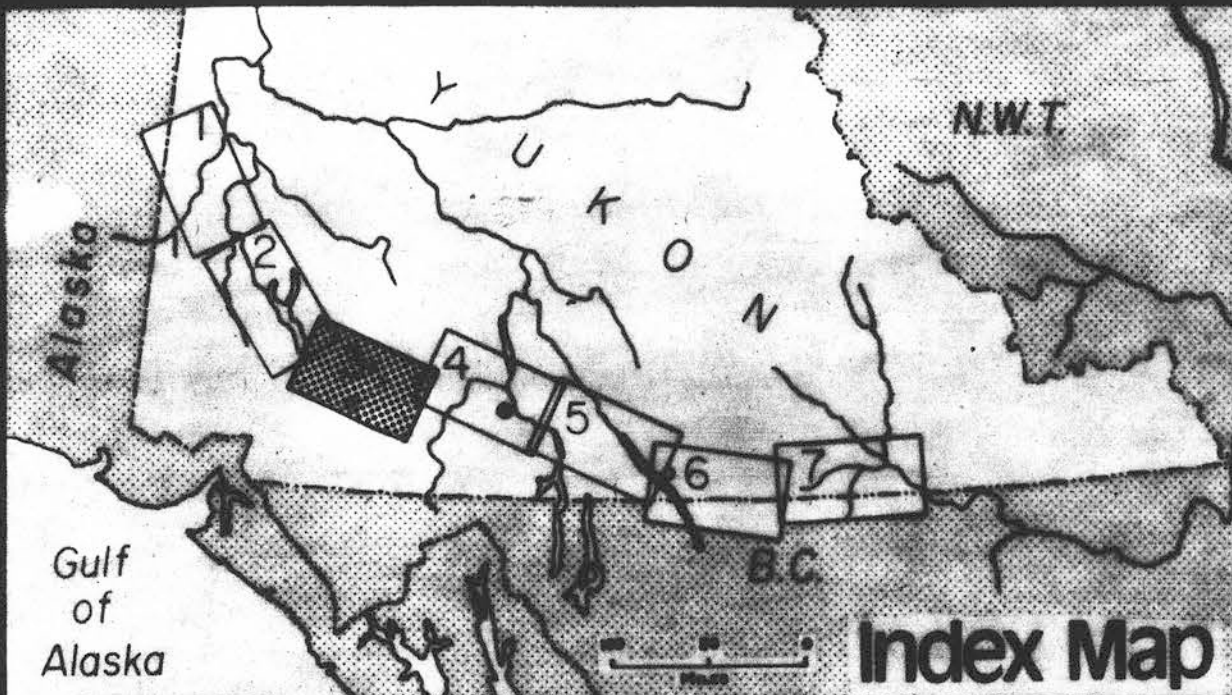


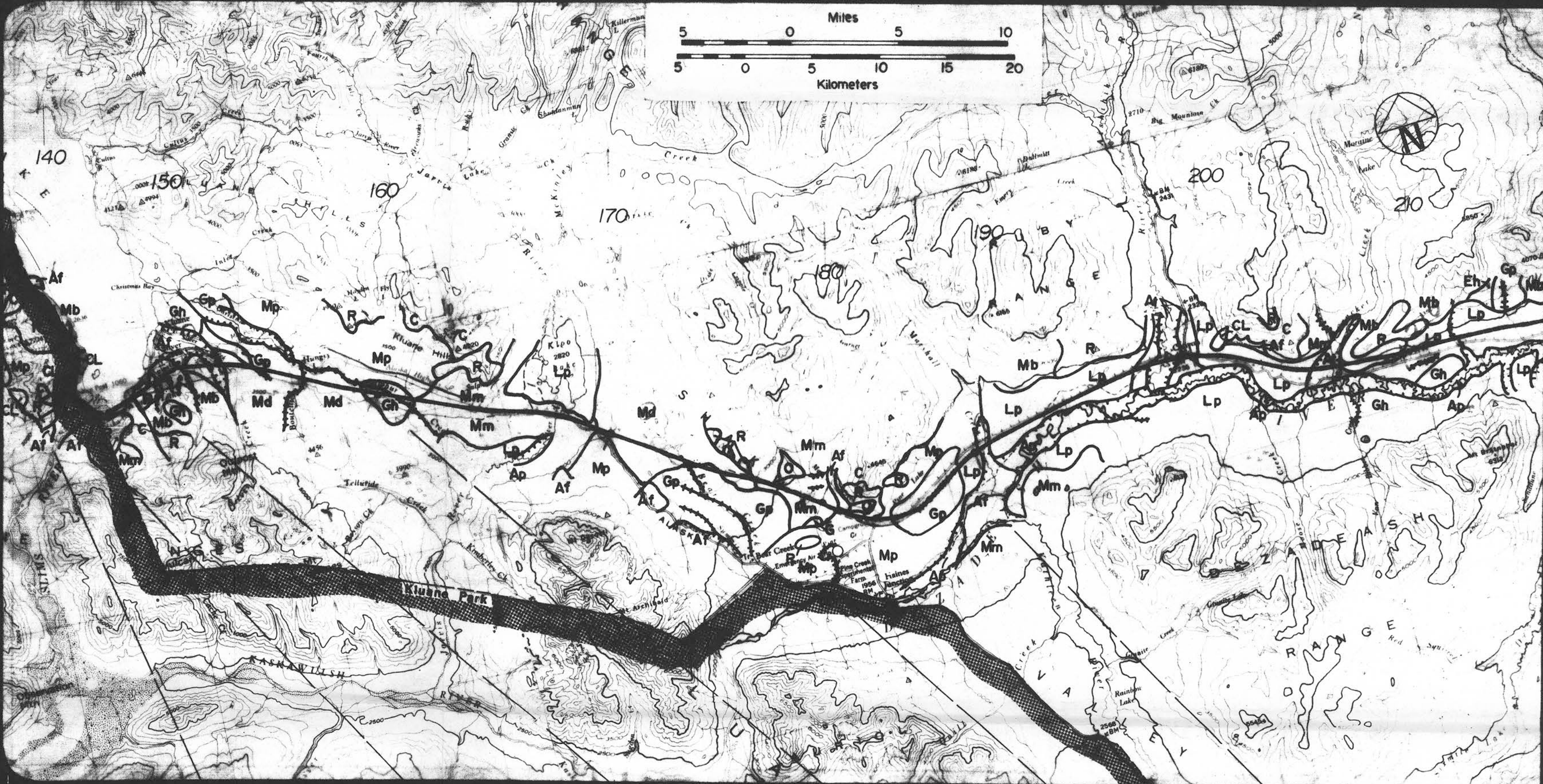
MAP 3  
TERRAIN OVERVIEW  
ALCAN PIPELINE  
YUKON TERRITORY

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Refer to Geologic Legend  
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PHYSIOGRAPHIC UNITS		SHAKWAK VALLEY/KLUANE RANGES	SHAKWAK VALLEY/SLIMS RIVER DELTA	SHAKWAK VALLEY/KLUANE RANGES	SHAKWAK VALLEY	SHAKWAK VALLEY/BEAR CREEK	SHAKWAK VALLEY/HAINES JUNCTION	TAKHINI VALLEY
PHYSICAL	TERRAIN TYPES	Valley slopes with varying thickness of stoney till, colluvium and landslide debris, bouldery in places. Shallow bedrock common.	Floodplain of the Slims River consists of fine-grained material, alluvial fans are gravel.	Glacially-scoured bedrock, alluvial and colluvial fans. Fans consist of poorly sorted bouldery gravels.	Drumlinized moraine and till-blanketed slopes with numerous stream-cut ravines, 100 to 300 feet plus deep. Tills are stoney.	Mainly rolling moraine plain, scattered patches of glacial lacustrine and hummocky outwash. Moraine consists of silt and clay, outwash of gravel and sand.	Complex of drumlinized moraine, rolling and flat ground moraine and outwash, scattered organic terrain. Moraine landforms consist of stoney till, outwash is gravel.	Glaciolacustrine plain and occasional alluvial terraces along major streams. Glaciolacustrine sediments are varved silt and clay, alluvium consists of sand and gravel.
