

PLATE 15. COMPOSITION AND TRANSIENT CONDITIONS OF SURFICIAL GEOLOGIC UNITS MAPPED ON PLATES 2 THRU

ENGINEERING GEOLOGIC UNIT	STRATIGRAPHY	GRAIN SIZE DISTRIBUTION	ICE CONTENT AND TYPE	MOISTURE CONTENT OF ACTIVE LAYER	ORGANIC CONTENT	VEGETATION AND SOIL CHARACTERISTICS	DRAINAGE/SURFACE WATER	DEPTH OF ACTIVE LAYER	RY DNS	SLOPE AND SLOPE STABILITY	BEARING STRENGTH, THAWED	
Silt, sand, and gravel associated with upland tundra areas—ut	Stratified sandy gravel to great depths (>400 m) with interbedded lenses of sand, silty sand, and gravelly sand (individually up to 3 m thick); overlain by poorly stratified sandy silt 0.5-3.5 m thick, often organic-rich; overlain by organic silt tundra mat up to 15 cm thick.	Sandy silt blanket generally less than 0.5 m, <18% coarse sand and occasional pebbles. Sandy gravel dominantly 0.2 to 20 mm with mean about 7.5 mm.	Interstitial seasonal ice in silt; perennal interstitial ice in sandy gravel, ice wedges in interval 1.0 to 5.0 m below surface, in 7-10 m polygons; ice lenses occasionally in silt, particularly where organic-rich. * pings adjacent to units M, ML, ML, ML, ML.	In silts and silty sands, commonly 50-200%, occasionally higher, dependent on ice content; sandy gravels 5-20%; sand with minor gravel and silt 10-35%.	Some organic material in silt common, particularly in upper 0.5 m; sandy gravel usually organic-free; organic mat at surface up to 15 cm thick.	Continuously tussock-dwarf heath tundra and dwarf shrub-heath tundra. Tundra soil continuous and up to 3 m thick, except where broken by frost heaving or raised polygon rims.	Moderately well-drained except during spring and early summer; locally, shallow (<0.25 m) pools of water occur within low-center ice wedge polygons and in trough along raised rims.	Typically 0.5 to 1.5 m, although locally up to 2.5 m, e.g., near unit boundaries.	Generally if adjacent unconsolidated, silt of this	unit are being modified by streams and lakes, but they are therefore, bound static or diminishing.	2.0 to 4.0 m/m toward the north or northeast; natural slope stability during active layer thaw, good; natural slope stability during upper permafrost thaw fair, generally, poor near some boundaries; cut slopes, thawed, above 10% (5'), poor in silt and upper sandy gravel.	Moderate if only active layer thawed; poor to very poor if permafrost thawed. Progressive failure under static loading as duration increases.
Active floodplain gravels—af	Stratified sand and gravel greater than 100 m thick, interbedded with thin lenses of silty sand; occasionally sequence overlain by thin (<1.0 m) silt and sand cap on braided interfluvies.	>90% sand and gravel, dominantly in range of 20 mm to 0.20 mm (see pl. 17); interfluvial caps of fine sand and silt (<0.5 mm).	Free of perennal ground ice to considerable depth due to thaw bulb; seasonally frozen particularly on exposed interfluvies with interstitial ice.	Saturated to or near surface, water table at or near surface, 5-20% moisture content, slightly higher in sands (to 35%).	Free of organic material, except for stream-washed organic fragments.	Free of vegetation except for scattered patches of aquatic waterways community on interfluvies. No soil.	Well-drained except for static water in back channels isolated from through flowing channel. Fluctuations due to channel migration and variation of discharge.	Not measured, estimate 1.0-2.0 m, underlain by perennally thawed zone to several meters' depth.	Bounded by fluvial unit undercuts boundaries Downstream	upland tundra or inactive interfluvies; thermal erosion, as typical at scarp. West less than east boundaries; units.	2.0 to 2.5 m/m toward north to northeast; cut slopes stable at less than 2:1 (57%).	Very good in situ, particularly if surface drained, excellent if compacted.
Inactive floodplain gravels—if	Stratified sand and gravel greater than 100 m thick, interbedded with thin lenses of silty sand, commonly overlain by silt and fine sand cover up to 1.0 m thick.	>90% sand and gravel, dominantly in range of 20 mm to 0.20 mm (see pl. 17); covered by fine sand and silt (<0.5 mm) with minor coarse sand and fine gravel.	Free of perennal ground ice to considerable depth due to thaw bulb, except in some distal areas from unit of where pore ice may persist annually. Seasonally frozen with pore ice to several meters.	Water table shallow, saturated to or near surface, except well-drained in areas above water table; moisture content generally in range of 5-20% in sandy gravels, slightly higher where sand predominates.	Same as unit af. Some organic debris occurs in silt-sand cover.	Aquatic waterways plant community, thin and often separated by stream channels. No soil.	Well-drained except for static water in channel depressions. May be flooded seasonally during peak discharge or continuously by channel modifications.	Same as unit af.	Bounded by terrace unit undercuts older unit detail unit	vs floodplain and/or fluvial potential. Along unit of potential. Boundaries with Downstream transition to	Same as unit af.	Same as unit af.
