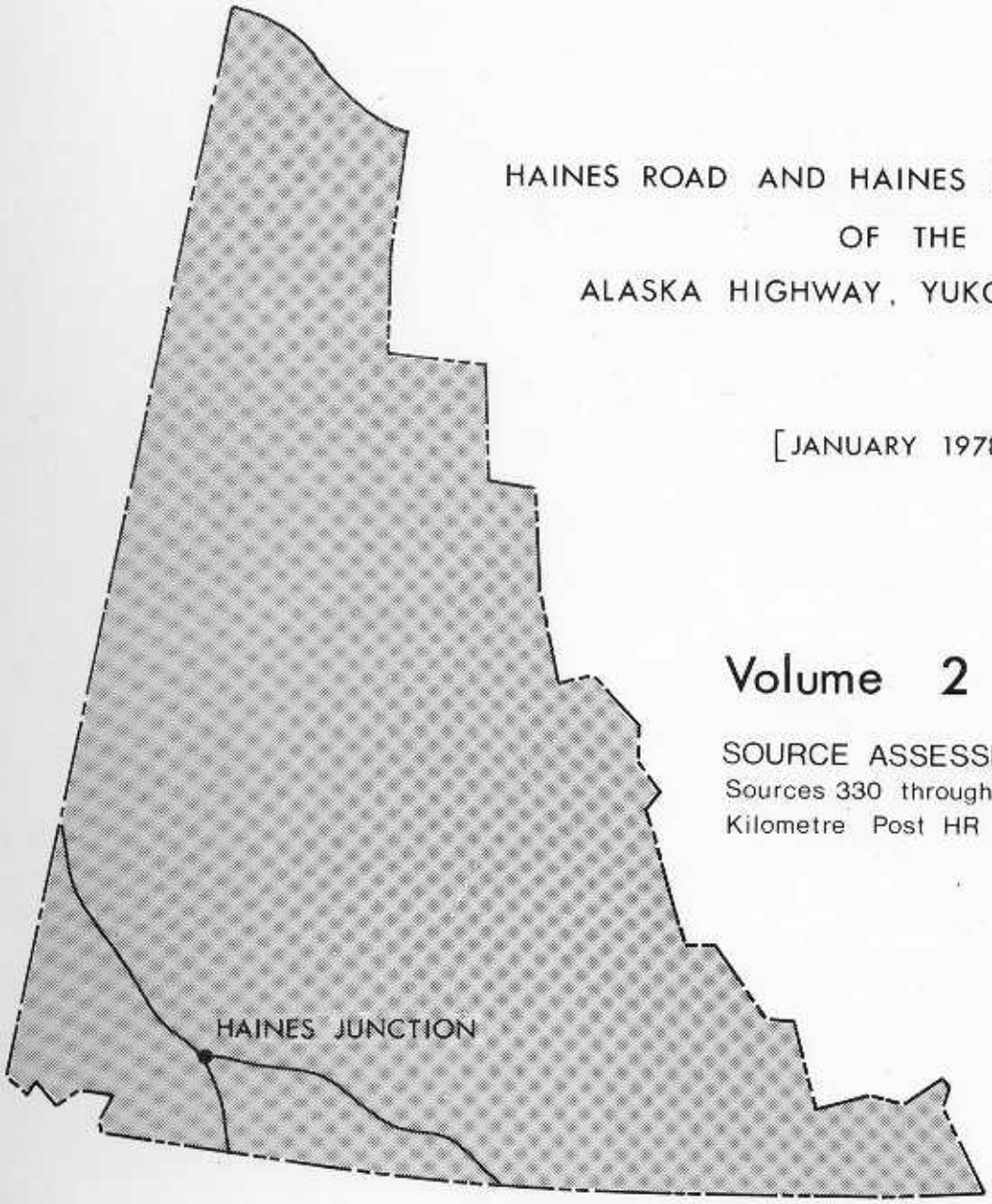
GRANULAR MATERIALS INVENTORY



HAINES ROAD AND HAINES KLUANE SECTION OF THE ALASKA HIGHWAY, YUKON TERRITORY

[JANUARY 1978]

Volume 2

SOURCE ASSESSMENT SUMMARIES
Sources 330 through 740
Kilometre Post HR 178 to AH 1664

EBA Engineering Consultants Ltd.

F.F. SLANEY & COMPANY (ALBERTA) LIMITED

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	330
SAMPLE NOS.	no samples taken
LANDFORM AND LOCATION	EC probably resting on bedrock high near kilometre post HR178
MATERIAL	sands and gravels (assumed)
ESTIMATED VOLUME	50 000 m^3 to 100 m^3
AIRPHOTO NOS.	HIGH LEVEL A11523-210
	LOW LEVEL A24177-84

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 330 is a small esker complex resting on the flanks of the Boundary Ranges. The source is close to the Haines Road and is bordered on the east by Motherall Creek. The telephone cut line traverses part of the source while the abandoned pipeline right-of-way passes on the east side.

Biotic

Vegetation is composed of spruce to 10 m in height with shrub willow and birch. Moose and grizzly bear are to be expected in the area but no sign was observed during field surveys. Range horses periodically use the area for grazing. Salmon and trout in the Klukshu system very likely utilize the lower reaches of Motherall Creek.

Recreation

The site lies within a registered outfitter/guided and trapping area, but has no special features or recreational potential.

GRANULAR RESOURCES

The source was not visited during the geological field investigation, however, it is assumed that poorly stratified sands and gravels are present within the eskers. Relatively thick tree cover may present some access problems.

DEVELOPMENT

Although acceptable granular materials may be present within this source, the deposit is relatively small, other material with superior accessibility is also available in the same area. Thus no further development of this source is recommended at the present time. Depending on the eventual need for sand and gravel, a more detailed examination of the deposit could be carried out in the future.

Source Nos. 320, 330 and 370 Airphoto No. A24177-53

SOURCE: 330

LANDFORM AND LOCATION: TERRACE

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	1
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	GRIZZLY BEAR HABITAT	2
AQUATIC FAUNA:	SALMON IN LOWER REACHES OF MOTHERALL CREEK, NORTH OF SITE	2
SURFACE WATER:	POTENTIAL FOR SLUMPING, EROSION AND SILTATION	1
LAND STATUS AND USE:	INDUSTRIAL USE (ABANDONED PIPELINE) HUNTING AREA OUTFITTER/GUIDING AREA TRAPPING AREA	1
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

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DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	340
SAMPLE NOS.	none taken
LANDFORM AND LOCATION	AMP along Klukshu River
MATERIAL	silt, sand and gravel
ESTIMATED VOLUME	not estimated
AIRPHOTO NOS.	HIGH LEVEL A11521-152, A23820-123
	LOW LEVEL A24177 to A24177-61

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 340 is an active meander plain along the Klukshu River with oxbows and meander scars. Flat terrain and a high water table were evident throughout this source area.

Biotic

Although no detailed biotic assessment was made, marshy areas adjacent to the road were observed during field surveys. Salmon and trout populate the Klukshu River.

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GRANULAR RESOURCES

Sand and gravel were encountered in the test pits excavated in this deposit.

DEVELOPMENT

Development of Source No. 340 is not recommended. Environmental concern for possible development effects upon fish resources can be expected to be high. The source area is very wet and probably difficult to develop.

Source Nos. 320, 340

Airphoto No. A24177-50

SOURCE NO. 340

PIT NO. 340-1

EXPOSURE: hand dug test pit

MATERIAL TYPE: fine to medium grained sand, trace of gravel

GENESIS (LANDFORM): AMP

REMARKS: overburden very thin where sampled

SOURCE NO. 340

PIT NO. 340-2

EXPOSURE: river bank exposure along Klukshu river near bridge

MATERIAL TYPE: gravel

GENESIS (LANDFORM): AMP

REMARKS:

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DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	350
SAMPLE NOS.	350-1 350-2
LANDFORM AND LOCATION	AC formed by Vand Creek near kilometre post HR181
MATERIAL	sand and gravel, some cobbles and boulders, trace of silt
ESTIMATED VOLUME	3 000 000 m^3
AIRPHOTO NOS.	HIGH LEVEL A11521-152 LOW LEVEL A24177-48 and 49

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 350 is a large alluvial cone deposit formed by Vand Creek. The base of the cone crosses the Haines Road near kilometre post HR181, overriding the kame terrace near the northern margin and dissecting the terrace into three separated remnants along the south side. The torrential Vand Creek forms an intermittent water course along the centre of the cone, and is braided near the apex. The creek passes through culverts under the Haines Road at two locations. The abandoned pipeline right-of-way traverses the cone 150 to 550 m upslope from the road.

Biotic

Source No. 350 is covered mainly with spruce to 10 m in height and a few aspen. Understory consists of shrub willow and birch with a ground cover

of empetrum, Labrador tea and mosses. The active stream channels are barren of vegetation. Evidence that range horses utilize the site for grazing was observed in the field. Salmon and trout likely utilize the lower reaches of Vand Creek.

Recreation

The source east of the Haines Road is a registered outfitter/guiding and trapping area. Kluane Game Sanctuary lies west of the road.

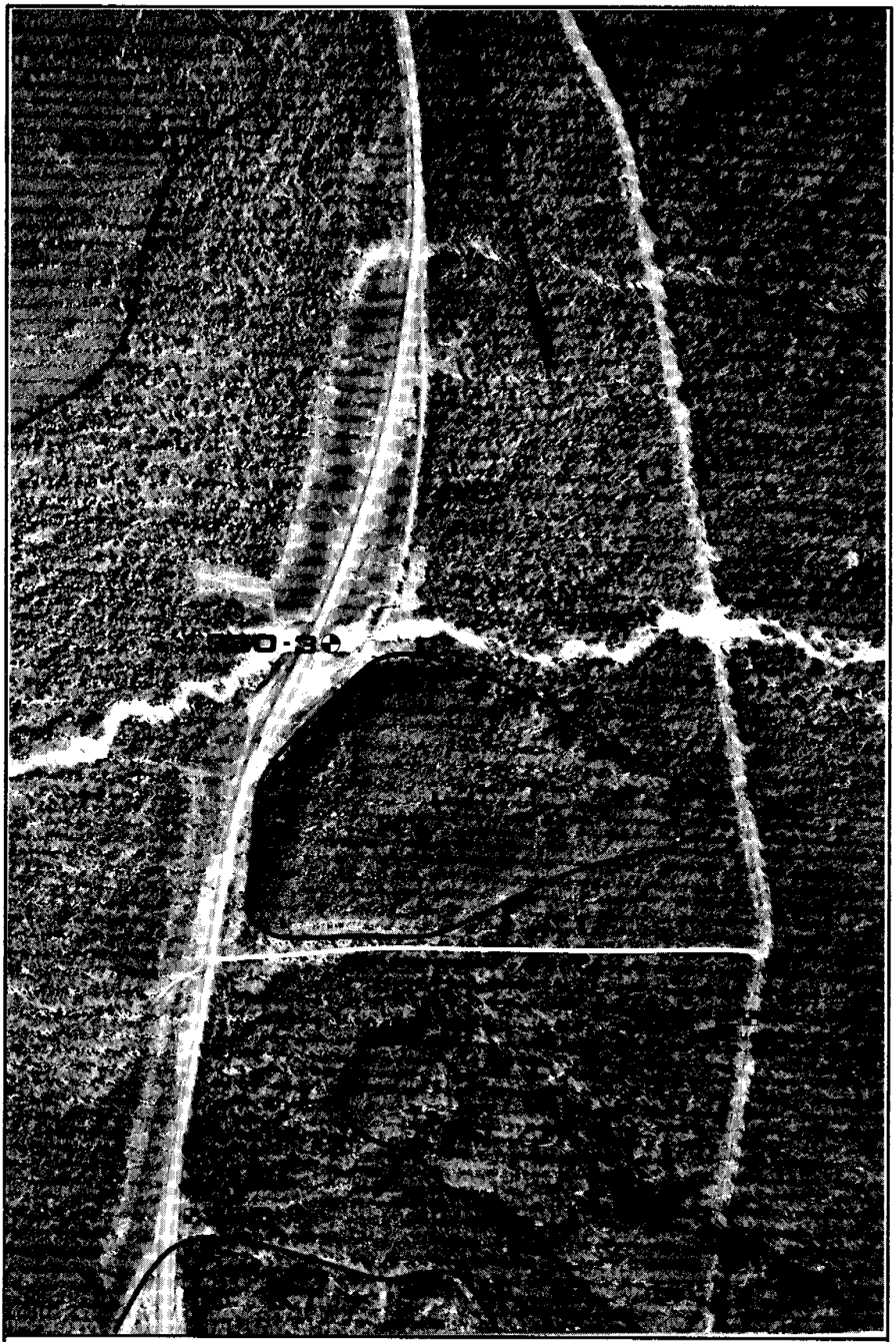
GRANULAR RESOURCES

The Vand Creek alluvial cone was sampled at three locations. Large quantities of sand and gravel were located near the base of the cone. Cobbles and boulders were found in most areas but especially in the main channels of Vand Creek. Silt sizes are relatively scarce. The main rock types are granodiorite and quartzite, but sandstone, diorite and greenstone are also present in small amounts. Volumes were calculated by assuming that at least 50% of the deposit contained suitable borrow material having an average depth of 5 m. Road access to the source is excellent.

