TERRAIN SENSITIVITY AND PERFORMANCE RATING TABLE

To accompany map sheets 116 P (Bell River), 106L (Trail River) and 1160 and NE¼ (Old Crow)

Map Unit	Occurrence	Permafrost Terrain: Degradation following disturbance of ground surface: Flat ground (~3° slope)	Permafrost Terrain: Degradation following disturbance of ground surface: Sloping ground (~3° slope)	Performance of Newly Thawed Materials	Non-Permafrost Terrain (Units I-IV) and Bedrock Terrain, with low ice content (Units XI-XV): Occurrence	Performance of Unfrozen Materials (Units I-IV) and low-ice Materials (Units XI-XV)	Slope Hazard (Units XI-XV)	Rock Competence (Units XI-XV)	Flooding Hazard
1	2	3	4	5	6	7	8	9	10
I	peatlands	3K	2S 2G	3	fenland	3			N
II	general	1-2K	(1-2S, 1-2G)	1-2	active river deposits	1			3-2
III	general	2K	(2-3S, 3G)	3-2	active river deposits	2-1			3-2
IV	general	3K	(3S, 3G)	3		3			3-2
V	general	2K	2S, 2G	2					N
VI	general	2K	2S, 2G	2					N
VII	general	3K, 2G	(3S, 3G)	3					N
VIIIa	general	2K	(2-3S, G)	2					N
b	general		(2S, 2G)	2					N
c	general	(2-3S, 3K)	2(3K, 3S, 3G)	3					N
IX	general	2K	1-2S, 1-2G	2					N
X	general	N	2-3S, 2-3G	3-1					3-2(valley bottoms)
XI	plateau areas and valley slopes	N	1(S, G)	1	general	1	2-3(T, R)	1	2-3(valley bottoms)
XII	plateau areas and lower valley slopes	N	2S, 2G	2	general	1-2	1-3(T, R)	1(2)	2-3(valley bottoms)
XIII	plateau areas, lower slopes, valley slopes/ floors	1-2S, 1-2G	2-3S, 2-3G	2-3	general	2	1-3(T, R)	2(3)	2-3(valley bottoms)
XIV	general	1-2S, 1-2G	2-3S, 2-3G	2-3	general	2	N	2	2-3(valley bottoms)
XV	general	N	N	N	general	1	3RF	1(3)	N

KEY TO PERFORMANCE RATING TABLE - EXPLANATORY NOTES

Sensitivity - Performance Scale

Rating Number	General	Columns 3 & 4	Columns 5 & 7	Column 8	Column 9	Column 10
1	good sites	low frequency, and/or low intensity	least troublesome materials	slopes of 0-13°	Competent rocks	flooding under extreme conditions
2	fair sites	moderate frequency and intensity	moderately troublesome materials	slopes of 13-33°	Rocks of intermediate competence	flooding a common occurrence
3	poor sites	high frequency and/or high intensity	highly troublesome materials	slopes 33°	rocks of low competence	no flood hazard
N	not applicable or not represented					

Degradation following disturbance of ground surface (Columns 3 and 4)

Rating applies to changes resulting from man-induced disturbance such as stripping of the surface down to mineral soil, long-term ponding of water on surface, or re-routing of flowing water for substantial periods. Degradation of somewhat lesser intensity and/or frequency results from compaction of mechanical disturbance of the surface vegetation mat or peat. Earthflows may develop in sloping sites following fire on units rates as 2 or 3.

K - thermokarst depressions or ground subsidence from melting of ground ice.

S - slope failures such as ground ice slumps, earth flows, landslides, block collapse (minor sloping sites in brackets).

G - gully erosion (minor sloping sites in brackets).

Sloping ground includes:

- eroded banks in gullies, along rivers, valley walls, and eroded coasts (Note: major eroded areas mapped as unit x).

- slumped banks around thermokarst lakes or thermokarst depressions.

- mountainside and escarpments (unit IX).

Performance of newly thawed material (Column 5)

The rating is for performance of thawed materials under worst conditions (i.e., immediately after melting of constituent ice) when subjected to load in place, when used as fill, or when exposed on a cut slope. Rating also applies to "normal" active layer materials under the same conditions.