	LOCAL RELIEF AND DRAINAGE	Moderate to steep slopes along valley walls. Very well drained by numerous creeks flowing into Klane Lake.	Flat to gently sloping. Floodplain, poorly drained. Alluvial fans well-drained.	Variable slopes; gentle to moderate along distal edge of fans; moderate to steep on bedrock slopes. Well-drained with small creeks on fans.	Gentle to moderate slopes except for steep ravine walls. Well-drained, some poorly drained swales in drumlinized areas.	Gentle slopes mainly. Well-drained except in small low swales and depressions.	Flat to gently sloping. Moderately well-drained except for area of peatbog near Pine Lake.	Flat to gently sloping except for steep stream-cut scarp. Well-drained by series of small creeks, and ravines draining to incised Dezadeash River.
	GROUND ICE AND PERMAFROST	No ground ice at lower elevations, but sporadic permafrost, especially on north facing slopes.	Ground ice and permafrost may be present in flood plain sediments.	Shallow sporadic permafrost probable on north facing slopes. Minor ground ice because of coarse sediments.	Infrequent permafrost may occur in poorly drained areas. Ground ice only in few areas where organic deposits are present.	Permafrost probably present on north facing slopes and in poorly drained depressions containing fine-textured and organic deposits.	Scattered permafrost. Ground ice in organic terrain.	Permafrost infrequent. No evidence of ground ice.
	BEDROCK LITHOLOGY	Mainly Triassic basalt and andesite. (15, 14)	Cretaceous granitic rocks and Devonian age slate, greywacke, conglomerate and greenstone. (15, 16)	Cretaceous greywacke, slate, argillite, conglomerate and granite; minor Triassic andesite and basalt. (15, 14)	Cretaceous Dezadeash Group and Triassic andesite basalt, rhyolite, volcanic breccia, tuff, argillite, slate and limestone. (15, 14)	Granite and Precambrian Yukon Group rock north of highway. Cretaceous ultrabasics and Dezadeash group south of highway. (16)	Mainly Precambrian Yukon Group rocks. (16)	Precambrian Yukon group and Cretaceous intrusions, mainly granodiorite. (16)
	HYDROLOGY	White River drainage basin.	Slims River flow affected by meltwater of Kaskawulsh Glacier; peak flows during high melt period. During some years the glacier meltwater flows down Kaskawulsh River with little down Slims River. (34)	Small creeks.	Silver Creek, Sulphur Creek, Boutellier Creek.	Alsek River Drainage Basin. General flow is parallel to route. Flash floods possible in summer, especially in creeks on north side of Dezadeash River, Jarvis River, Bear Creek.	Pine Lake.	Marshall River; Aishihik River mean slope 11.9 ft/mi., ice 3.90 ft, thick - February; Maximum annual runoff 3.1 cfm, mean annual runoff 0.3 cfm; Cracker Creek Dezadeash River, slope 3.97 ft/mi., ice 3.53 in April, maximum annual runoff 8.4 cfm; mean annual runoff 1.3 cfm. (54, 65, 66)
	PROCESSES AND STABILITY	Large landslides periodically affect area. Small creeks carry minor amount of sediment down slope.	Deposition of sediments on alluvial fans/floodplain. Slims River channel confined by Alaska Highway and bridge. Shifting stream beds on alluvial fans. Glacial silt carried by the Slims River is filling in the southern end of Klane Lake at a rate in excess of 100 feet per year.	Debris flows and flooding on alluvial fans during periods of intense and continued rainfall.	Some shifting of stream channels on coarse-textured alluvial fans. Scour probably minimal.	Very slow peat accumulation in wet depressions.	Potential for expansion of thermokarst lakes in organic terrain.	Stable except at small stream crossings where some lateral erosion may occur.
LIVING	ENGINEERING IMPLICATIONS AND CONSTRUCTION MATERIALS	Potential erosion and burial by landslides. Potential flow of eroded materials and contaminants directly downslope to Klane Lake. Granular materials locally abundant.	Permafrost, ground ice and possible potential for liquefaction of Slims River alluvium. Scour and deposition by Slims River. Granular materials available on alluvial fans.	Rock excavation; right of way may be subject to debris flows; potential erosion of materials and contaminants directly into Klane Lake. Ample construction material.	Numerous steep ravine walls; abundant granular materials.	Ample granular material in scattered beach ridges and subsurface outwash.	Organic terrain to be avoided because of thermokarst potential. Ample granular materials available in outwash fans.	Wide stream valleys allow for separate scarp and stream crossings. Granular material in stream terraces and beach deposits at some distance.