Lower fluvial terrace gravels, partially scoured—lt	Stratified sand and gravel of considerable thickness, interbedded with thin lenses of silty sand; overlain by continuous silt and fine sand blanket less than 2.5 m thick, commonly less than 1.5 m; often overlain by organic silt layer less than 15 cm thick.	Same as unit if.	Foliated ice wedge polygons rarely or weakly expressed at surface, present in subsurface, but less extensive than unit ifa. Permafrost table in excess of 1.0-m depth, moderate to excessive pore ice in permafrost, pore ice and some ice lenses in active layer.	Moderate to highly supersaturated, in sand/silts dependent on ice content 50-100% moisture content, in sandy gravels 5-20%, pore spaces saturated. Sands up to 35%.	Organic mat 5-10 cm thick at surface, may be organic-rich to 20 cm in silt-sand matrix, trace of organic material in underlying sediments.	Tussock-dwarf heath tundra and dwarf shrub-heath tundra, with some wet sedge meadows along abandoned channels. Tundra soil continuous but broken along raised polygon ridges and within 50 m of terrace scarps.	Generally good except along abandoned drainage channels where shallow water (static) may occur during summer months.	Shallow, less than 2 m, except along boundary scarps where variable to greater depths.	Scarp true otherwise mass movement frost heaving	in and upland tundra units, a show thermal erosion and mass stable but subject to frost ice creep of thawing silts.	General slope toward north at about 2.5 m/m and stable. Local undulation of surface due to stream scouring, resultant slopes up to 15' (25%); considered stable. Scarps have variable inclination; unstable. Artificial cuts susceptible to sluff, rotation, and flow.	Moderate to poor; however, generally better than unit ifa due to less massive ice.
Lower fluvial terrace gravels, ice wedge polygons—lp	Stratified sand and gravel of considerable thickness, interbedded with thin lenses of silty sand; overlain by continuous silt and fine sand blanket less than 3 m thick; often overlain by organic silt layer less than 15 cm thick.	Same as unit if.	Foliated ice wedge polygons abundant and expressed at surface. Also visible pore ice in permafrost. Permafrost table from <1.0-m to 3.0-m depth. Little to moderate visible pore ice in active layer, occasional massive ice lenses.	Same as unit ifa.	Same as unit ifa.	Tussock-dwarf heath tundra and dwarf shrub-heath tundra. Tundra soil continuous but broken along raised polygon ridges and within 50 m of terrace scarps.	Moderate, generally free of intrapolygonal surface water except in some low centers. Drainage along polygon troughs. Occasional standing water during spring surface melt.	Same as unit ifa.	Scarp true otherwise mass movement frost heaving	unit ifa.	Natural slopes less than 2.5 m/m toward the north or northeast and stable. Scarps have variable inclination and often unstable. Artificial cuts deemed unstable due to thaw of massive ice.	Moderate to poor under seasonal thaw conditions; poor if permafrost thawed, but slightly better near boundaries with unit ifa.
Upper fluvial terrace gravels—ut	Stratified sand and gravel, interbedded with thin lenses of silty sand, overlain by continuous silt and fine sand blanket greater than 2 m thick, often overlain by organic silt layer less than 15 cm thick.	Same as unit if.	Same as unit ifa. * pings adjacent to floodplain.	Moderate to supersaturated in silts, 50-200%; where ice content high, above 200%. In sandy gravels 5-20%, in sands to 35%, occasionally higher due to massive ice.	Same as unit ifa.	Tussock-dwarf heath tundra and dwarf shrub-heath tundra, except local low center polygons with wet sedge meadows. Tundra soil continuous but broken along raised polygon ridges and within 50 m of terrace scarps.	Poor to moderate due to static intrapolygonal surface water. Some drainage along integrated polygon trough. Particularly wet from spring to midsummer.	Same as unit ifa.	Scarp true otherwise mass movement frost heaving	n, otherwise gradational with a thermal erosion and mass stable but subject to frost ice creep of thawing silts.	Same as unit ifa.	Moderate to poor under seasonal thaw conditions; hazardous if permafrost thawed due to massive ground ice.