Performance of normal unfrozen material (Column 7)

The rating is for performance of materials under typical field moisture conditions when subjected to load in place, when used as fill, or when exposed on a cut slope.

Slope Hazards (Column 8)

RF - retrogressive flow slides, common (especially in areas of bentonitic shales).

T - unstable talus (rockslides/rock falls, processes of active creep, and solifluction.)

R - abundance of steep rock faces.

For the above hazards the degree of risk increases with steepness in slope, designated as in the previous section on the basis of a 1-3 rating scale.

TERRAIN CLASSIFICATION AND SENSITIVITY SERIES
LEGEND

To accompany map sheets 116P (Bell River), 106L (Trail River) and 1160 and 116N E½ (Old Crow).

MAP UNIT	NAME	GENERAL DESCRIPTION	LOCAL DESCRIPTION	PERMAFROST, GROUND ICE CONDITIONS	DRAINAGE CHARACTERISTICS	HAZARDS	ENGINEERING COMMENTS AND/OR SOURCES OF CONSTRUCTION MATERIAL
I	ORGANIC TERRAIN (including muskeg)	Peat, fen; peat-fen complex; commonly occurring as a cover on Till Plain Unit; flat to moderately sloping.	Fenland: Flat to very gently sloping areas (0-2°) in part with a reticulate network of low ridges (relief to 3 ft), covered with woody sedge peat 6-10 ft. thick. Peatland: Flat to very gently sloping, typically with numerous shallow steep sided (6-10 ft) depressions occupied by lakes, ponds and bogs. Surface cover consists of peat 6-12 ft. in thickness - typically sedge and woody sedge peat overlain by sphagnum peat.	Commonly unfrozen to 6 ft.; little data available on segregated ice content at greater depths. Commonly up to 20%, locally up to 60% segregated ice within peat; typically 1-3 ft., locally up to 10 ft. total thickness segregated ice[1] in mineral soil immediately below peat. Peat in wet depressions commonly thawed to 3 feet.	No organized drainage; water at surface throughout summer months Deranged. Higher surfaces of peat platforms dry. Surface seepage through organic filled depressions and downslope seepage in shallow sub-parallel runs.	Wet sites; material compressible and of low strength. Alternations of permanently frozen peat mounds (some actively degrading) and water bodies and thawed depressions present serious problems in construction of roads, pipelines, etc. material highly compressible when thawed.	Unsuitable
II	RIVER DEPOSITS - COARSE	Gravel and sand in river channels, floodplains, low terraces adjoining rivers, and alluvial fans. Includes some silt, peat and organic silt.	Floodplains and low bordering terraces consisting of sand and gravel 3-15 ft., commonly with a surface veneer of silt 1-6 feet in thickness; coarse gravel alluvial fans 5-150 feet thick. Topography is level to gently sloping with slopes ranging from 3-3°, with local relief to 15 feet due to the presence of former channels, bars, steep scarps etc. (slopes to 35°). Alluvial fans and fan aprons consist of gravel, sand and minor silt with slopes of 1-12° and relief to 150 feet (from head to toe). Peat cover is largely restricted to former river channels and ranges in thickness from 5-10 ft.	In alluvial floodplains and terraces permafrost lacking in active unvegetated parts; cement ice only except in silt veneer which commonly has 10-25% segregated ice as thin (<1") seams. In alluvial fan deposits ice content is highly variable; low in gravel, moderate to very high in silt. Occurs as thin seams in the upper 6-10 feet thick layers up to 5 feet thick at depth. Ice content generally lower in coarser sediments at head of fan than in finer sediments at outer margins.	Surfaces of coarser grained materials are dry; ponds and swamps in former river channels. In alluvial fans one or more shifting streams usually present; downslope seepage in poorly defined runs. In areas of rock fans ephemeral streams and surface wash - subsurface percolation.	Minor slumping on margins of lakes and channels in areas with a veneer of silt; undercutting and bank collapse along channels during high water; flooding during breakup and summer storms; channel shifts.	Offers good construction sites where silt veneer is thin. Includes such gravel and mixed gravel and sand; the unit contains much sandy material suitable for fill. Exploitation of sites adjoining rivers may lead to accelerated erosion or channel shifts.