DEVELOPMENT

The Vand Creek alluvial cone has excellent potential as a source of granular material. Environmental concerns are minimal if care is taken in development and good quality sands and gravels are present in large quantities. The deposit, if properly developed, could be an important source of asphalt and concrete aggregate as well as a source of base course and sub-base material. Some processing and blending in the form of crushing and screening will be required, but washing will not be necessary.

Major borrow areas should not be developed in the immediate vicinity of Vand Creek, to avoid possible siltation during torrential spring flows which might endanger the fisheries resources of the Klukshu River.



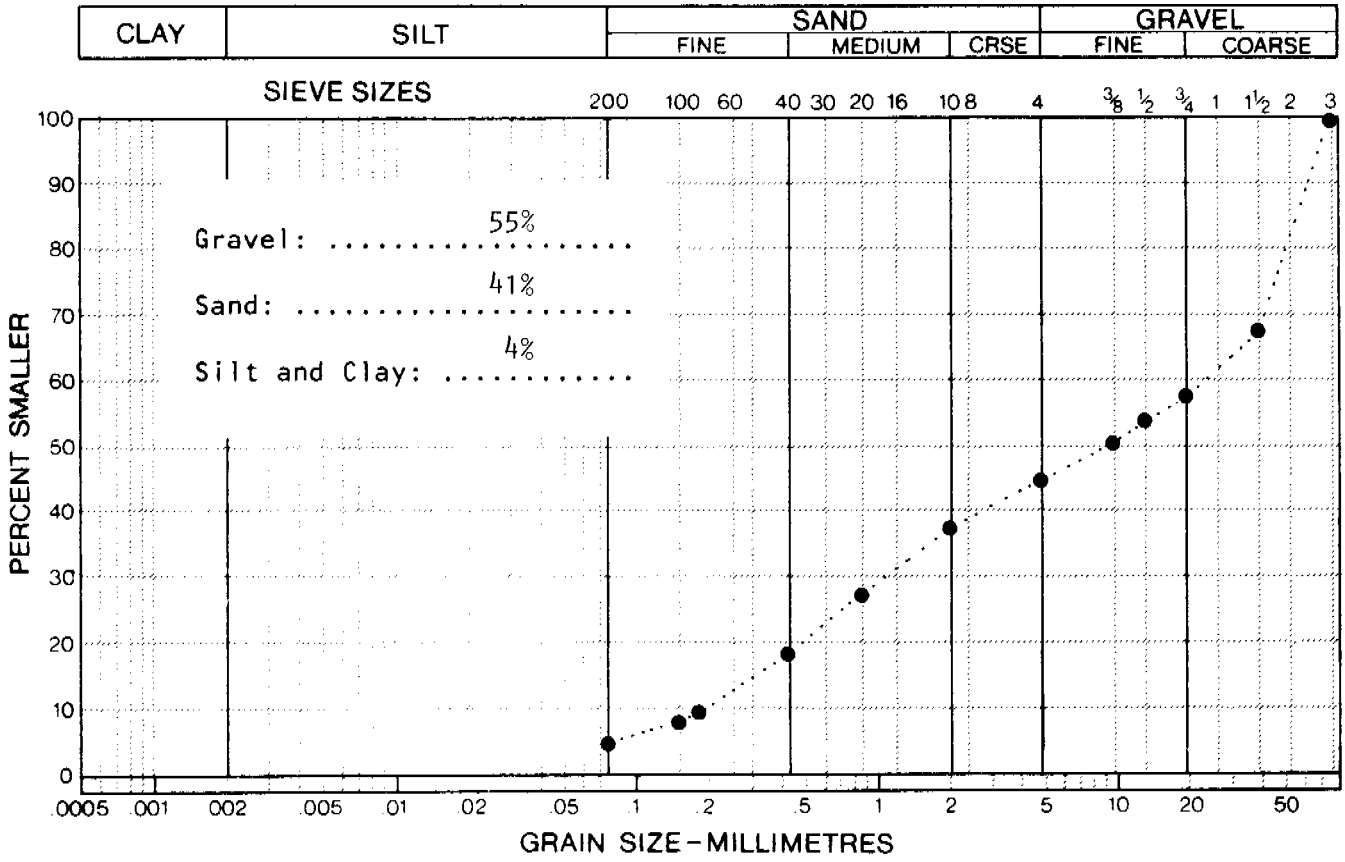
Source No. 350 Airphoto No. A24177-47

LABORATORY ANALYSIS

SOURCE NO. 350

PIT NO. 350-1

EXPOSURE: abandoned borrow pit



MATERIAL TYPE: gravel and sand, traces of cobbles, boulders and silt

GENISIS (LANDFORM): alluvial cone

PETROGRAPHIC ANALYSIS:
granodiorite 63%
quartzite 27%
greenstone 4%
sandstone 3%
diorite 3%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: spheroidal, angular

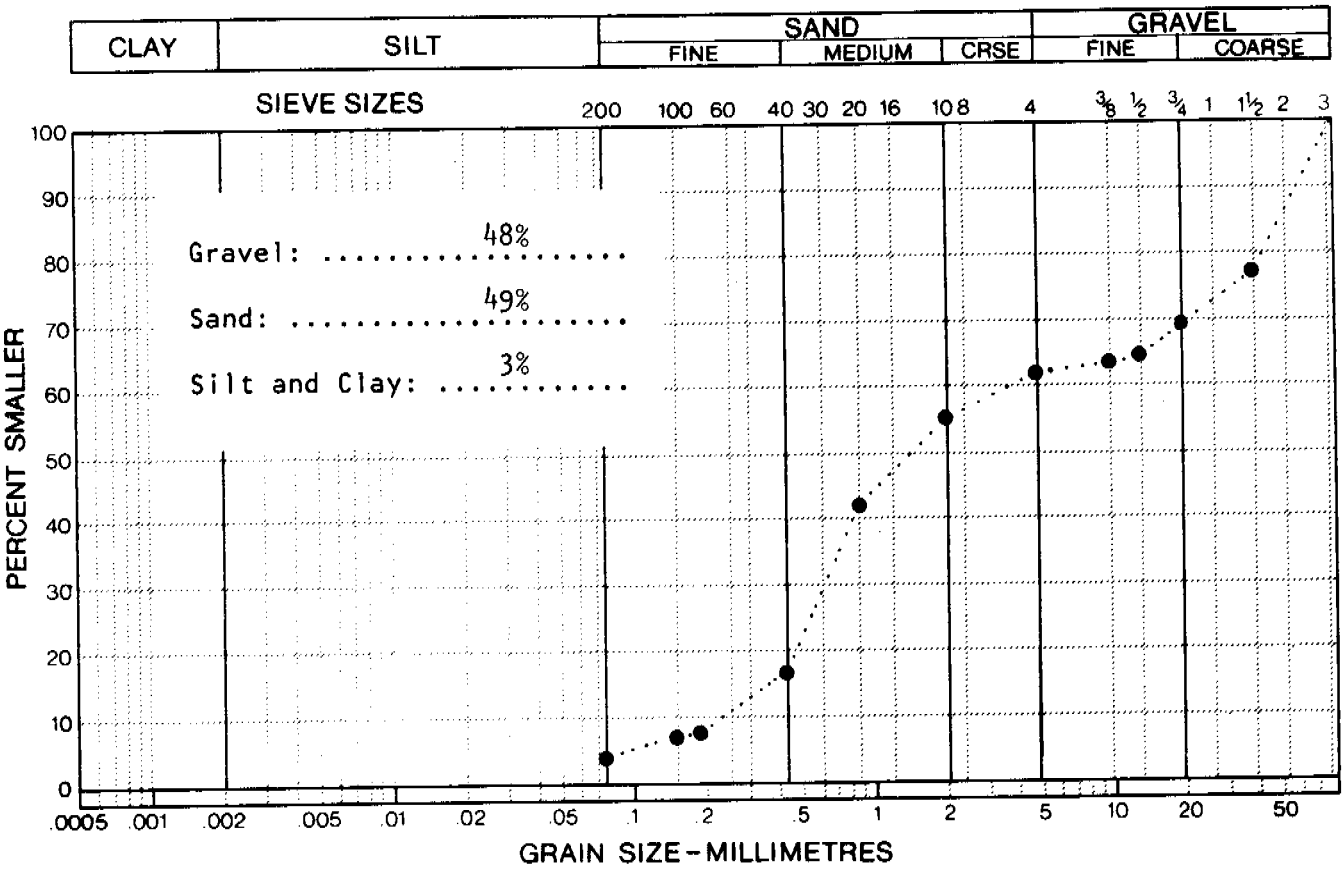
REMARKS: abundant calcareous coatings

LABORATORY ANALYSIS

SOURCE NO. 350

PIT NO. 350-2

EXPOSURE: hand excavated test pit



MATERIAL TYPE: sand and gravel, some cobbles and boulders, trace of silt

GENISIS (LANDFORM): alluvial cone

PETROGRAPHIC ANALYSIS: granodiorite 95%
sandstone 5%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: spheroidal, angular

REMARKS:

SOURCE NO. 350

PIT NO. 350-3

EXPOSURE: dry stream bed at Vand Creek

MATERIAL TYPE: cobbles and boulders

GENESIS (LANDFORM): AC

REMARKS: granodiorite is the major rock type

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

SOURCE: 350

LANDFORM AND LOCATION: ALLUVIAL FAN DEPOSIT

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	1
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	GRIZZLY BEAR HABITAT	2
AQUATIC FAUNA:	SALMON AND TROUT IN LOWER REACHES OF VAND CREEK THROUGH THE SITE	2
SURFACE WATER:	POTENTIAL FOR SLUMPING, EROSION, SILTATION AND ALTERATION OF EXISTING DRAINAGE	2
LAND STATUS AND USE:	GAME SANCTUARY (WEST OF HAINES ROAD) INDUSTRIAL USE (ABANDONED PIPELINE) UTILITIES (TELEPHONE LINE) HUNTING AREA OUTFITTER/GUIDING AREA TRAPPING AREA	2
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	360
SAMPLE NOS.	not sampled
LANDFORM AND LOCATION	AC originating from the KT north of Vand Creek
MATERIAL	variable, includes sandy and silty gravel
ESTIMATED VOLUME	not estimated
AIRPHOTO NOS.	HIGH LEVEL A11523-258
	LOW LEVEL A24177-46

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 360 is an alluvial cone deposit formed by gullying within the kame terrace above. Both Haines Road and the abandoned pipeline right-of-way traverse the lower reaches of this source.

Biotic

Based on observations of nearby sites vegetation is mainly spruce with a few aspen. Understory on well drained sites in the area consists of shrub, willow and birch with a ground cover of empetrum, Labrador tea and moss. East of the road is a registered outfitter/guiding and trapping area. The Kluane Game Sanctuary lies west of the road.

GRANULAR RESOURCES

No sampling was carried out in this deposit. From the airphoto it appears that the source material for the cone has been provided entirely by the kame terrace, and hence is likely to consist of non-uniform silts, sands and gravels.

DEVELOPMENT

The relatively small size of this deposit, its hetrogeneous nature, and its proximity to a superior source of granular material at Vand Creek make this deposit unsuitable for development of any kind.

Source No. 320, 360

Airphoto No. A24177-45

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO. 370

SAMPLE NOS. not sampled

LANDFORM AND LOCATION D/B along Haines Road near Vand Creek

MATERIAL gravelly, silty sand

ESTIMATED VOLUME not estimated

AIRPHOTO NOS. HIGH LEVEL A11521-152

LOW LEVEL A24177-84, A24052-37

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 370 is a thin cover of drift which overlies bedrock above the kame terrace (Source No. 320).

Biotic

No specific environmental assessment was undertaken at this site.

GRANULAR RESOURCES

Drift in the form of a gravelly silty, sand lies directly on weathered bedrock. According to the small abandoned pit at 370-2, the bedrock consists of conglomerates in this area.

DEVELOPMENT

The surficial materials appear to be acceptable as general fill, but no development is recommended at the present time.

Source Nos. 320, 330 and 370 Airphoto No. A24177-53

Source Nos. 320 and 370

Airphoto No. A24177-86

SOURCE NO.	370
PIT NO.	370-1
EXPOSURE:	road cut
MATERIAL TYPE:	gravelly silty sand
GENESIS (LANDFORM):	D/B
REMARKS:	sample of drift

SOURCE NO.	370
PIT NO.	370-2
EXPOSURE:	borrow pit
MATERIAL TYPE:	weathered conglomerate (bedrock)
GENESIS (LANDFORM):	D/B
REMARKS:	bedrock rust coloured; variety of rock types

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	380
SAMPLE NOS.	380-1
LANDFORM AND LOCATION	CAC along Haines Road from approximately kilometre post HR186 to HR190
MATERIAL	sandy gravel, some cobbles, trace of silt
ESTIMATED VOLUME	not estimated
AIRPHOTO NOS.	HIGH LEVEL A11521-152
	LOW LEVEL A24177-37

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 380 is an elongated area of coalescing alluvial cones with moderate slopes. Material in this deposit originates in the kame terrace and terminates against the active meander plain sediments of the Klukshu River. Several intermittent streams drain the cones. The Haines Road, abandoned pipeline right-of-way and telephone line traverse the entire length of the source.