Thermokarst stream channel gravels—ts	Same as unit ut.	Same as unit ut.	Surface ice during winter, frozen to tundra, trace to >2.0 m thick; silts and sands contain moderate to extensive visible pore ice and lens ice; remnant ice wedges may be present at depth but not actively forming; pore ice present in gravels of permafrost.	Saturated throughout year from surface to permafrost table; moisture contents similar to unit ut.	High organic content probable throughout active layer in silt and sand.	Aquatic waterways community dominant, also fresh water aquatic community in broader areas and wet sedge meadow community along boundaries. Soils mixed or absent.	Submerged to partially emergent at boundaries; varies from wet tundra surface to >2.0 m of surface water, moving at low to moderate velocity.	Variable, generally thawed zones above permafrost table greater than unit ut.	Transit and edge	d units, boundaries gradational to	Natural slopes less than 2 m/m, except very locally up to 4 m/m; very unstable when thawed along boundaries.	Very low, should be avoided, or traversed via conduits or bridgework.
Terrace gravels associated with thermokarst streams—tt	Same as unit ut.	Same as unit ut.	Silts and sands contain moderate to extensive pore ice and lens ice; remnant ice wedges at >2.0 m but only weakly active to inactive; pore ice present in permafrost.	Varies from moderate to supersaturated. Silts to >200%; sands with silt, up to 80%; otherwise <35% moisture content.	Organic mat less than 10 cm thick but considerable organic material in underlying silt and sand layer. Occasional traces in sandy gravels.	Tussock dwarf-heath tundra dominates, with local wet sedge meadows. Continuous tundra soil, in part disturbed by overbank stream flow.	Poor to moderately drained, dependent on microtopography, occasional ponding with water less than 0.5 m deep throughout the summer.	Undetermined, assumed to be 1.0-2.0 m. Thawed zone over permafrost thicker than that in unit ut.	Gradational to scarps.	ter tundra units, usually grade along small (<1.0 m) outbank	Very gentle slopes, less than 2 m/m; natural slopes stable; cut slopes unstable when thawed.	Variable from very poor to moderately good dependent upon degree of saturation.
Silts and gravels associated with large area lakes—ll	Stratified sand and gravel interbedded with lenses of sand and silt, much in excess of 100 m thickness; overlain by sandy silt, from less than 2 m to more than 8 m thickness.	Sand and gravel predominantly in range of 20 mm to 0.20 mm; overlying fine sand and silt less than 0.5 mm with organic debris.	Perennally thawed, often to greater than 8 m, except along marginal shelves where shallow seasonal freeze occurs; no ice wedge polygons expected, except as inactive relicts; permafrost gravels contain pore ice.	Perennally saturated.	Organic debris incorporated in sandy silts, including disintegrated tundra mats up to 1.5 m in diameter, higher organic content expected near margins of unit.	In deeper water, mostly free of rooted vegetation; in shallow areas and near lake margins (<1.3 m water depth) the zoned freshwater aquatic community is common. No soil.	Continuously submerged. Liquid water usually present beneath ice throughout winter. Near coast waters may be brackish or saline, diminishing winter freeze magnitude and duration.	Perennally thawed, except at margins where the lake was frozen to the bottom and freeze-thaw of the underlying sediment occurs to 2-m depth.	Usually tundra low-wet	small scarp <1.0 m high, where d, or by a gradational slope. n units partially thawed.	Essentially horizontal, with very slight grade from east to west. Slope stability—not applicable.	Not applicable.
Silts and gravels associated with intermediate area lakes—il	Same as unit ll.	Same as unit ll.	Shallow, central perennally thawed zone, however winter lake ice may freeze to bottom throughout much of lake basin resulting in seasonal freeze of shallow sediments. Seasonal pore ice and local segregated ice lenses several centimeters thick in silt. Ice wedge polygons may occur beneath areas where water is very shallow.	Perennally saturated.	Same as unit ll.	Same as unit ll.	Continuously submerged. Liquid water usually present beneath ice until midwinter, however, total freeze down generally occurs by February-March; local pools beneath ice may persist through winter. Near coast waters may be brackish or saline, diminishing winter freeze magnitude and duration.	Most of unit underlain by thaw bulb; much of lake freezes to bottom during winter and underlying sediment frozen to shallow depth from midwinter to late spring.	Often edge	as unit ll.	Same as unit ll.	Not applicable.
Silts and gravels associated with small area lakes—sl	Same as unit ll, but with sandy-silt layer generally thinner, usually less than 3 m thick.	Same as unit ll.	Lake freezes to bottom from midwinter to early spring; underlying silt frozen seasonally resulting in pore ice and segregated ice lenses several centimeters thick. Ice wedge polygons often found lake and may extend beneath lake, however ice wedge usually inactive or being thawed.	Perennally saturated.	Organic tundra mat often continuous across unit or extensive along margins; underlying silts rich in organic debris, including disintegrated fragments of tundra mat.	Zoned freshwater aquatic community extends across most of lake unit.	Continuously submerged. Total freeze-down usually occurs in fall or early winter. Some exceptionally deep lakes may be similar to unit ll.	Perennally thawed zone very limited or absent; shallow (<3 m) active layer above permafrost table.	Often edge	dge polygons, or gradational to boundaries often not broken.	Same as unit ll, although more irregular surface due to submerged remnant polygons.	Not applicable.

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