III	RIVER DEPOSITS - FINE	Silt and silty sand in river channels, floodplains, low terraces adjoining rivers and alluvial fans; includes organic silt, peat and minor gravel.	Silt and fine sand 3-50 ft. thick forming floodplains and low bordering terraces, commonly with meander scars; in places with numerous channels. The unit is flat; (overall relief ranges from 3-15 ft., except for channel margins). Peat cover is negligible on the active floodplains, but is up to 15 ft. thick in the abandoned channels and terraces. Unit includes fine grained alluvial fans with fan aprons (up to 150 ft. thick with slopes to 12°).	Pérmafrost lacking in unvegetated part of floodplain; elsewhere 10-25% segregated ice as thin (<1") seams in upper 10 ft. at greater depth segregated ice to 40% by volume as reticulate network (in subjacent massive silts and clays) or as layers 1-2" thick (in varved silts and clays); also thick tabular bodies of near pure ice; ice wedges as polygonal networks usually present. In fine grained alluvial fans ice content is highly variable; low in gravel, moderate to very high in silt (the more common case). Thin seams in upper 10 ft. Ice content generally lower in coarser sediments at head of fan than in finer sediments at outer margin.	Many areas wet, lakes and marshy areas common. Surface drainage with no integrated drainage system (in meander scar areas impeded by meander scroll ridges). In fan areas one or more shifting streams usually present. Downslope seepage in poorly defined runnels and considerable subsurface seepage in gravel fans.	Ground ice slumping and gullying on margins of lakes and channels, undercutting and bank collapse along channels during high water; flooding during breakup and summer storms; channel shifts. Melting of ice wedges produced polygonal network of depressions when vegetation is removed.	Gravel deposits rare and small; generally poor source of borrow material. Fans with high silt content are unsuitable for construction.
IV	RIVER DEPOSITS - FINE (THERMOKARST)[2]	Thermokarst alluvial floodplains and terraces of low energy streams.	Same as Unit III, with numerous shallow thermokarst lakes and ponds (relief to 10 ft.)	20-50% segregated ice by volume in upper 10 ft. (Probably to greater depths)	Seepage centripetal to ponds and lakes, intermittent seepage along fen-filled depressions between ponds and lakes.	Thermokarst processes active around pond margins. Melting of ice wedges produces polygonal network of depressions when vegetation is removed; subject to periodic flooding.	Highly unsuitable
V	TILL PLAINS	Till, occurring as ground moraine with low rolling relief or parallel drumlin ridges. Large areas are clayey to silty till on shale; locally forms a thin veneer on other kinds of bedrock. Includes undifferentiated areas of organic terrain.	Silty to clayey till plains, generally 1-50 ft. thick (locally to 150 ft.) underlain by bedrock. Contains drumlin fields, crevasse fillings and ridge moraine, composed of mainly silty to clayey till; locally gravelly. Overall, this unit forms a sloping-rolling plain, generally bedrock controlled with slopes to 13°; individual parallel to subparallel, straight to sinuous ridges (relief to 60 ft.) provide slopes to 30° in places. Local relief (due to stream incision) up to 60 ft. Discontinuous peat cover up to 15 ft. in depressions, and as irregular patches on hills.	Commonly 10-25% segregated ice as thin (<1 in.) irregular discontinuous seams in upper 6 feet. Locally, thicker lenses at depth (>10 ft. thick).	Ground surface commonly wet - water in depressions - no organized drainage with downslope seepage in sub-parallel runs. Crests of drumlins and ridges relatively dry, with a well-integrated drainage system developed between the drumlins and in fluted moraine.	Moderate susceptibility to gullying. Ground ice slumps and superficial mudflows on slopes and large flow slides in clay rich till. Drumlinoid features display a minor susceptibility to gullying, creep, and channelling.	Gravel deposits rare and small; usefulness of the silty till[3] material as fill is limited by its ice content. Where bedrock is close to the surface, it is a source of borrow material. Gravelly and sandy till in drumlins may provide minor source of borrow material. Crests of prominent ridges offer restricted but good construction sites.