Biotic

Aspen and scattered spruce with some balsam poplar cover these alluvial cones. The understory consists of kinnikinnick, empetrum and juniper with a few shrub willows.

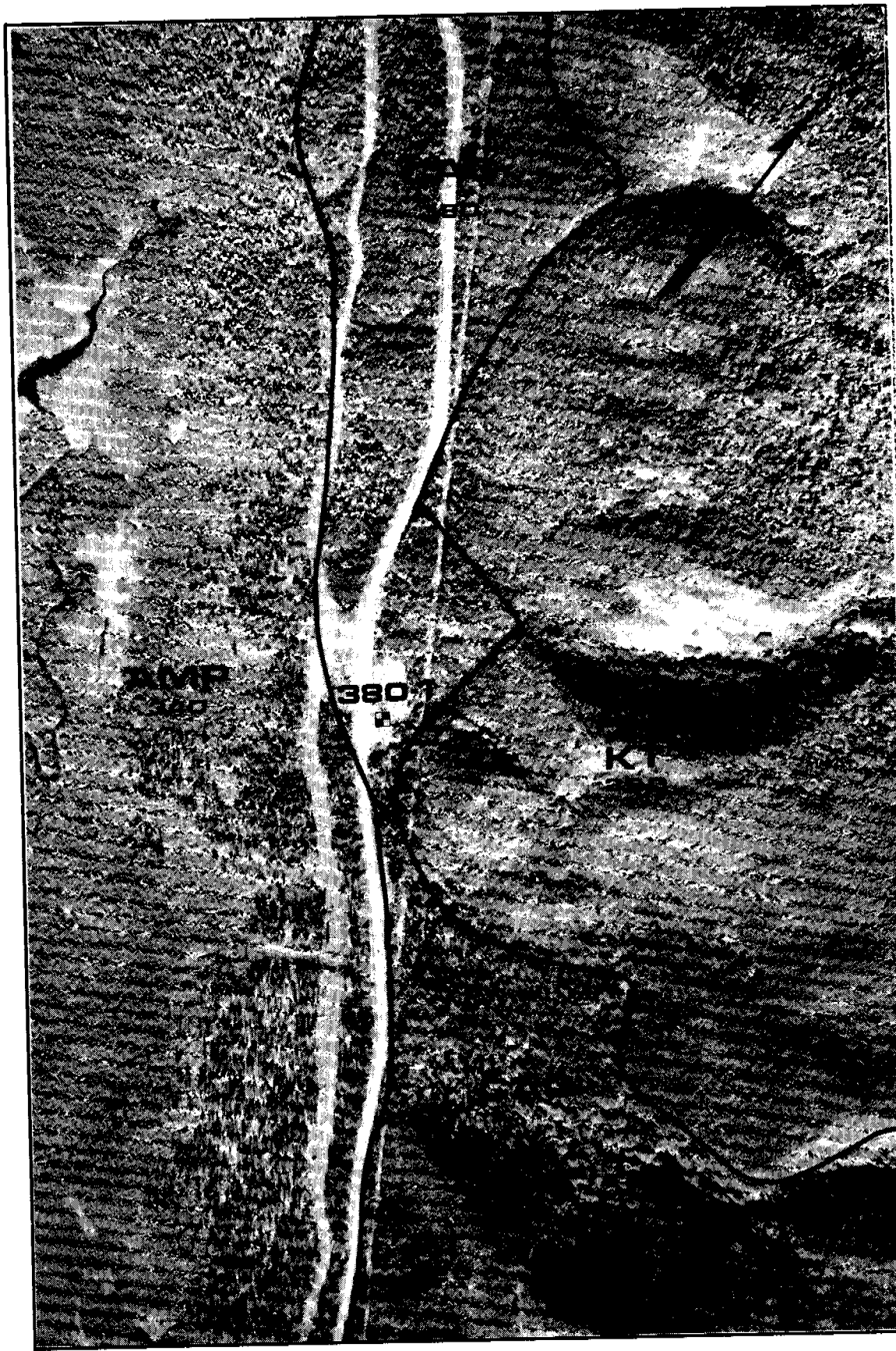
GRANULAR RESOURCES

Two abandoned borrow areas were observed within Source No. 380. Both contain sandy gravel, with some cobbles and a trace of silt. Quartzite is the main rock type with diorite and granodiorite as the main assessories. Deleterious materials, slate, weathered sandstone and schist make up 8% of the sample tested. Access to the source by road is excellent.

DEVELOPMENT

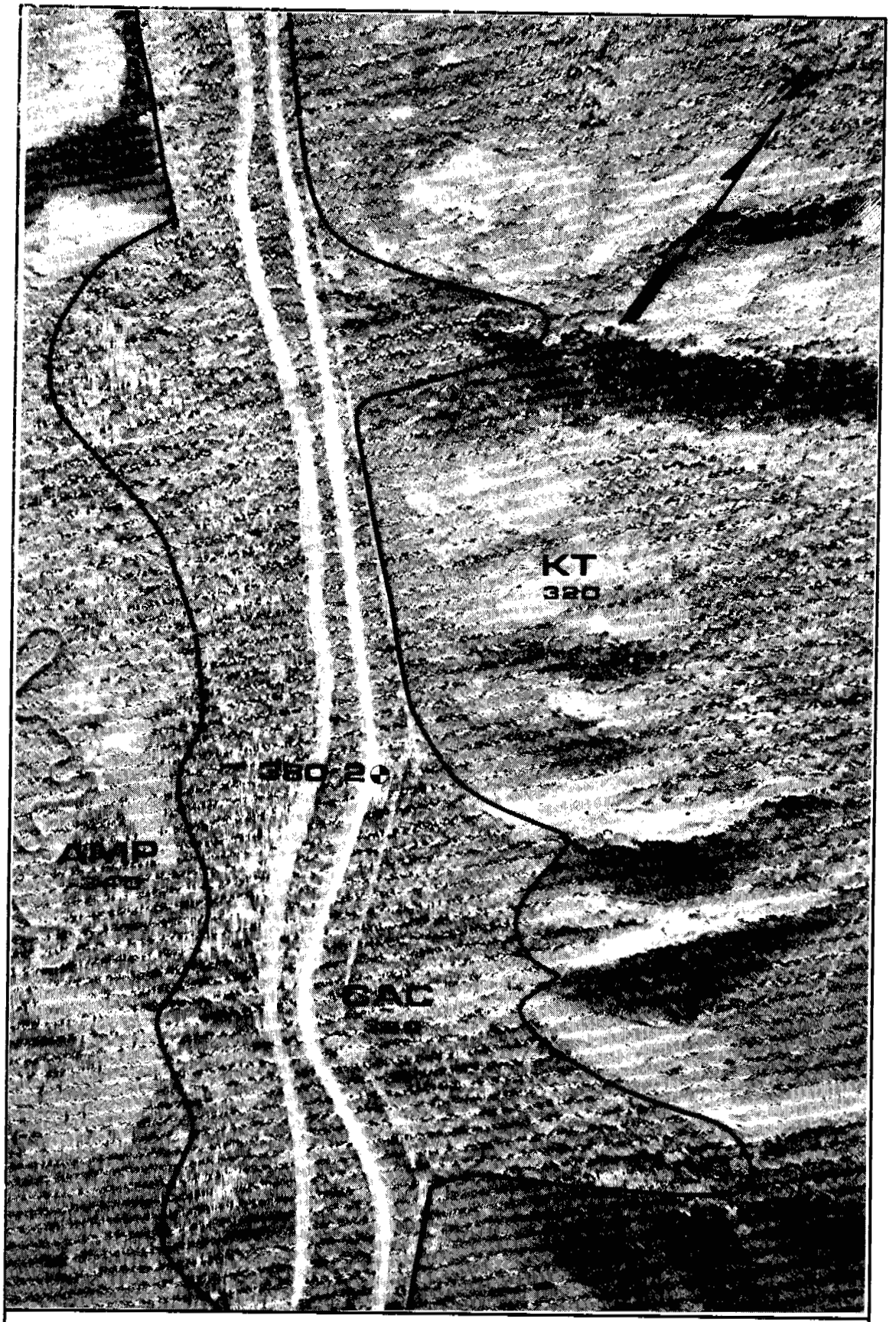
The materials in Source No. 380 with minor processing would be suitable for use as base course, sub-base and concrete aggregate. Some screening of the coarse fraction would be necessary. Environmental concerns are moderate. Development could cause siltation of the intermittent streams leading to the Klukshu River unless precautions are taken. Excavation areas and haul roads upslope from the highway may be visable unless carefully sited.

In view of the proximity of the larger source at Vand Creek, and the difficulties of minimizing environmental impact during borrow operations, no immediate development is recommended. Further assessment of the extent of the coarse granular material will have to be undertaken if future granular resource requirements in this area become large.



Source No. 380

Airphoto No. A24177-37



Source No. 380

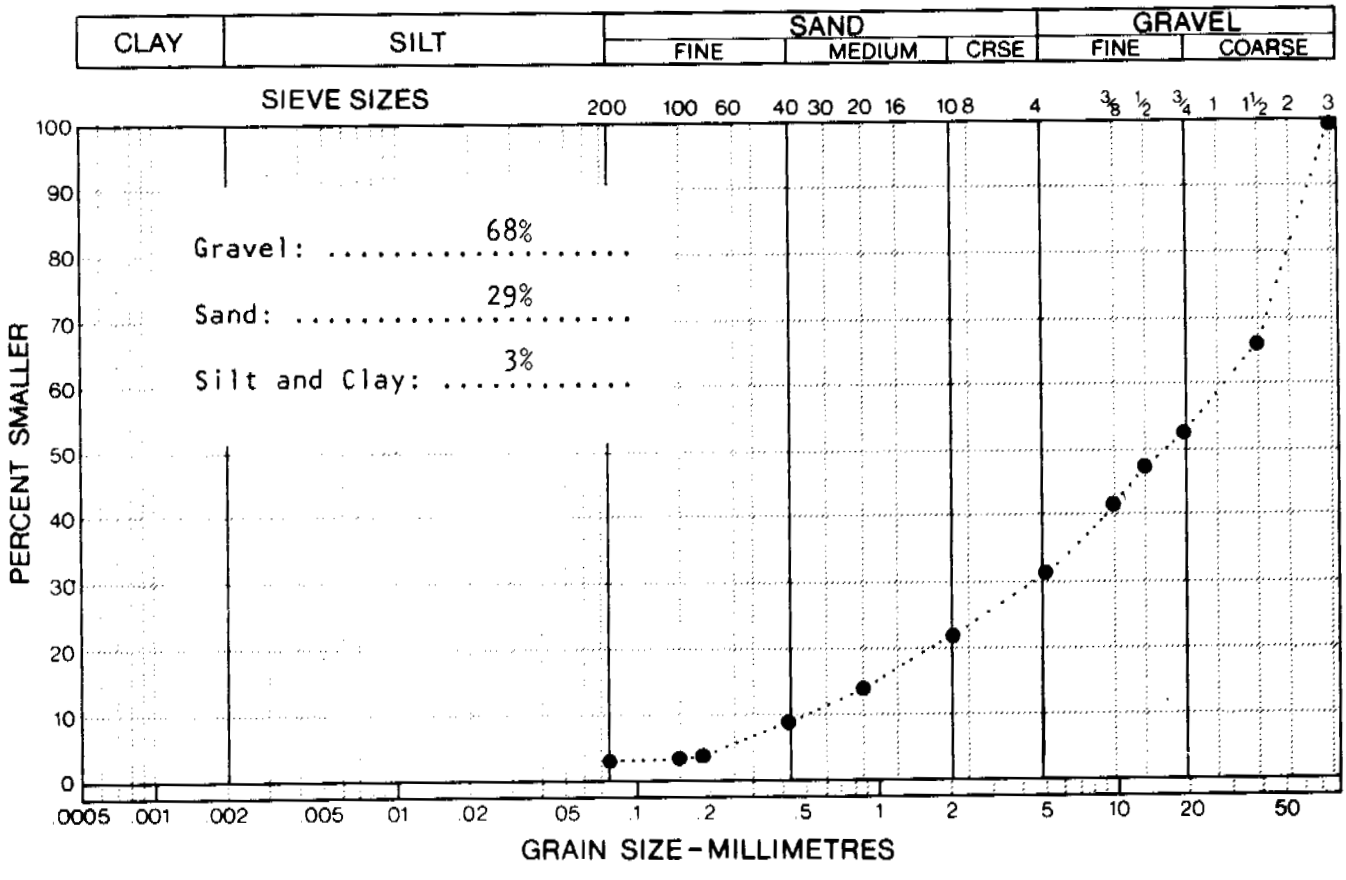
Airphoto No. A24177-34

LABORATORY ANALYSIS

SOURCE NO. 380

PIT NO. 380-1

EXPOSURE: abandoned borrow area



MATERIAL TYPE: sandy gravel, some cobbles, trace of silt

GENISIS (LANDFORM): alluvial cone

PETROGRAPHIC ANALYSIS:

quartzite 77%
diorite 10%
granodiorite 5%
slate 4%
sandstone 2%
schist 2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS:

SOURCE NO. 380

PIT NO. 380-2

EXPOSURE: abandoned borrow pit adjacent to Haines Road

MATERIAL TYPE: gravel, some sand, with cobbles and boulders

GENESIS (LANDFORM): CAC

REMARKS: material apparently derived from kame terrace

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

SOURCE: 380

LANDFORM AND LOCATION: ALLUVIAL FAN DEPOSIT

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	0
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	GRIZZLY BEAR HABITAT	2
AQUATIC FAUNA:	TROUT AND SALMON IN KLUKSHU RIVER BELOW SITE. TRIBUTARY OF KLUKSHU WITH INTERMITTENT FLOWS THROUGH SITE	2
SURFACE WATER:	POTENTIAL FOR SLUMPING, EROSION, SILTATION AND ALTERATION OF EXISTING DRAINAGE PATTERNS	3
LAND STATUS AND USE:	GAME SANCTUARY (WEST OF HAINES ROAD) INDUSTRIAL USE (ABANDONED PIPELINE) UTILITIES (TELEPHONE LINE) HUNTING/TRAPPING AREA OUTFITTER/GUIDING AREA SPORT/SUBSISTENCE FISHING	2
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	390
SAMPLE NOS.	not sampled
LANDFORM AND LOCATION	DR above terrace on west side of Klukshu River
MATERIAL	unknown
ESTIMATED VOLUME	not estimated
AIRPHOTO NOS.	HIGH LEVEL A11521-142
	LOW LEVEL not available

COMMENTS

This ridge may either be entirely composed of drift, or may be bedrock controlled. The latter is suspected. Thus bedrock may also be very shallow beneath the terrace designated as Source No. 280. No development of Source No. 390 is recommeneded.

