts caused by icings (aufeis). Sandy alluvium subject to wind deflation if surface cover is stripped. Subject to flooding to depth of 3 to 5 meters. Design should accommodate to this.
Qog Outwash gravel and terrace deposits	Cobble gravel to medium and coarse sand; clasts well rounded to subrounded, generally 1 to 10 cm in diameter; rarely includes boulders as large as 20 cm in diameter, and are of local rock types--chert, graywacke, diabase, quartzite, quartz, arkose, limestone, and quartz monzonite. Well sorted, stratified, and includes minor beds and lenses of fine material, much of which forms the surface mantle.	Forms terrace remnants bordering the Colville River; as high as 25 m above the river; deposits mantled with 0.5 to 5 m of carbonaceous silt; organic-rich.	Flat to gently sloping terraces bounded by scarps. Would normally be well drained if not for permafrost.	Permafrost present throughout unit to within 0.5 m of surface. Ice content of permafrost in granular deposits probably less in finer materials, even though ice wedges are well developed, especially on terraces. Ice content not known.	Silt mantle and beds and lenses of silt are frost susceptible; granular material is not frost susceptible.	Provides good foundations if silt overburden is allowed for in design without upsetting thermal regime of any ice rich part of the deposit. Excellent source of gravel which is suitable for fill, base course, surface course, but unsatisfactory for aggregate because of chert content.	Subject locally to stream erosion above flood level.
Qg High-level gravel (ancestral Colville).	Chiefly sandy cobble and pebble gravel to 10 cm in diameter and sand beds and lenses. Clasts well rounded to subrounded and are 60 percent chert, 30 percent graywacke, and 10 percent quartzite, diabase, and quartz. Well sorted, stratified, and includes minor beds of silt; mantled with organic-rich silt.	Occupies the broad valley of the Colville River. Thickness 2 to 10 m. 35 to 45 m above Colville River.	Flat to gently sloping terraces bounded by scarps. Would normally be drained if not for permafrost.	Permafrost present throughout unit to within 0.5 m of surface. Ice content and potential thaw settlement somewhat similar to Qog unit.	Silt mantle and beds and lenses of silt within gravel are frost susceptible; granular material is not frost susceptible.	Provides good foundations if silt overburden is allowed for in design without upsetting thermal regime of any ice-rich part of the deposit. Excellent source of gravel which is suitable for fill, base course, and surface course (with proper grading) but unsatisfactory for aggregate because of chert content.	Subject locally to stream erosion above flood level.
Qsm Silt and muck	Silt, clay, and some sand; contains abundant peat and other organic material; stratified	Occurs in topographic low-lying areas scattered throughout the foothills area. Generally 1 to 10 m thick.	Flat to very gently sloping surface having poor drainage.	Well developed ice wedges indicated by polygonal ground; ice content known, but probably high in that at least 3.3 m of thaw settlement may be expected in areas unmodified by thaw lake activity. Active layer generally less than 0.5 m thick.	Fine materials are frost susceptible.	Not suitable for foundations because of excessive differential settlement on thaw of ice-rich permafrost; requires special design to prevent thaw of permafrost. Not suitable for binder because of excess organic material, nor for any other borrow material.	Easily eroded by running water when water channeled by construction activity or when surface vegetation removed.
Qds Debris slides	Sand, silt, clay, and boulders derived from soil and bedrock. Unsorted, non-stratified. Deposits moved by slump, soil flow. Contains organic debris.	Mapped in only the extreme eastern part of the area along the Titaluk River, at one locality along the Meade River and one isolated locality in the northwest part of the map area. Thickness 1-3 m.	Deposits are lobate with a hummocky surface. Scars or breaks in vegetation at uphill margin and piles of debris at the base are characteristic. Drainage good to poor depending on angle of slope.	Permafrost throughout unit; ice content variable. Active layer approximately 1.0 m thick.	Frost susceptible	Unsuited for foundations.	Subject to slow downslope movement during summer when active layer is thickest and saturated with water. Slip surface is commonly the base of the active layer.
Qsf Solifluction mantle	Mixed sand, silt, clay, and boulders derived from upslope sources by sudden or slow gravity movements and to some extent by water transport. Poorly sorted; crudely bedded to nonstratified. Deposits moved by landslide, slump; debris flow, soil flow, and talus processes. Locally contains organic debris.	The few deposits large enough to map border Lookout Ridge in the southwest corner of map. Small unmapped deposits are present throughout much of the foothill zone where slopes are 10 percent or higher. Drainage good or poor, depending on slope.	Deposits are lobate to irregular in plan and some have hummocky surface. Scars or breaks in vegetation often identified by linear streamline concentrations of vegetation parallel to slope.	Permafrost underlying unit. Active layer approximately 1.0 m thick.	Frost susceptible	Unsuitable for foundations because of potential for local differential settlement on thaw of permafrost and of instability of slope.	Subject to slow movements during summer when active layer is thickest and saturated with water.