VI	HUMMOCKY TILL	Clayey to gravelly-sandy till, local gravel, forming rolling to hilly moraine composed of individual and coalescent hummocks, Local contrasts in material and ground ice between well drained hills and poorly drained depressions. Includes small undifferentiated areas of organic terrain.	Mainly gravelly till with thickness ranging from 3-150 feet. Topography varies from a subdued rolling moraine (with slopes from 5-10°) to hummocky moraine composed of individual to coalescent hummocks with slopes to 20°, and individual and compound straight to sinuous ridges 50-150 ft. in height with slopes to 20°.	Highly variable depending upon topographic position; crests of prominent ridges and hummocks well drained and ice free to depths of 6-15 feet; in areas of lower slope and in more subdued hummocky terrain commonly up to 10% (locally up to 40% segregated ice) as thin (<1 in.) irregular discontinuous seams in upper 6-10 ft. Locally thicker ice lenses at depth. (5°-15 ft.)	Surfaces of ridges and hummocks is dry, poorly drained depressions in places containing bogs or ponds. Water moves downslope, and follows poorly defined drainage connecting depressions.	Minor susceptibility to gullying.	Hummocks and ridges provide major sources of gravel and mixed gravel and sand; usefulness of till material as fill is limited by its ice content. The silty[3] till is suitable borrow material where ice content is low.
VII	GLACIOLACUSTRINE/ THERMOKARST PLAIN	Clay and silt, commonly surfaced by sand or silty sand (thin veneer or dune ridges), with discontinuous organic cover.	Silt and clay 1-60 ft. in thickness forming a flat to gently sloping plain (0-2°) with relief to 10 ft. Locally the unit contains thin veneer or dune ridges with slopes to 20° and relief to 30 ft. In areas of thermokarst plain terrain is flat to gently sloping(0-5°) with numerous shallow lakes and ponds (relief to 20 ft.)	Commonly up to 10-25% segregated ice as thin (<1") seams in upper 10 ft.; segregated ice as reticulate network to 40% by volume or thick tabular bodies of nearly pure ice at greater depth. In areas of sand cover (dunes) probably cement ice only below active layer; segregated ice highly probable in subjacent glaciolacustrine silts.	Ground surface commonly wet. Seepage centripetal to ponds and lakes; intermittent seepage along fen-filled depressions between ponds and lakes. In dune areas, mainly subsurface seepage - no organized drainage.		Generally unsuitable. Eolian deposits offer restricted well-drained sites within large areas of poorly drained glaciolacustrine plain.
VIII	GRAVEL-SAND HILLS, RIDGES, PLAINS AND TERRACES	Gravel, sand and some silt. Includes eskers, and other glaciofluvial deposits, river terraces, and glaciofluvial lacustrine plains (some areas with thermokarst).	(a) Plain and Terrace areas: Sand and gravel 5-50 ft. thick, locally with a veneer of silt or sand; forms flat to gently sloping benches (0-2°) interrupted by shallow channels and low scarps (relief to 30 ft.) (b) Hummocky and Ridged areas: Gravel and sand 5-100 ft. thick. Terrain characterized by hummocks (relief to 120 ft., slopes 5-15°), and long sinuous ridges (up to 90 ft. high) often breached by streams. (c) Glaciofluvial Lacustrine Plains: Glaciolacustrine silt and clay (10-15 ft. thick) overlain by glaciofluvial sand with minor silt (1-100 ft. thick), and rare fine gravel. The area is flat to gently sloping (0-2°) with minor relief to 10 ft. Discontinuous organic cover.	Typically cement ice only, but with locally high segregated ice within silt and below peat in channels. Polygonal pattern on some areas suggests possible wedge ice. Typically no segregated ice in well-drained sites but segregated ice may be present in association with silt layers beneath depressions. Commonly up to 10-25% segregated ice as thin (<1") seams in upper 10 ft. of sand, but massive segregated ice rare in the sand; very high ice content (to 75% by volume) as reticulate network or thick tabular bodies in underlying silt and clay.	(a) Ground surface relatively dry, except on large flat areas and in channel (b) traces; drainage mainly subsurface (c) In thermokarst plain ground surface is wet. Seepage centripetal to ponds and lakes, intermittent seepage along fen filled depressions between ponds and lakes.	(a) Some gullying on hillsides and sloping banks, principally where material is fine sand or silt. (b) Thermokarst processes active & around pond margins; Active (c) layer detachment slides followed by development of retrogressive thaw flow slides common on colluvial slopes developed on this unit, especially following fire or other disturbance of vegetation. Rotational slope failures common along banks of larger streams where sand and silt is thicker than 30 ft. Gullying is common even on gentle slopes upon removal of vegetation.	(a) Offers good construction sites major source of aggregate where material is gravel rather than sand except in channels which may contain peat and ice-rick silt. Offers good construction sites; major source of aggregate where material is gravel rather than sand. Unsuitable