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DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	400
SAMPLE NOS.	400-3, 400-4, 400-6
LANDFORM AND LOCATION	AFD with AFP west of Klukshu Lake
MATERIAL	sand and gravel
ESTIMATED VOLUME	250 000 m^3 along active channels, 750 000 m^3 in abandoned channels
AIRPHOTO NOS.	HIGH LEVEL A23820-126
	LOW LEVEL A24177-31

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 400 is a large, relatively flat, alluvial fan deposit and two active flood plains associated with tributaries feeding the Klukshu River system. The most northerly AFP commences at the lower end of Gribbles Gulch, and feeds directly into Klukshu Lake. At the time of investigation, most of the stream beds were dry, and the access to the interior of the source was excellent. The dry, braided watercourses (shown by the light areas on the airphotos) are composed primarily of coarse granular materials. These channels are separated by elevated terraces of silts and fine sands which support vegetative cover. During torrential spring flooding these terraces may be overtopped in some areas. East of the Haines Road the source is occupied by a native settlement (Klukshu) and the pipeline right-of-way.

Biotic

Vegetation on the active floodplain consists entirely of balsam poplar and several willow species. Much of the understory on the terraces is absent due to annual flooding. Bear and moose tracks, as well as beaver cut were observed. The watercourse through the fan is a tributary of the high-value Klukshu-Tatshenshini River system, joining the Klukshu River near the highway bridge crossing. Concerns for possible effects on the salmon and trout fisheries are extreme.

The northwest portion of the fan deposit lies within Kluane National Park. The site also includes Klukshu village, an area of considerable value to the Native peoples because of its historic salmon fishery. A Territorial campsite is located in the village. The torrential watercourse and bouldery stream bed within the National Park has tourist interest.

GRANULAR RESOURCES

Material within the stream channel is almost entirely a subangular, blade shaped, quartzitic gravel, with traces of sand sized particles. Where sampled, the terraces appear to be sands, locally stratified with silts or gravels. A petrological investigation of a sample from the Gribbles Gulch watercourse (400-6) also showed traces of slate and soft sandstone, although this amounted to less than 10%. Little or no overburden is present along the stream channels which have been recently active. Finer material in the terraces is overlain by 0.2 to 0.5 m of organic topsoil.

Volume estimates are difficult to make, since only the most recently active channels are apparent on the airphotos. In spite of the relatively large area of the deposit (5 km^2) less than 10 percent is believed to be suitable for mining. Using an average resource thickness of two metres, the total volume of gravel available would be approximately 1 000 000 m^3. About 25% of this is probably available within the active channels seen on the airphotos.

DEVELOPMENT

Overriding environmental concerns make some areas of the source unsuitable for development. No development is permitted, for instance, in the northwest portion of the site, within the confines of the Kluance National Park. Much of the southeast corner is unsuitable due to the presence of the Klukshu Indian Village, and intense utilization by campers, picnicers, tourists and sport fishermen.

Development of selected sites within the source is feasible, providing that measures are taken to prevent excessive erosion during torrential spring flooding and the resulting effects of downstream siltation on the fish population in the Klukshu River.

The grain size analyses on the two samples obtained from the stream channels indicates that this deposit may be too coarse to be useful as engineering aggregate without some processing. Blending with selected sandy material from the terraces or other nearby sources could be used to supply some concrete, aggregate sub-base and base course, although the economic considerations may be prohibitive. Crushing would also be required in the production of asphalt aggregate.

Source Nos. 340 and 400 Airphoto No. A24177-31

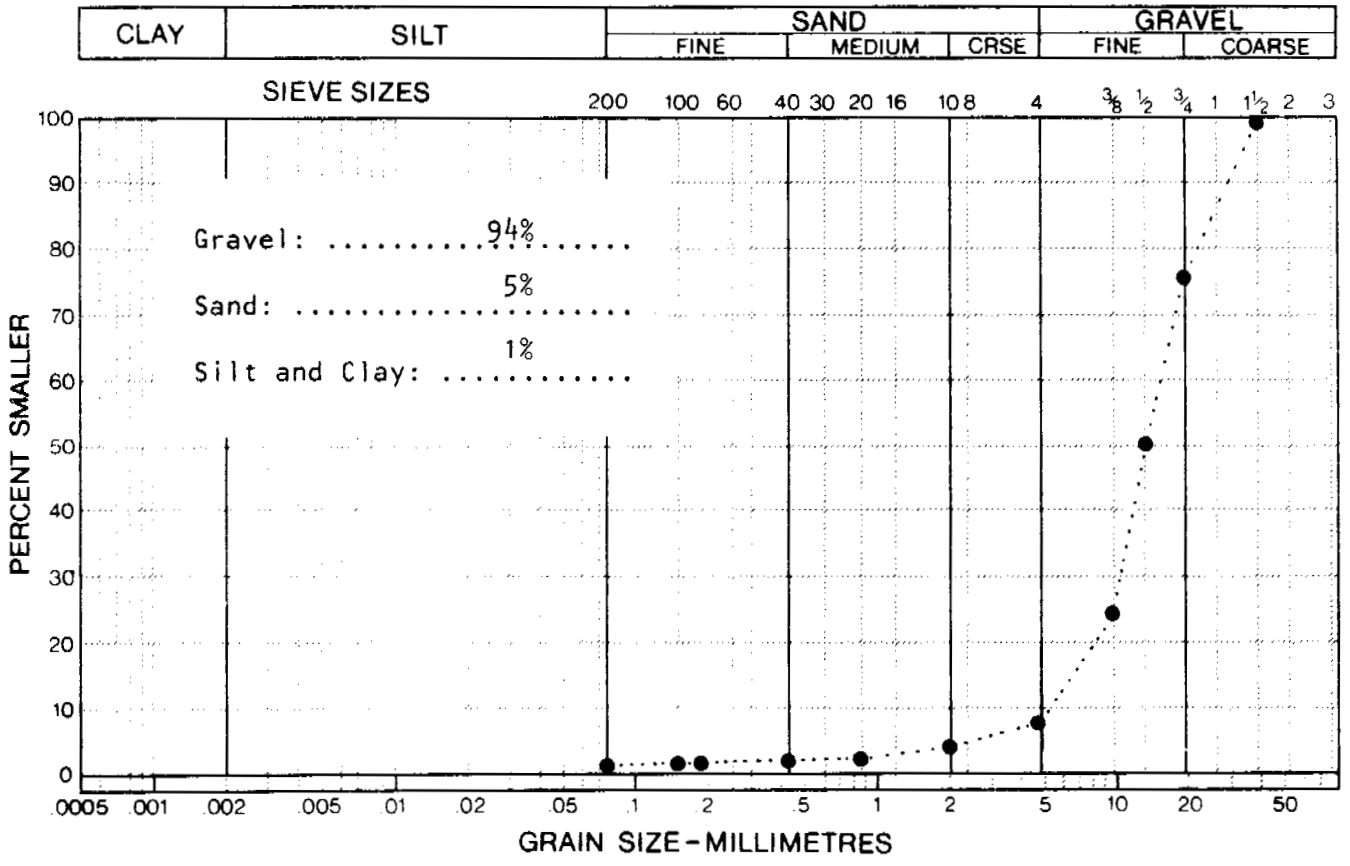
Source No. 400 Airphoto No. A24177-27

LABORATORY ANALYSIS

SOURCE NO. 400

PIT NO. 400-3

EXPOSURE: hand excavated test pit



MATERIAL TYPE: gravel, trace of sand and silt

GENISIS (LANDFORM): active flood plain

PETROGRAPHIC ANALYSIS: quartzite 100%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

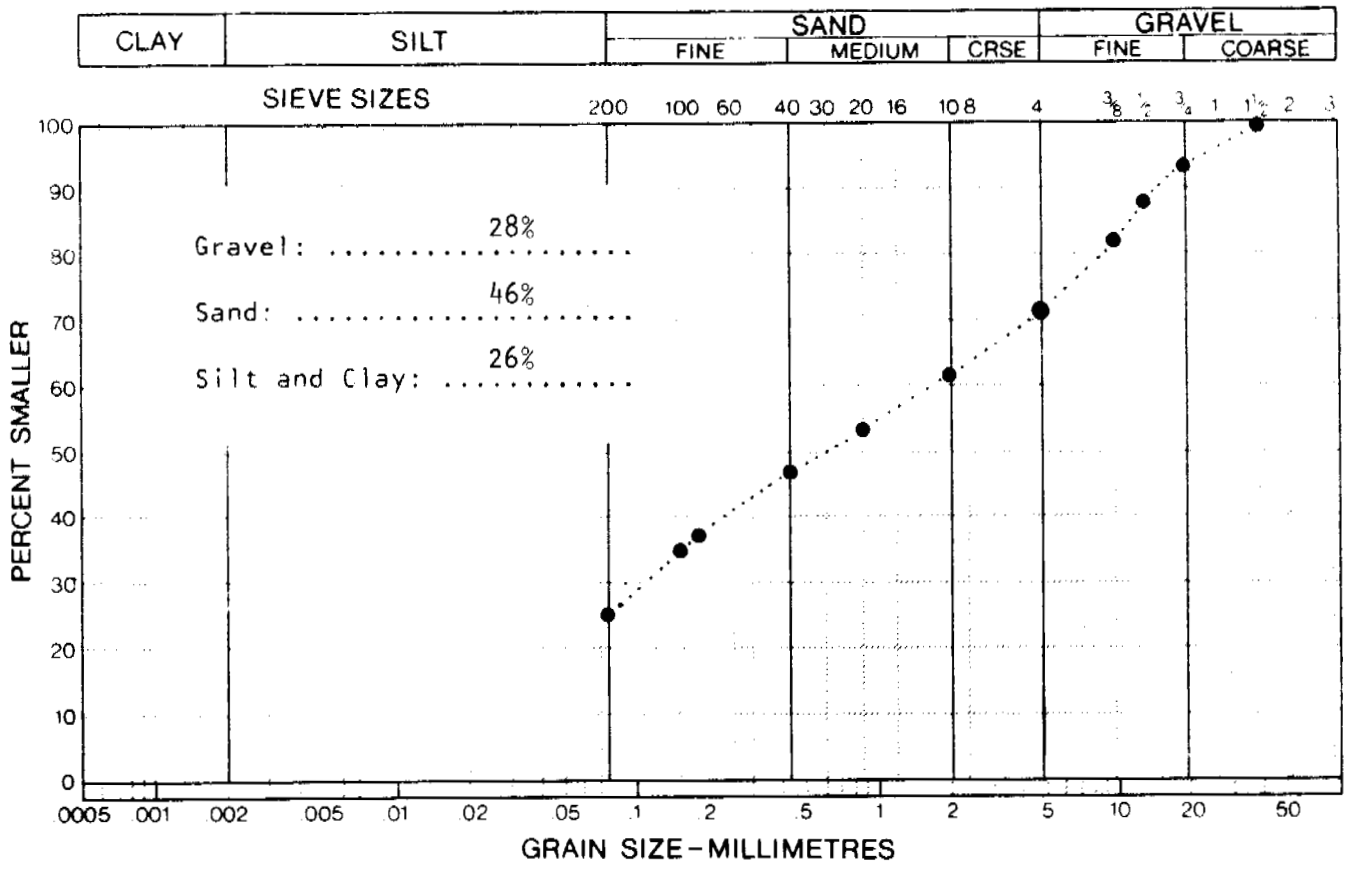
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 400