	VEGETATION	Complex of white and black spruce forest on north facing slopes; aspen and grassy meadows on south facing slopes.	Discontinuous patches of grassland on floodplain; alluvial fans covered by white spruce/aspen complex.	Mainly spruce forest with scattered ash and paper birch.	White spruce and white spruce/aspen forest most common; scattered grassland meadows with numerous shrubs.	White spruce/aspen forest dominates; dense shrub understory in recent burnt areas; scattered grassland meadows with numerous shrubs.	White spruce and white spruce/aspen forest dominate; dense shrubbery on recently burnt areas. Scattered grassy meadows; black spruce muskeg on poorly drained sites.	White spruce/aspen forest with scattered grassy meadows; occasional recently burnt area characterized by dense shrubbery.
	FISHERIES	Klone Lake contains important sport fish populations including lake trout, grayling and pike. There are probably lake trout spawning along the shores.						
ENVIRONMENT	MAMMALS AND BIRDS	Southwest of east end of Klane Lake - Raptors: cliff-nesting species breeding area. Sheep mountain area. Dall sheep winter and spring habitat adjacent to highway.	Mouth of Slims River - upland game bird range. Southwest of east end of Klane Lake and mouth of Slims River - waterfowl staging area; ducks, geese, swans.	Mule deer have recently been sighted east of the Slims River. They may be extending their range into the area. (43)	Moose, coyote, fox, lynx, wolverine and black bear are cosmopolitan along the route. Moose frequent the Boreal areas (below 3,500 feet) and are most often seen in the willow vegetation along watercourses. These animals are members of the largest sub-species in North America ( <i>Alces alces gigas</i> ) common in Alaska but found in Canada only in the Klane area. Winter habitat is mostly in the lowland valleys outside the Klane across the pipeline route.  Small mammals that are common in the Boreal forest and along the valleys include beaver, muskrat, mink, shrews, rabbit and small rodents.  Many species of birds have been recorded from the Klane area. These include species typical of the Boreal forest including gray-jay, dark eyed junco, ruby crowned kinglet, yellow rumped warbler and many others. Golden eagles are common and other raptors such as the bald eagle, goshawk, martin, gyrfalcon and peregrine are frequent visitors to the Klane area.			
	RESEARCH PRIORITIES	Effects of earlier construction on small creeks and sedimentation in Klane Lake. Spawning and nursery areas for fish along SW shore of Klane Lake.	Soar depth of Slims River. Stability/strength, rate of deposition frost and ice contents of Slims River alluvium. Ecological significance of Slims River delta.	Effects of earlier construction on small creeks and sedimentation in Klane Lake. Erosive power of debris flows.	Identification and distribution of permafrost in meltwater channel near Hungry Lake.	Distribution of permafrost. Ice-content of peaty and fine-grained sediments in depressions.	Extent of organic deposits. Thermokarst potential of organic terrain.	Frost penetration and susceptibility of fine-grained lacustrine sediments. Aishihik river downstream of Aishihik Lake. Hydroelectric scheme has seasonally regulated discharge pattern.
NOTES		*Periodic large landslides along steep valley wall Klane Lake. (57)	*Klone Lake levels at 40 feet or more above present level are known, but no chance of repeated high elevations without complex changes in Slims, Kaskawulsh and Klane River drainage. (30)	*Debris flow blocked Alaska Highway in summer of 1967. (59)	*Base of old meltwater channel is poorly-drained.	*Scattered beach ridges present in this area. (9)	*Most till and outwash is veneered by a mixture of silty and sandy lacustrine deposits. Drowning of Alsek River by Lowell Glacier could potentially flood low areas in vicinity of Haines Junction.	*Glaciolacustrine beaches along valley edge at various elevations. *Local salt accumulations in some depressions. (19)
		*Active rock glaciers on higher slopes well above right-of-way. (57)						*Northwestern extent of lodgepole pine noted by Johnson and Raup. (60)