IX	GLACIATED UPLAND AND PIEDMONT COMPLEX	Areas of moderate to low slope, in part hilly, surfaced by till disintegrated bedrock, and local clay, silt, sand or gravel. Unconsolidated deposits generally form a thin veneer over rock but in places they are thick.	Rolling bedrock controlled topography with relief to 450 ft. and slopes to 15°. Composed of glacial till, 1-15 ft. thick (uplands), and 1-50 ft. thick or lower piedmont slopes. Minor glaciofluvial sand and gravel, and glaciolacustrine silt and clay, with discontinuous peat patches.	On hilltops and gentle slopes commonly 10-25% segregated ice as thin (<1") irregular discontinuous seams in the upper 10 ft. Massive segregated ice common in both till or glaciolacustrine sediments at greater depth. Locally up to 40% by volume segregated ice in silt and clay filled depressions.	Major streams deeply incised. Downslope seepage in sub-parallel runnels; permanent streams in valleys.	Active-layer detachment slides and subsequent retrogressive flow slides common on colluvial slopes developed on this unit.	
X	ERODED AND/OR ERODING RIVER BANKS, COASTAL CLIFFS AND VALLEY WALLS - LARGELY UNCONSOLIDATED MATERIALS	Various unconsolidated materials on moderate to steep slopes; generally with surface veneer of slope debris; includes unstable areas.	Same as general description. Surface colluvial debris up to 15 ft. thick; steeply sloping valley walls and scarps, slopes 12-45°, relief to 1000 ft. Material on upper part of slope is same as adjacent map unit; different materials commonly occur lower on the slope; locally bedrock rubble forms the base of the slope.	Probably cement ice only.	Surface of sandy and gravelly materials is generally dry; other materials commonly wet with local running water and active gullying. Generally freely drained.	Active stream erosion; slumping, retrogressive - thaw flow slides, active layer detachment slides common. Cryoturbation and solifluction process active on high slopes of Richardson Mts.	Unsuitable. Irregularity of topography and slope instability present major problems for any kind of construction.
XI	AREAS OF RESISTANT BEDROCK (UNGLACIATED) SCARP AREAS WITHIN THIS UNIT SHOWN AS XIs	Mountains, high and low hills, composed of carbonates, chert, granite, quartzites, and conglomerate.	(a) Mountain areas developed on Paleozoic limestone and dolomite (White Mts.), on Road River Formation (east and west flank of the Richardson Mts.), and on Precambrian argillite and quartzites of the Hindle Group. The surface material consists of a blocky colluvium with minor fines and ranges in thickness from 1-10 ft. (b) High hills and mountains with occasional sharp elongated steeply dipping ridges. Surface materials consist of gravelly to blocky colluvium 1-10 ft. thick, with minor fines on slopes and increased fines on flat tops and lower slopes. (c) Low rounded hills and ridges with smooth slopes. Surficial deposits form a veneer 1-10 ft. thick; their composition reflecting the character of the underlying bedrock.	Low to nil except very locally in slope wash sediments in restricted floors of narrow valleys Low to nil Low to moderate; locally high to very high on lower slopes, valley floors and in silts.	Well drained areas due to adequate slope and coarse grained surficial material. Well drained area due to adequate slope and coarse grained surficial material. Downslope drainage, wet ground on local flat areas.	Steep slopes and high relief make rockfalls and slides common; solifluction creep on steeper slopes. High relief and locally steep slopes may result in rockfalls and slides. Active creep on steep slopes, gullying of soft materials.	