PIT NO. 400-4

EXPOSURE: stream bank



MATERIAL TYPE: gravelly silty sand

GENISIS (LANDFORM): alluvial fan deposits

PETROGRAPHIC ANALYSIS: quartzite 100%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

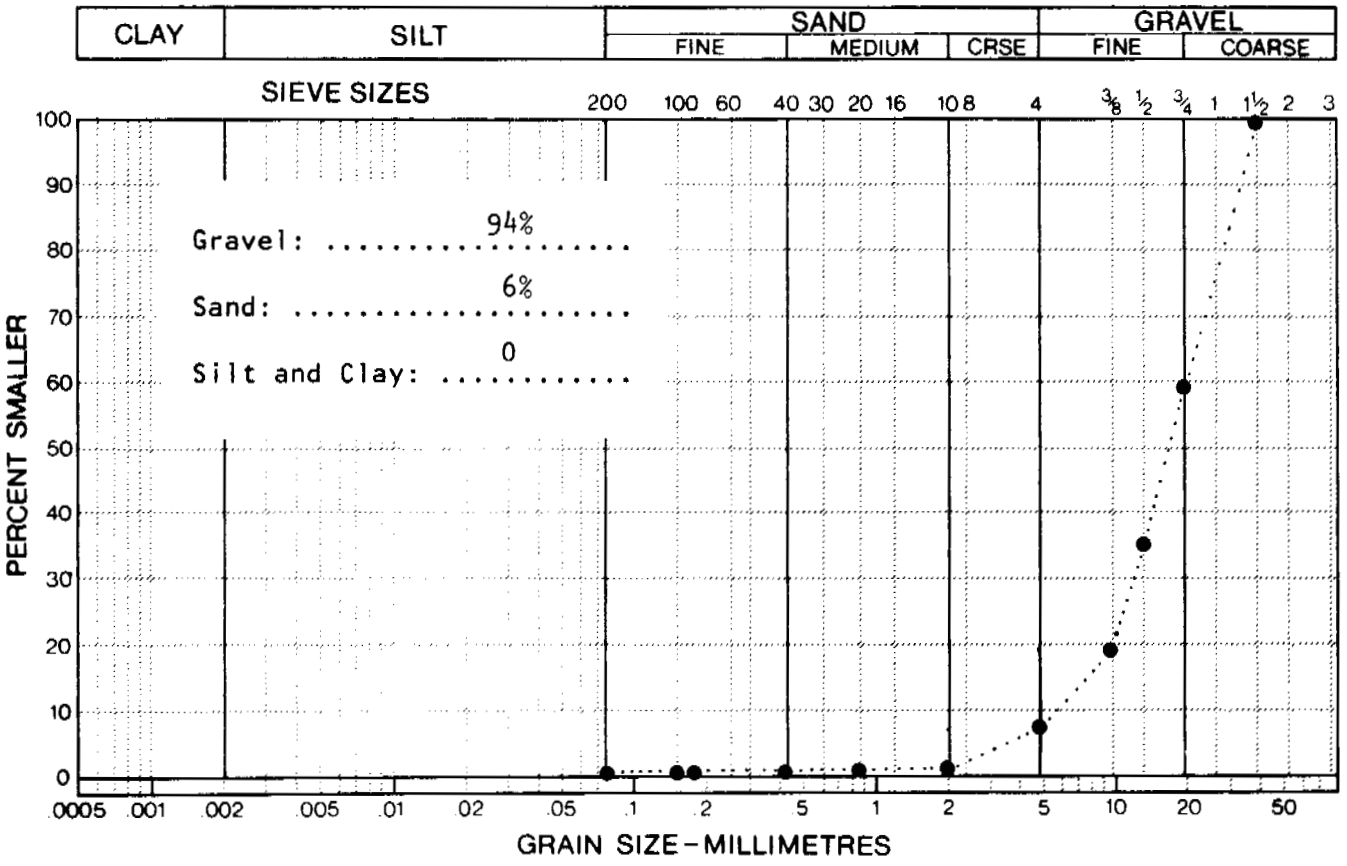
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 400

PIT NO. 400-6

EXPOSURE: stream bed



MATERIAL TYPE: gravel, trace of sand

GENISIS (LANDFORM): active flood plain deposit

PETROGRAPHIC ANALYSIS:

quartzite 90%
slate 7%
sandstone 2%
gneiss 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS:

SOURCE NO. 400

PIT NO. 400-1

EXPOSURE: hand dug test pit along dry stream bed

MATERIAL TYPE: gravel

GENESIS (LANDFORM): AFD with AFP

REMARKS:

SOURCE NO. 400

PIT NO. 400-2

EXPOSURE: hand dug test pit in dry stream bed

MATERIAL TYPE: gravel

GENESIS (LANDFORM): AFD with AFP

REMARKS:

SOURCE NO.	400
PIT NO.	400-5
EXPOSURE:	hand dug test pit adjacent access road to Klukshu Indian Village
MATERIAL TYPE:	gravel
GENESIS (LANDFORM):	AFD with AFP
REMARKS:	0.2 m of organics at the surface

SOURCE NO.	400
PIT NO.	400-7
EXPOSURE:	gully along Gribbles Creek
MATERIAL TYPE:	stratified silts, sands and gravels
GENESIS (LANDFORM):	AFD with AFP
REMARKS:	sample taken from creek bank

SOURCE: 400

LANDFORM AND LOCATION: ALLUVIAL FAN DEPOSIT

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	2
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	GRIZZLY BEAR HABITAT BEAVER HABITAT	2
AQUATIC FAUNA:	TROUT AND SALMON IN KLUKSHU RIVER BELOW SITE. INTERMITTENT TRIBUTARY OF KLUKSHU FLOWS THROUGH SITE	4
SURFACE WATER:	POTENTIAL FOR SLUMPING, EROSION, SILTATION AND ALTERATION OF EXISTING DRAINAGE PATTERNS	4
LAND STATUS AND USE:	NATIONAL PARK (NORTHWEST PORTION OF SITE) GAME SANCTUARY (WEST OF HAINES ROAD) BORDERS POTENTIAL INDIAN LAND CLAIMS INDUSTRIAL USE (ABANDONED PIPELINE) UTILITIES (TELEPHONE LINE) CAMPSITE/PICNIC SITE SPORT/SUBSISTENCE FISHING	5
HERITAGE RESOURCES:	KNOWN PREHISTORIC SITE AT KLUKSHU	2
SPECIAL INTEREST:	DRY BOULDERY STREAM BED, SUMMER TORRENTIAL WATERCOURSE, SPRING	2

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO. 410

SAMPLE NOS. 410-2
410-3

LANDFORM AND LOCATION UD present along the Haines Road from near kilometre post

MATERIAL sand and gravel, some silt

ESTIMATED VOLUME not estimated

AIRPHOTO NOS. HIGH LEVEL A23820-129

LOW LEVEL A24177-10 and 11

DETAILED ASSESSMENT

ENVIRONMENT

Physical

The genesis of Source No. 410 is very difficult to establish on the airphotos. The source has been designated undifferentiated drift, but the boundary between this source and the alluvial fan deposit to the south is indistinct.

Biotic

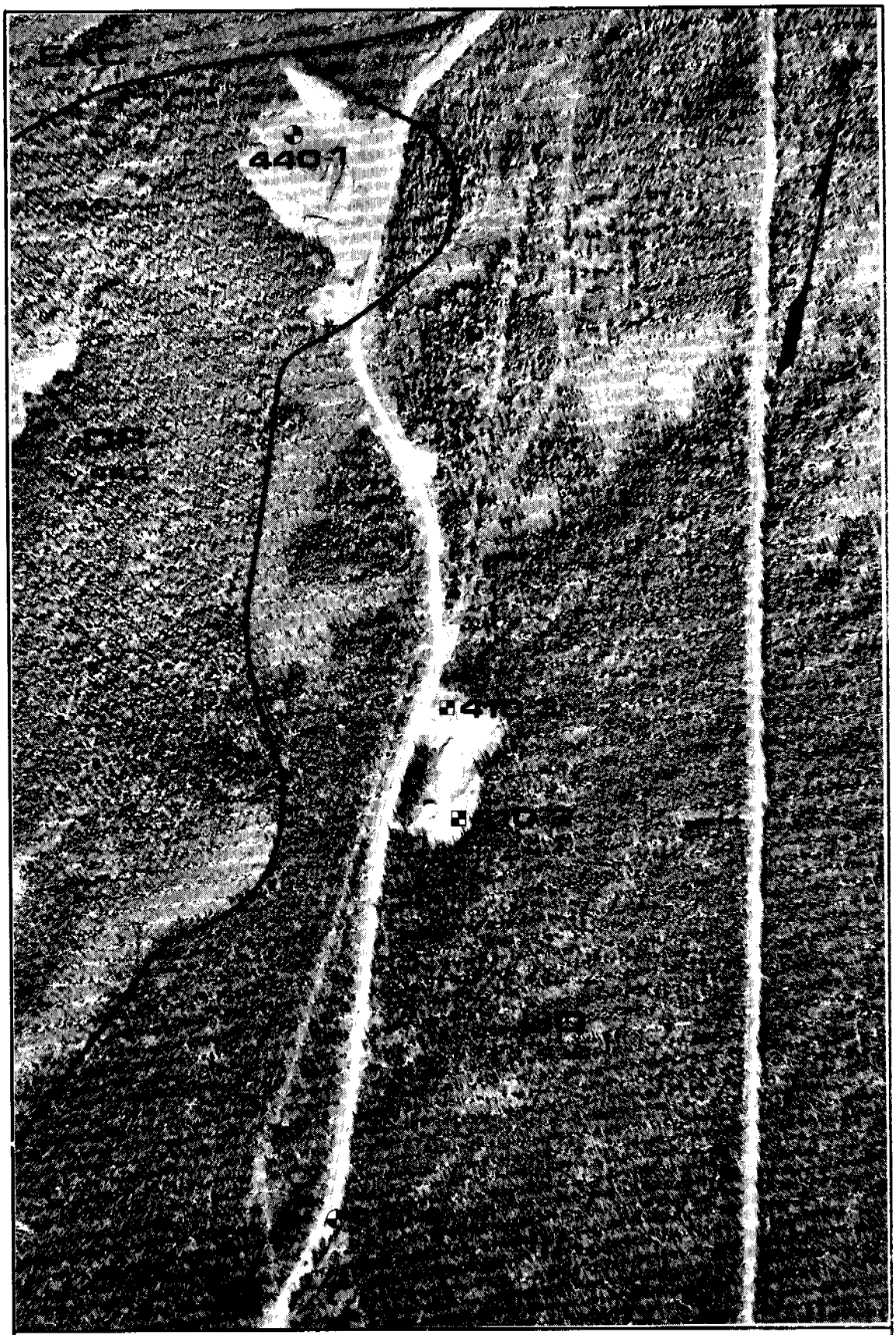
An analysis of biotic factors was not carried out in the field, but fauna and vegetation appear to be similar to those of Source No. 400, based on airphoto information.

GRANULAR RESOURCES

Test pits excavated on the source revealed sand and gravel with some silt. Quartzite is the main rock type. Road access is excellent.

DEVELOPMENT

Development of the source is not recommended because of the relatively high silt content of the granular materials. General fill could be supplied from those pits presently being developed.