Qt Thaw lake deposits	Consists of sediment eroded from banks and redistributed by current and wave action; chiefly silt to fine sand in upland silt, clay and silt in Nanushuk Group rocks. Contains retransported chunks of peat, sticks, as well as in situ peat beds and lenses. Commonly silty and organic rich.	Coalesced and individual thaw lake basins restricted to coastal plain, the northern one-third of map. Deposits generally less than 3 m thick in coastal plains, and as much as 11 m thick in upland silt east of the Meade River.	Forms interlocking and overlapping basins with local relief of less than 5 m below residual surfaces in coastal plain and less than 21 m below surface in upland silt unit east of Meade River. Depressions either undrained or connected by small meandering creeks; drainage generally poorly integrated.	In lakes less than 2 m deep and in adjacent marshes and meadows permafrost generally present beneath a thin active layer. Lakes deeper than 2 m may have a small thaw bulb between the bottom of active layer and permafrost table.	Thaw lake deposits in silty sand with admixed organic material probably frost susceptible; silt deposits very frost susceptible	Generally unsuitable source of materials because of silt and organic content of materials and seasonal flooding by snow melt of thaw lake depressions.	Thaw lake basins have potential for differential settlement upon thaw of permafrost that may require refrigerated foundations.
Qus Upland silt	Silt, silty sand, and fine sand, including some clay and scattered pebbles and granules of chert. Stratification indistinct, but locally indicated by thin interbeds of detrital wood and felted peat. Deposits are generally well sorted. Map unit includes wind blown silt, silt reworked in gullies by running water, and marine(?) silt.	Lies between 45 and 140 m above sea level in an east-west belt at the boundary between the coastal plain and the foothills. Deposit a few cm to more than 30 m thick; covers sand and fine gravel of fluvial origin in valleys carved in bedrock. May also lie directly on bedrock or on marine beach gravel.	Forms flat to gently rolling terrain broken by ravines, stream valleys, and thaw lakes basins. Drainage generally poor, except on steep slopes and hill crests.	Contains ice wedges and a very high volume of ice as small interstitial masses and lenses. In some areas, ground ice may approach 80 percent of the volume of subsurface materials, and excess ice (above volume of voids in soil) may persist to depths greater than 30 m below surface. Active layer 0.5 m to as much as 1.5 m thick at well drained sites. High thaw settlement when thawed.	Silt, sandy silt, and fine sand are frost susceptible.	Not suitable for foundations because of excessive differential settlement on thaw of ice-rich permafrost; requires special design to prevent thaw of permafrost. Not suitable for borrow except as binder material.	Easily gullied by running water when water channeled by construction or when surface vegetation is removed.
Qb Marine beach deposits	Chiefly coarse to fine sand, granule and pebble gravel. Gravel well rounded, smooth, locally polished chert, quartz, quartzite. Generally contain less than 6 percent silt, even in pit run samples.	Mapped as 5 small separate outcrops in the north central map area. Generally 2-4 m thick.	Forms nearly flat terrace with break in slope at lower boundary. Well drained.	Perennially frozen to within 0.5 m of the surface. Little thaw settlement.	Granular materials not susceptible to frost action.	Generally good, but requires binder or stabilization for use as fill, base course, or surface course. Contains chert and coal fragments that are deleterious for use as concrete aggregate.	Small volume at inland sites.
Kn Nanushuk Group rocks	Includes graywacke, sandstone, siltstone, shale, and conglomerate in the foothills; and sandstone, clay, bituminous coal, shale, and siltstone, in the coastal plain.	Ubiquitous in foothills and part of coastal plain. Also present along the bluffs of the Meade River in the northern part of the quadrangle; however, exposures are too small to show on map.	Exposed as west-northwest trending hills and valleys reflecting the broad, open folds in the rocks. Generally well drained. A prominent south-sloping erosion surface has been cut on these rocks in the southern one-third of the map area. Discovery, Quartzite, and Birthday Creeks are consequent drainageways that have developed on this tilted surface.	Present to depths as great as 405 m (according to 1944-53 test well and temperature data). Ice content generally insignificant in hard, jointed rocks in which ice merely fills the cracks. Significantly high ice content in weathered zone and in near-surface siltstone, shale, clay, and other rock types. Ice rich polygonal ground is prevalent in the low-gradient surfaces bordering the Awuna River.	Thin bedded and well bedded rocks susceptible to frost action. Frost may split apart even most durable rocks by expansion of water freezing along joint planes.	Normally makes good foundations. Individual beds may prove to be suitable source of construction material after appraisal by conventional tests and in terms of economics of site and development costs.	Stability of slopes would require some knowledge about dip of beds with respect to land slope.
Kt Torok shale and Fortress Mtn. Formation	Predominantly shale, some wacke and conglomerate.	Present in elongated outcrop belts in southern part of map area where it is exposed in the center of breached anticlines.	Generally forms a lowland flat topography due to the high content of easily eroded shale. Drainage generally poor.	Permafrost throughout. Contains ice wedges and high volume of ice as interstitial masses and lenses.	Frost susceptible.	Not suitable for foundations due to high ice content.	

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To Accompany

ENGINEERING - GEOLOGIC MAPS OF NORTHERN ALASKA, LOOKOUT RIDGE QUADRANGLE

By

Warren Yeend

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.