Steep slopes and high relief make much of this unit unsuitable for location of roads, pipelines, etc. In some areas gravelly character and low ice content make surficial materials relatively stable and suitable for road or berm construction; near surface bedrock can be ripped. Good drainage and mainly coarse surficial material with low ice content, (except for local ice-rich silt on lower slopes and valley floors) make this a stable terrain. Limestone bedrock is generally thick bedded, and probably difficult to rip except in weathered near-surface layer; affords good source of rip-rap or crushed aggregate; high relief and locally steep slopes make this unit mostly unsuitable for routing of pipelines, roads, etc. Surficial materials stable except for ice-rich silts on lower slopes; mostly suitable for routing of roads, pipelines etc.
XII	AREAS OF MODERATELY RESISTANT BEDROCK (UNGLACIATED), SCARP AREAS WITHIN THIS UNIT SHOWN AS XIIs	Areas developed on bedrock of moderate resistance. This unit includes mountains, high and low hills composed of sandstone, and siltstone with minor areas of shale.	(a) Mountain plateaus, typically with sandstone capping, and irregular mountain ridges typically developed on moderately to steeply dipping sandstone, with intervening valleys developed on shale. Surface material consists of a colluvium with a silty to clayey matrix 1-10 ft. in thickness. (b) High hills with irregular ridges, and a surficial cover of sandstone, siltstone and colluvium rubble in a silty matrix, ranging in thickness from 1-10 ft. (c) Low hills and irregular ridges, mostly developed on moderately deformed sandstone, siltstone and shale. Surface material consists of sandstone and siltstone rubble 1-10 ft. thick, in places with a variable cover of silt over weathered sandstone and shale (typically clayey silt to sandy clay with sandstone fragments). A veneer of sandy silts on lower slopes often present.	Little or no ice content on moderately steep slopes; locally high on slope-wash sediments on gentle slopes and valley floors. Highly variable; generally low to moderate; locally high on lower slopes; nil in prominent ridges developed on sandstone. Low to high, locally very high in silts on lower slopes and valley floors.	Downslope drainage, wet ground on local flat areas. Downslope drainage, wet ground on local flat areas. Downslope drainage, wet ground on local flat areas.	Steep slopes and high relief make rockfalls and slides common; solifluction creep on steeper slopes. Potential for ground ice slumping in silts lower slopes and valley bottoms. Potential for ground ice slumping/ gullying in silts of lower slopes and valley bottoms.	Steep slopes and high relief make much of this unit difficult for location of roads, pipelines, etc. Flattish mountain summits are common in the unit, and afford suitable terrain for most types of construction, but summit areas are mostly separated by intervening steep slopes. Lower slopes and valley bottoms with potentially thick and ice-rich silt should be avoided, ridges and tops of scarps developed on sandstone or siltstone affords suitable routing for roads, pipelines etc; the sandstone and siltstone is mainly thin-bedded and readily ripped or crushed, but as road metal is too soft to withstand heavy traffic. Similar to (a) and (b) developed on some lithologies except for significant areas of silt with high ice content on lower slopes and valley floors; ridges and hills provide good routing for pipelines and roads; lower slopes and valley floors should be avoided.
XIII	AREAS OF BEDROCK OF LOW RESISTANCE (UNGLACIATED). SCARP AREAS WITHIN THIS UNIT SHOWN AS XIIIs	Areas developed on bedrock of low resistance and cohesion. Includes high and low hills composed of shale, siltstone and minor sandstone.	(a) Intricately dissected, high hills, irregular ridges and uplands. In high hills developed on chert, and shale, irregular ridges consisting of prominent subsidiary ridges developed on chert, with intervening depressions developed on shale. Chert rubble and clayey colluvium (1-5 ft. thick) on higher areas; thicker deposits of colluvium and silty clay on lower slopes. (b) Low hills and broadly rounded plains developed on shale and siltstone, and a dissected plain developed on flat lying shale and sandstone of the Eagle Plains Formation. The surficial material consists of discontinuous organic silty clay or weathered shale/sandstone 6-10 ft. thick; coarse sandstone; local peat accumulations on valley floors. Thickness of surficial materials is greater in valley bottoms.	