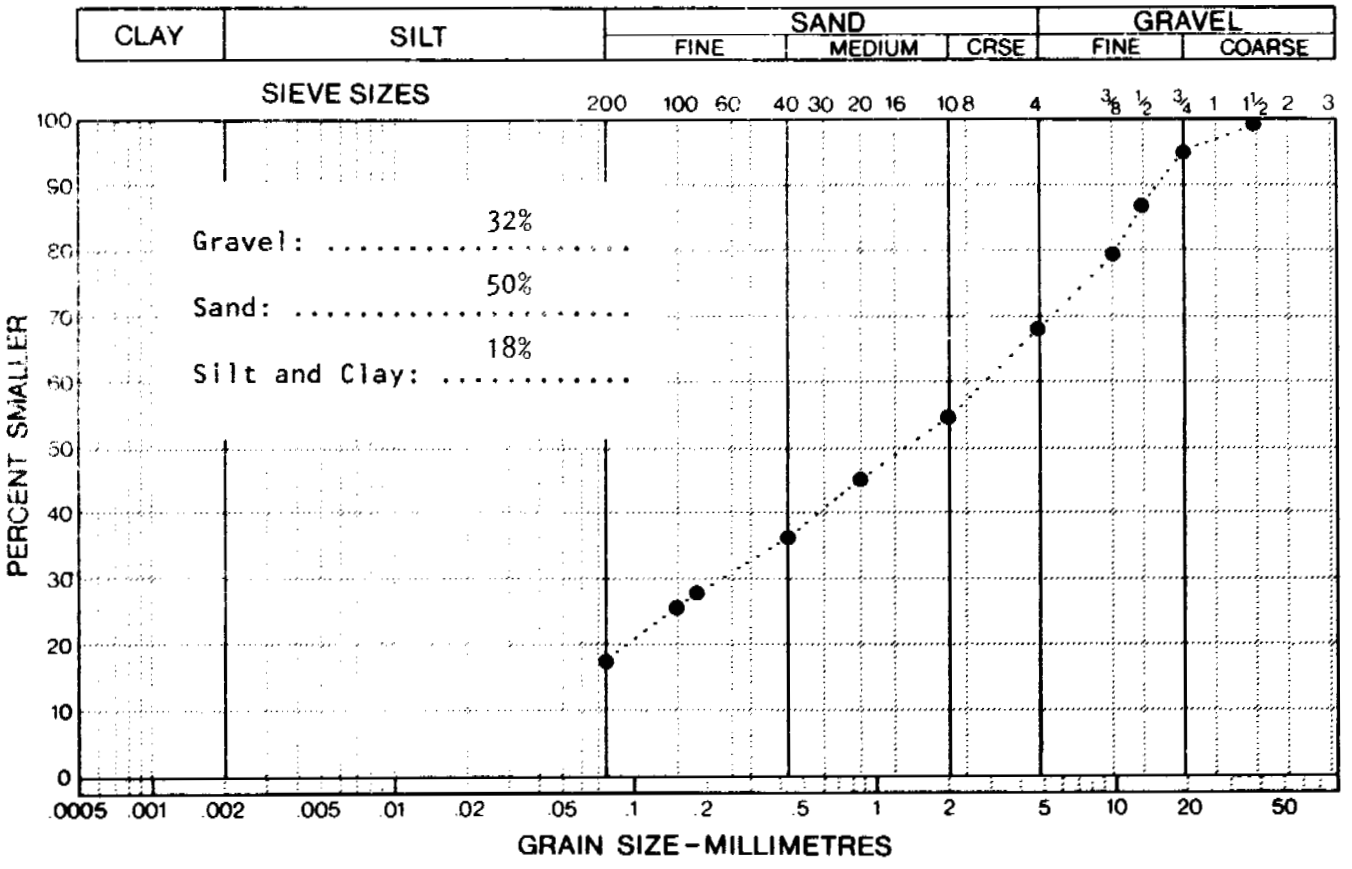
Source Nos. 410 and 440 Airphoto No. A24177-10

LABORATORY ANALYSIS

SOURCE NO. 410

PIT NO. 410-2

EXPOSURE: borrow area



MATERIAL TYPE: sand and gravel, some silt

GENISIS (LANDFORM): drift ridge on an outwash plain

PETROGRAPHIC ANALYSIS:

quartzite 88%
slate 6%
sandstone 2%
granodiorite 2%
diorite 2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, angular

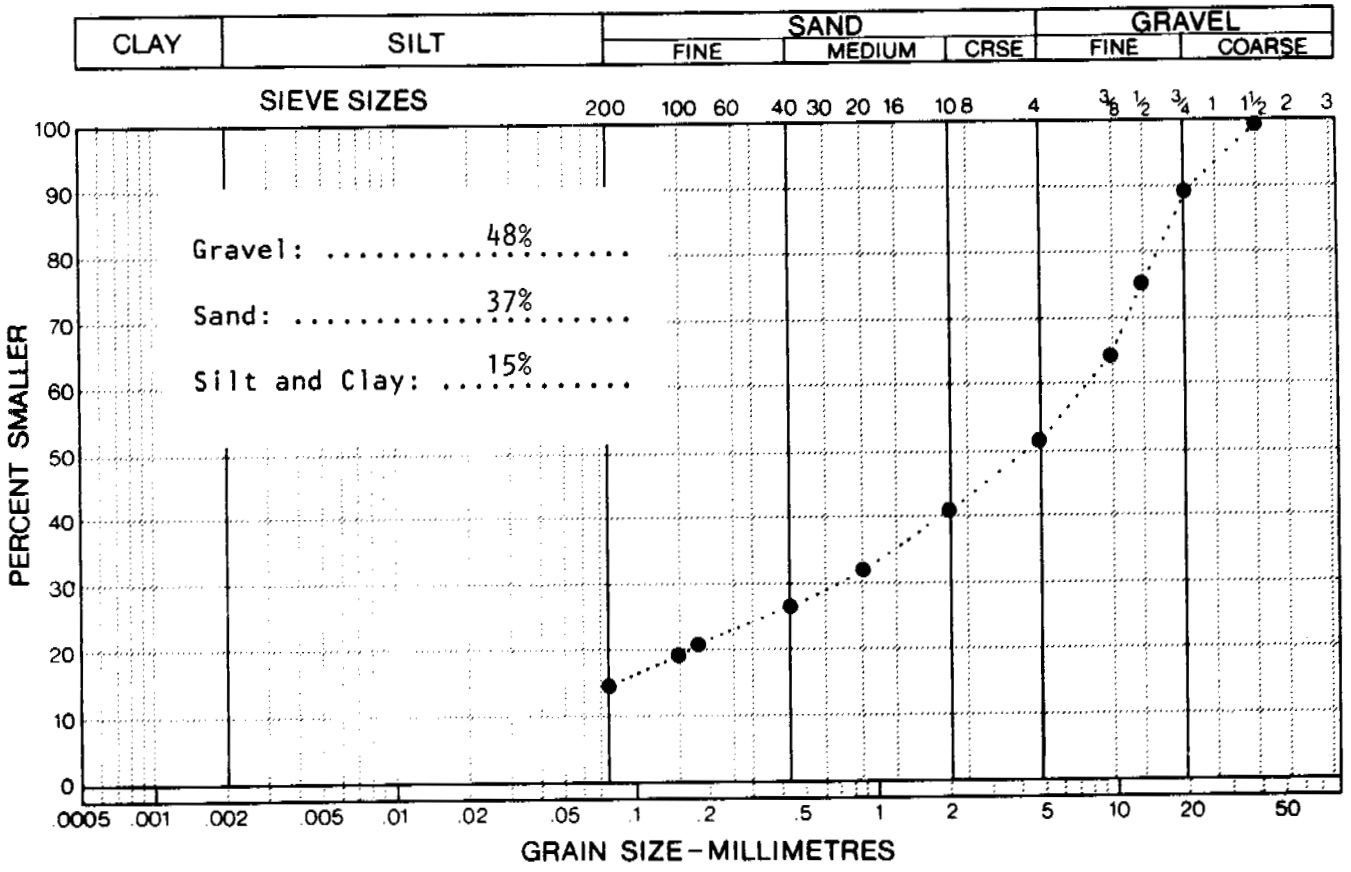
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 410

PIT NO. 410-3

EXPOSURE: stockpile sample



MATERIAL TYPE: gravel and sand, some silt

GENISIS (LANDFORM): stockpile from borrow pit

PETROGRAPHIC ANALYSIS:

quartzite 81%
diorite 6%
granodiorite 5%
slate 4%
sandstone 3%
gneiss 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, angular

REMARKS: some calcareous coatings

SOURCE NO. 410

PIT NO. 410-1

EXPOSURE: road cut

MATERIAL TYPE: fine sand and silt, trace of gravel

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	420
SAMPLE NOS.	not sampled
LANDFORM AND LOCATION	EK and KC east of Klukshu Lake
MATERIAL	sand and gravel (assumed)
ESTIMATED VOLUME	not calculated
AIRPHOTO NOS.	HIGH LEVEL A11523-301
	LOW LEVEL none available

COMMENTS

These landforms probably contain material which would be acceptable for engineering purposes, but their location on the east side of Klukshu Lake makes access very difficult. No development is recommended.

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	430
SAMPLE NOS.	not sampled
LANDFORM AND LOCATION	EM near Gribbles Gulch
MATERIAL	unknown
ESTIMATED VOLUME	not calculated
AIRPHOTO NOS.	HIGH LEVEL A11523-305
	LOW LEVEL not available

COMMENTS

The end moraine deposit was not sampled during this study, but is expected to contain material which is essentially identical to the undifferentiated drift deposit designated as Source No. 410. This deposit may provide suitable general fill, but no further exploration or evaluation is recommended.

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	440
SAMPLE NOS.	not sampled
LANDFORM AND LOCATION	DR northwest of Klukshu Lake
MATERIAL	sandy gravel with some silt
ESTIMATED VOLUME	not calculated
AIRPHOTO NOS.	HIGH LEVEL A23820-82
	LOW LEVEL A24177-10

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 440 is a bedrock controlled drift ridge adjacent to the esker complex near the south end of Dezadeash Lake. An existing borrow pit in this deposit has exposed 6 m of drift (sandy gravel with some silt) overlying weathered bedrock of the Dezadeash Group.

Biotic

Based on airphotos and nearby field observations, aspen, spruce and shrub willow constitute the vegetation, while ground cover is kinnikinnick, empetrum and juniper. Fisheries and recreational values are not expected. Most of this source is within Kluane National Park.

GRANULAR RESOURCES

Although no samples were retrieved for laboratory analysis, it is expected that the material in this source is too silty to be used for engineering aggregate.

DEVELOPMENT

While the material could be used as general fill, no development is recommended within the National Park.

Source Nos. 410 and 440 Airphoto No. A24177-10

SOURCE NO. 440

PIT NO. 440-1

EXPOSURE: abandoned borrow area

MATERIAL TYPE: gravelly silt, some sand

GENESIS (LANDFORM): DR

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	450
SAMPLE NOS.	450-1, 450-2, 450-4
LANDFORM AND LOCATION	EKC near the south end of Dezadeash Lake
MATERIAL	sand and gravel, trace of silt
ESTIMATED VOLUME	300 000 m^3 to 600 000 m^3 east side Haines Road, 500 000 m^3 to 1 000 000 m^3 west of highway
AIRPHOTO NOS.	HIGH LEVEL A23820-83 LOW LEVEL A29177-10

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 450 is a northeast trending esker-kame complex situated near the south end of Dezadeash Lake. West of the Haines Road, most of the complex is composed of eskers 8 - 10 m high which appear to lie directly on the steep bedrock slope, within the confines of Kluane National Park. The kame complex east of the road is situated on level ground, flanked on one side by undifferentiated drift, and on the other by a low swampy area. A ranch and rural residence occupy the same site. The entire complex is over 3 km long, and 300 m to 1,000 m wide. The telephone line and abandoned pipeline cross the complex near the highway.

Biotic

Vegetation is composed of open stands of aspen with scattered spruce and shrub willow. Kinnikinnick, empetrum and juniper form the ground cover. Spruce stands are developed on north-facing slopes and in poorly-drained hollows between the ridges. An active beaver dam was observed at the site. Fisheries concerns are not apparent in this deposit.

This esker complex provides a pleasant highway view and an interesting residential site but it does not have as significant a potential for recreational use as Source No. 240, the esker complex south of the Takhanne River. Much of the deposit is within Kluane National Park. Portions of the deposit on the east side of the road are presently used for ranching.

GRANULAR RESOURCES

According to information obtained at 450-1, 450-2 and 450-4, sand and gravels are the predominant soil types within the complex. Silt contents did not exceed 4% in the samples tested.

Quartzites/meta-greywackes form the principal components of this deposit, ranging between 60% and 87% by weight where tested. Slates and phyllites generally constitute 5% to 11%, whereas soft sandstone (2% - 10%) appears to be slightly less frequent. Granodiorites (0% - 3%), diorites (3% to 11%), gneiss (1%), rhyolite (9%) and greenstone (5%) were also observed in the samples.

Approximately 30% of the pebbles examined in the esker had particle coatings, but none were observed on the single sample obtained from the kame.

Overburden thickness did not exceed 0.5 m where examined, and was as little as 0.2 m in places.

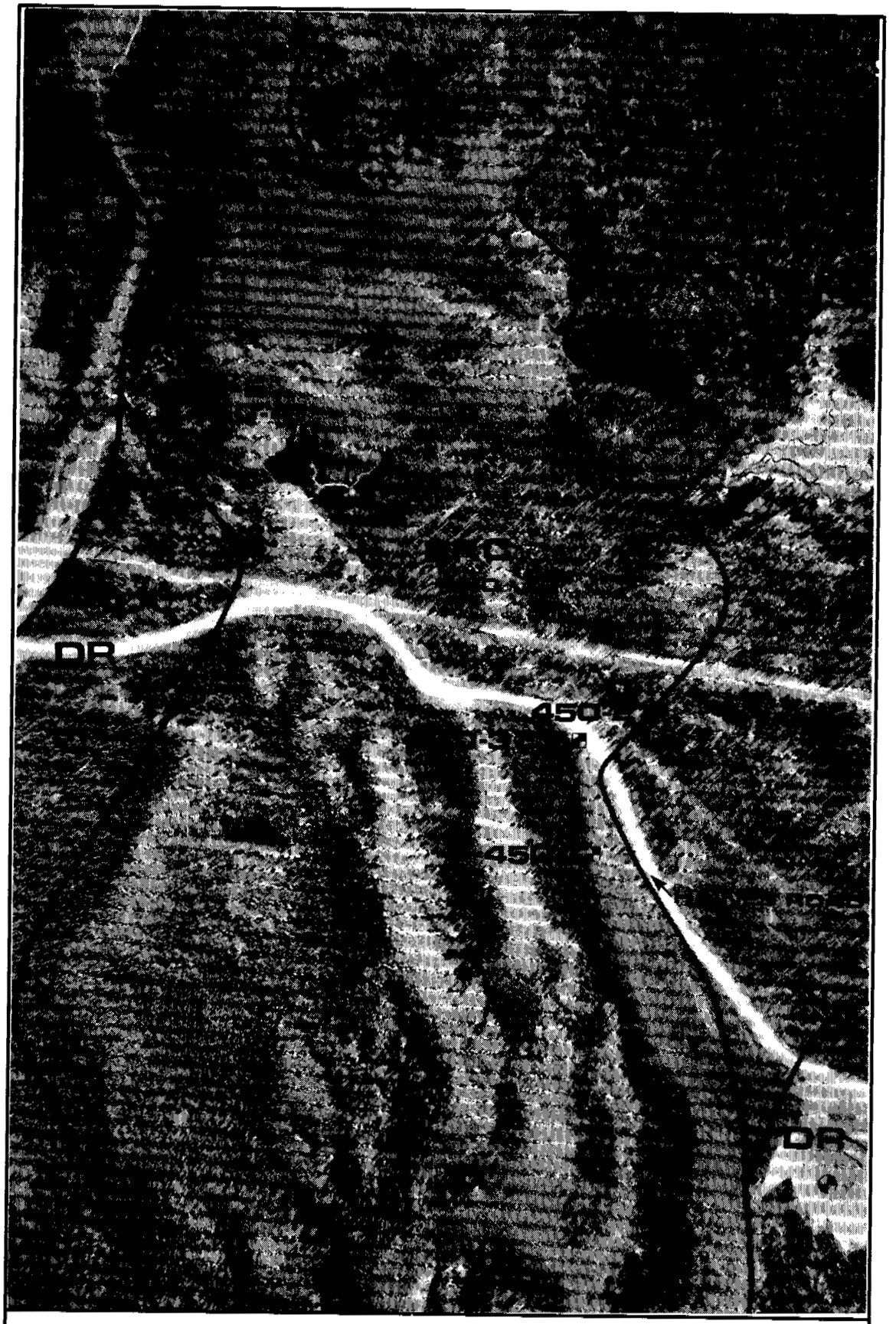
On the basis of field measurements, each single esker is estimated to have a cross-sectional area of approximately 200 m^2. Between 500 000 m^3 and 1 000 000 m^3 of sand and gravel may therefore be availabe from the eskers alone. Unfortunately, access on the west side of the highway is poor due to very steep grades; moreover, most of the deposit is within the National Park at the present time. On the basis of an assumed average kame elevation of 4 m, and considering that only 10% to 20% of the total area east of the road probably contains coarse material, a volume of 300 000 m^3 to 600 000 m^3 for this sector was estimated.

The laboratory analyses show that both grain size and petrology may vary widely within the complex. A 1.0 m test pit at 450-3, an intra-esker site encountered uniform fine sand. This might make an excellent blending material if sufficient quantities are available. Similar areas were also noted within the kame complex.

DEVELOPMENT

Development of this source during highway reconstruction is highly recommended. Although no borrow pit development is permitted inside the National Park, the future boundary may be adjusted at this location to accommodate highway realignment, and therefore development of some eskers could possibly take place.

According to the grain size distribution curves, this deposit may provide suitable material for the production of base and sub-base courses with minor screening of the coarsest fraction. Although the sieve analysis also appears favourable for the production of asphalt and concrete, deleterious substances such as slates, phyllites and soft sands, however, may be present in significant amounts. Further testing is therefore recommended to fully evaluate potential production of concrete and asphalt aggregate from this source.



Source No. 450

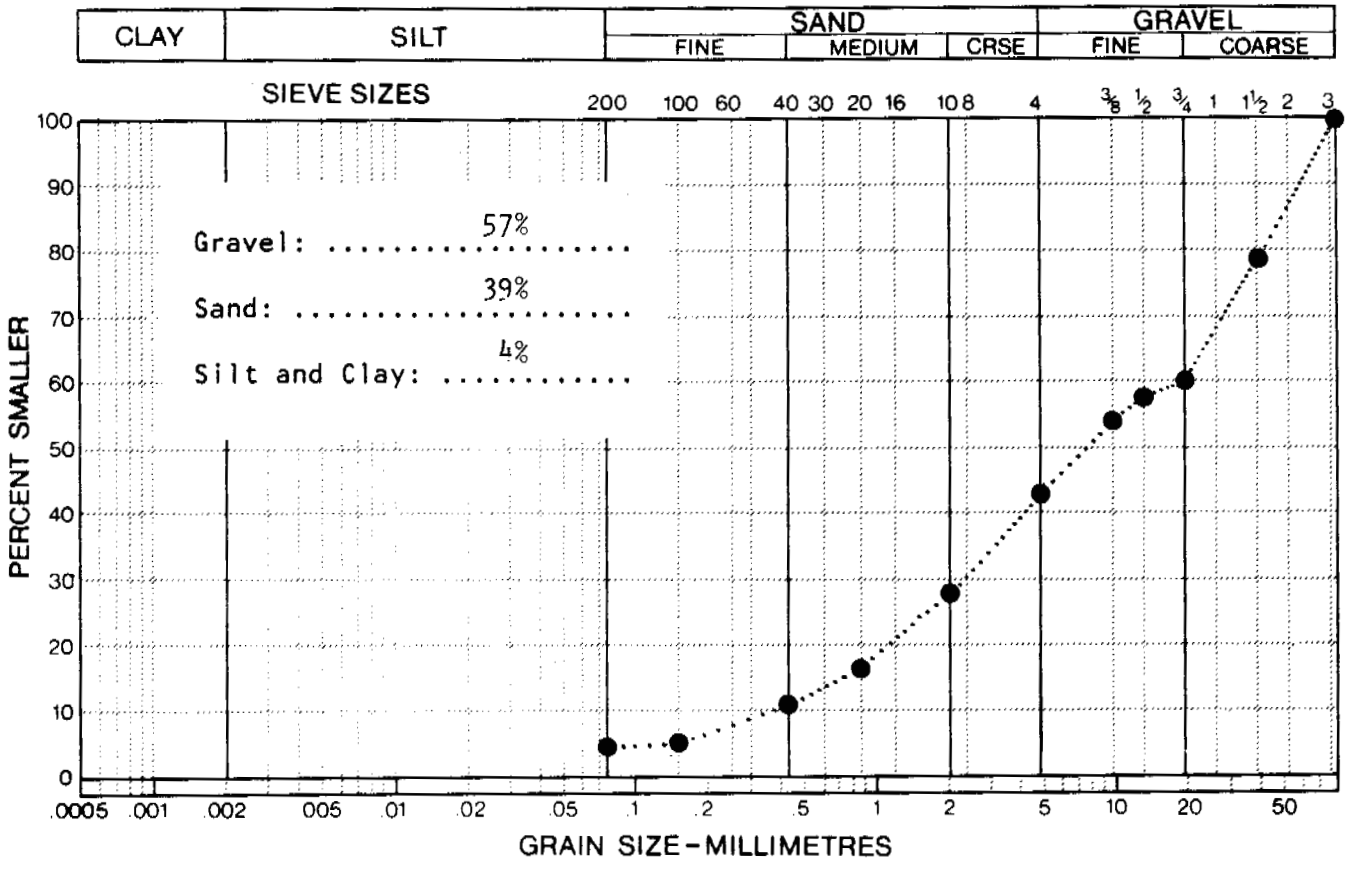
Airphoto No. A24177-10

LABORATORY ANALYSIS

SOURCE NO. 450

PIT NO. 450-1

EXPOSURE: pipeline cut on top of ridge



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): esker

PETROGRAPHIC ANALYSIS:
quartzite 72%
slate 6%
soft sandstone 2%
granodiorite 8%
diorite 11%
gneiss 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: spheroids and blades, subangular

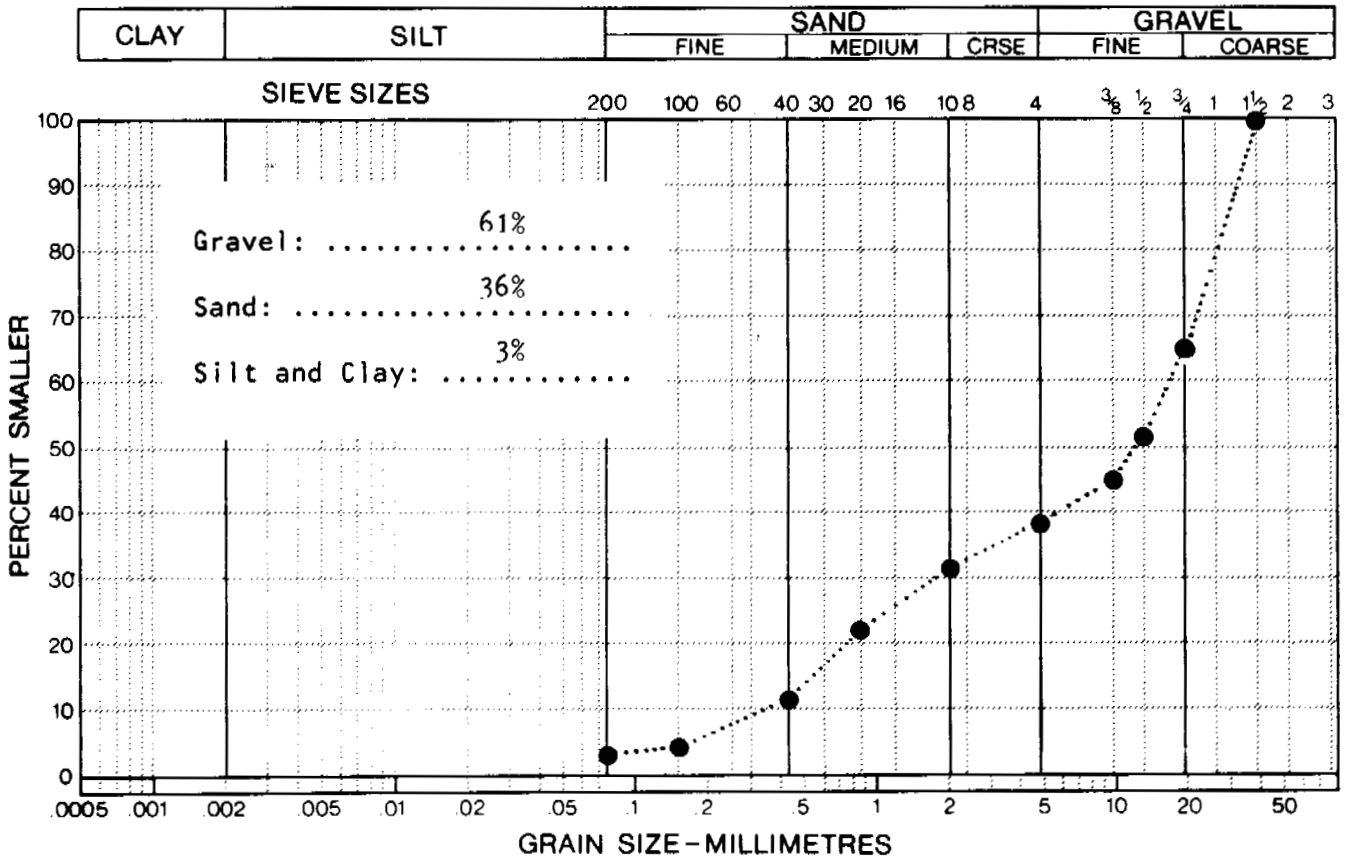
REMARKS: some clay coatings

LABORATORY ANALYSIS

SOURCE NO. 450

PIT NO. 450-2

EXPOSURE: highway cut



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): esker

PETROGRAPHIC ANALYSIS:

quartzite 87%
slate 5%
soft sandstone 2%
granodiorite 3%
diorite 3%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: bladed, subangular