Little or no ice in ridges, locally high ice content on valley floors and in upper 5 feet in depressions and saddles. Ice content of materials on flat high elevation surfaces and slopes high to very high (up to 80% ice by volume) on lower hills and valley floors.	Downslope drainage, wet ground on local flat areas. Downslope drainage, wet ground on local flat areas.	Active creep on steep slopes. High relief and steep slopes may result in rockfalls and slides. Gullying of soft materials. Highly susceptible to terrain damage due to degradation of permafrost when vegetation and/or organic cover is removed; steeper slopes subject to active layer detachment slides; shale may fail by rotational slumping in banks of larger streams.	Where hills are developed mainly on shale and siltstone intricate dissection makes this unit very unsuitable for location of roads or pipelines. Where hills are developed on chert, chert rubble and subjacent bedrock afford good material for road or berm construction. Unsuitable
XIV	PEDIMENT COMPLEX	Pediment Complex	Topography consists mainly of smooth gentle slopes, typically 1-3° (exceptionally to 9° in narrow pediments in mountain valleys) steepening somewhat near the upper margin. Composition of surficial deposits generally consists of organic silts 1-10 ft. thick overlying poorly sorted weathered gravels derived from the bedrock beneath (sandstone, siltstone and shale; granite; carbonate rocks; argillite, quartzite, and volcanic rocks; and conglomerates.)	Ice content is high to very high in the silt cover, locally high on lower slopes with a general increase downslope. Low to moderate in subjacent materials.	Downslope seepage in part with poorly integrated subparallel drainage.	Gullying of soft materials	In general, the silty cover is thickest in upper margin of pediment slope, thicker at lower margin; although ice content of silt is high, aggregate ice thickness is relatively low because of thinness of silt; burial of pipelines may be possible where trench depth exceeds thickness of silt. Roads or berms routed normal to or diagonally across the direction of slope will require numerous culverts to accommodate the downslope seepage of surface water.
XV	GLACIATED BEDROCK	Cretaceous sandstones, shales. Paleozoic sandstones, shales, quartzites, and carbonates which have undergone glaciation	Mainly prominent ridges, scarps and hills developed on resistant sandstones, quartzites and carbonates.	No records of segregated ice, but possibility of ice in joints and fracture zones; segregated ice may be present in silt-filled depressions. Ice-filled fractures observed locally in sandstone.	Surface generally dry and freely drained; some poorly drained depressions.	Shales, especially, bentonitic shales, of Cretaceous age subject to massive slides.	Carbonate rocks of Paleozoic age provide suitable material for rip-rap and crushed aggregate; sandstones and shales of Imperial Formation readily rippable to provide fill.

[1] Ground-ice data refer to the thermokarst alluvial terraces of Bell Basin (116 I, P) where terraces are underlain at depth by glaciolacustrine and/or non-glacial sediments; in map area 116 N (E½) and 1160, thermokarst alluvial terraces are underlain by silt 15-20 feet thick in turn underlain by gravel; segregated ice as thin (<1") lenses in upper 10 feet, or occasional thick tabular bodies at greater depth in silt; ice wedges as polygonal networks usually present; probably cement ice only in gravels.

[2] Segregated Ice: Ice as distinct lenses, layers, veins, and masses in soils, commonly, but not always oriented normal to direction of heat loss.

[3] Thermokarst: Heat from water in thaw pits, sinks and ponds results in melting of ground ice in areas of saturated peat and underlying mineral soils. The thaw basins may enlarge to the point of coalescing. They are usually steep-sided and flat-bottomed and are best developed in peat-covered, stratified, water-laid silt and fine sand.

[4] Clay, silt, and fine sand are commonly poor borrow materials under permafrost conditions because of their instability under the high moisture conditions that result from thawing of contained ground ice. Some improvement in properties for use as fill could be achieved by artificial drying.

[5] Excess Ice: Ice in excess of the quantity that would be retained as water in the soil voids upon thawing.