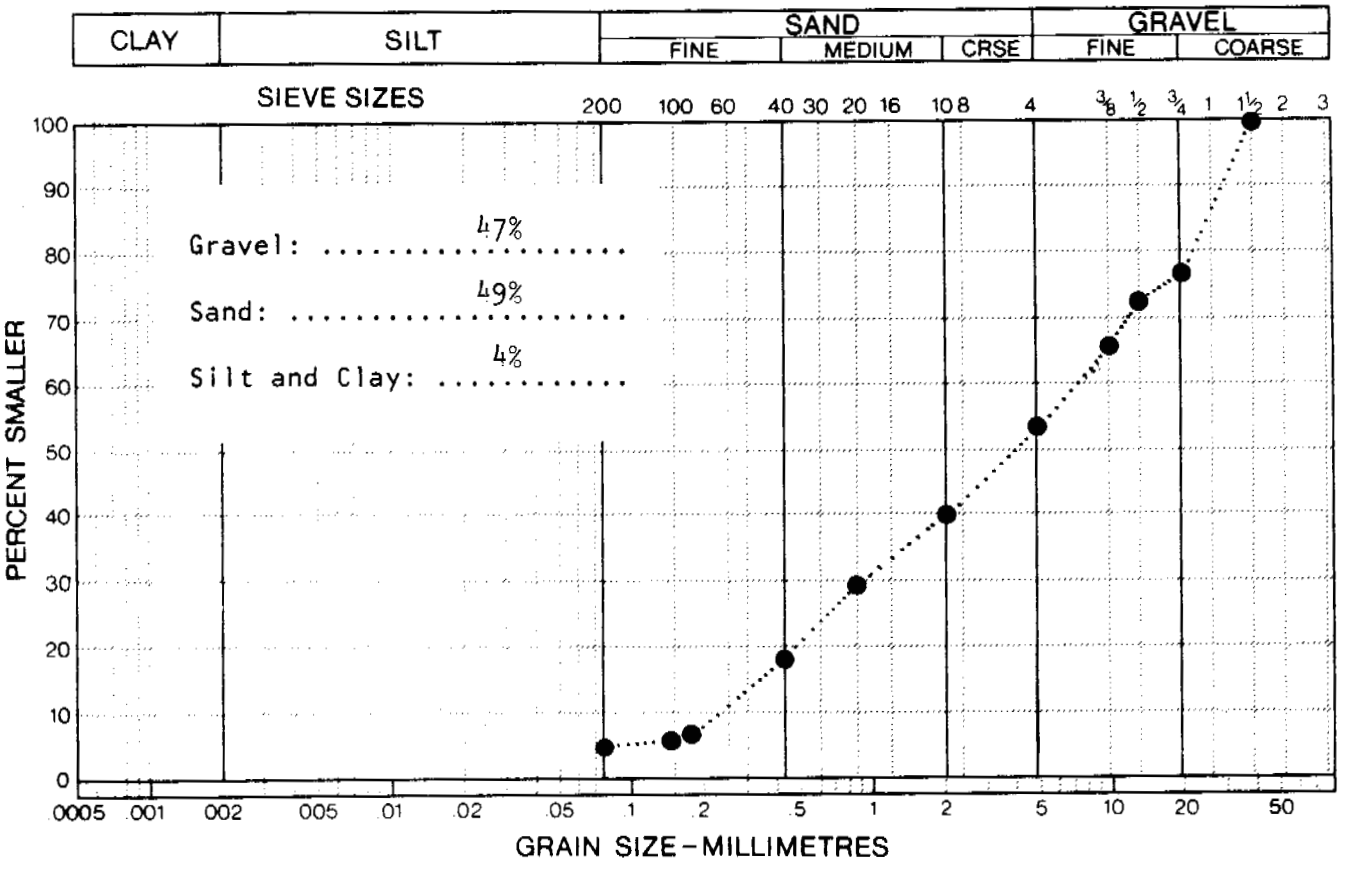
REMARKS: some calcareous coatings

LABORATORY ANALYSIS

SOURCE NO. 450

PIT NO. 450-4

EXPOSURE: hand dug test pit



MATERIAL TYPE: sand and gravel, trace of silt

GENISIS (LANDFORM): kame

PETROGRAPHIC ANALYSIS:

quartzite 60%
slate 11 %
soft sandstone 10%
rhyolite 9%
greenstone and schist 5%
diorite 5%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, angular

REMARKS:

SOURCE NO. 450

PIT NO. 450-5

EXPOSURE: hand dug test pit

MATERIAL TYPE: sand and gravel, some silt and cobbles

GENESIS (LANDFORM): EKC

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

SOURCE: 450

LANDFORM AND LOCATION: ESKER COMPLEX (EAST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	1
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	BEAVER HABITAT	2
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	INDUSTRIAL USE (ABANDONED PIPELINE) AGRICULTURE/RANCHING/GRAZING	3
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

SOURCE: 450

LANDFORM AND LOCATION: ESKER COMPLEX (WEST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	1
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	BEAVER HABITAT	2
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	NATIONAL PARK	5
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	470	
SAMPLE NOS.	470-4	470-8
	470-5	470-10
	470-6	470-11
	470-7	470-12
LANDFORM AND LOCATION	UD, UD/B and B west and northwest of Dezadeash Lake	
MATERIAL	sand and gravel with some silt and cobbles	
ESTIMATED VOLUME	not estimated	
AIRPHOTO NOS.	HIGH LEVEL	A23820-65 to -77; A23792-1 to -7, A23792-88
	LOW LEVEL	A24052-77, 85, 91 and 92

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 470 is a large area which extends along the west side of Dezadeash Lake, and northwest of the lake along the Haines Road to Kathleen Lakes. Most of the deposit north of the lake consists of undifferentiated drift. West of the lake the drift cover is much thinner, and rests directly on weathered bedrock.

The deposit is segmented by several other landforms, including alluvial cones, rock glaciers, bedrock controlled drift ridges and glacial footings. The Haines Road, the abandoned pipeline right-of-way and telephone line traverse the source.

Biotic

Vegetation is composed of open stands of spruce and scattered aspen with some shrub willow. Ground cover consists of kinnikinnick, empetrum and juniper. West of the Haines Road most of this source is within Kluane National Park.

GRANULAR RESOURCES

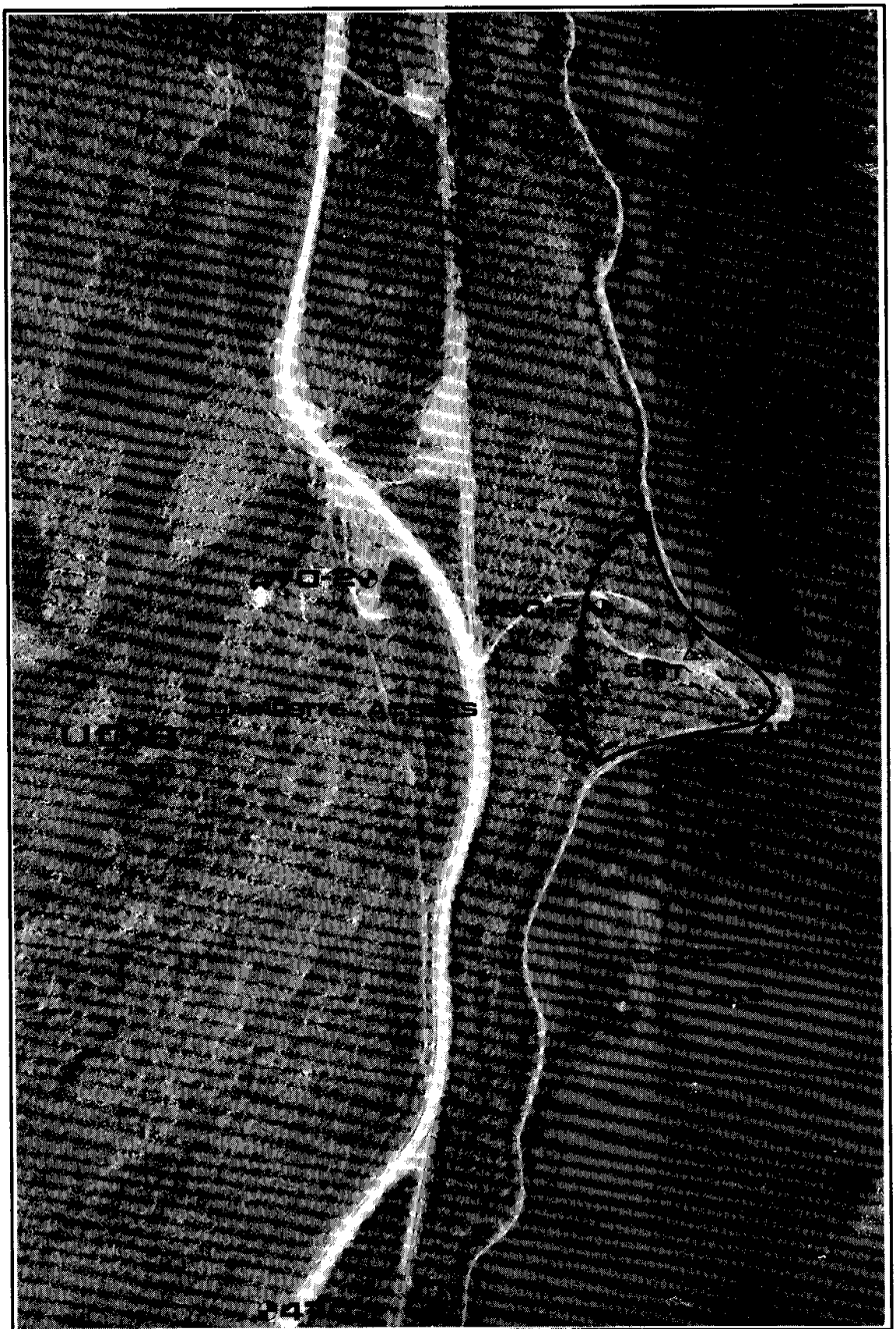
A number of abandoned borrow areas within Source No. 470 were examined during the field reconnaissance. Most of these areas contained sand and gravel with traces of cobbles and boulders. Silt contents ranged from 3 to 26 percent. Quartzite is the main rock type throughout the source area with minor accessory rock types including rhyolite, granodiorite, diorite, sandstone, slate, schist and gneiss.

DEVELOPMENT

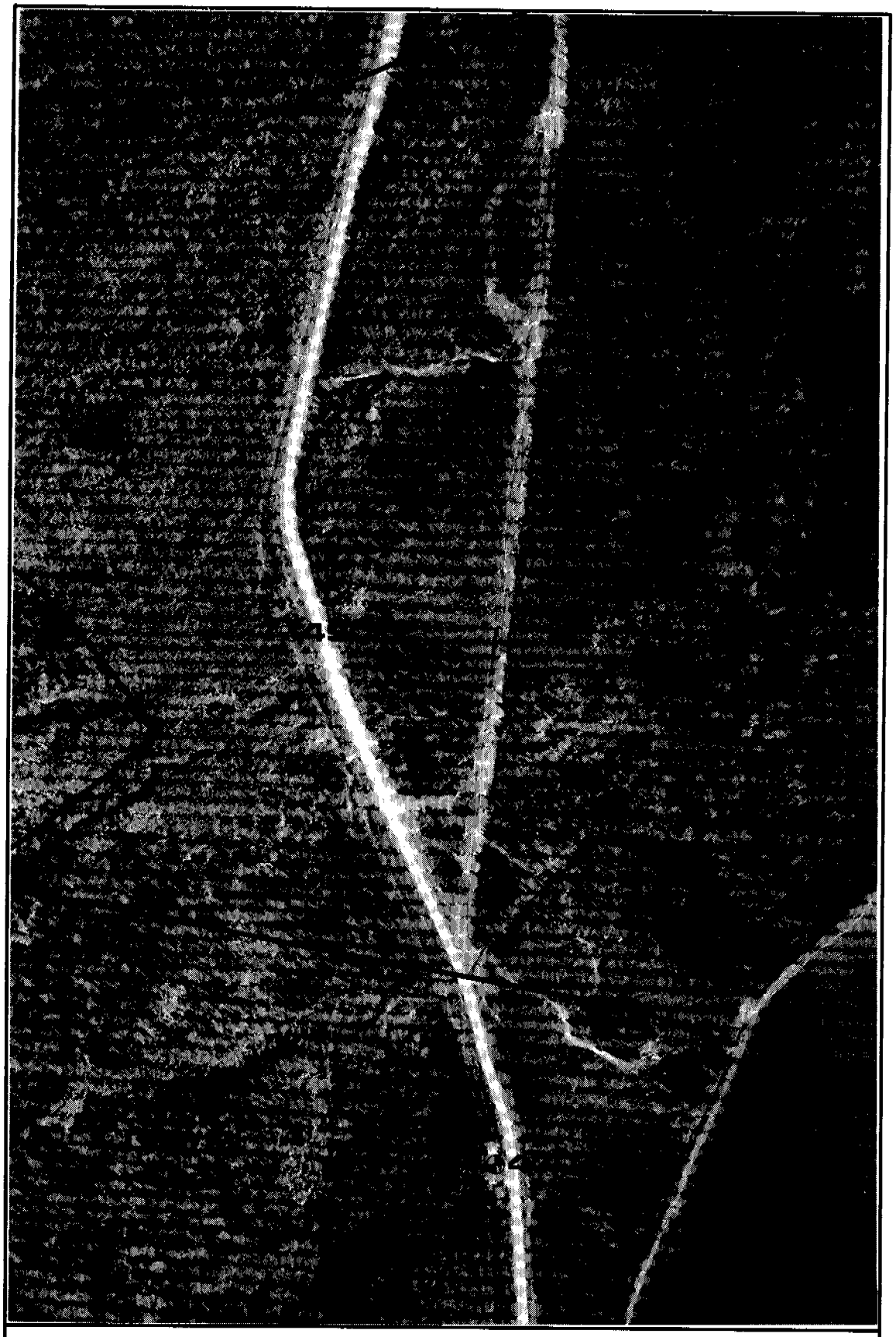
While much of the material appears to be too silty to be useful for engineering purposes other than general fill, existing borrow pit at 470-10 could be expanded as a possible source of base and sub-base course material.

Development of these particular areas is recommended only if future demands for granular material prove to be higher than currently anticipated. Site-specific studies should be initiated before extensive borrow removal is approved.

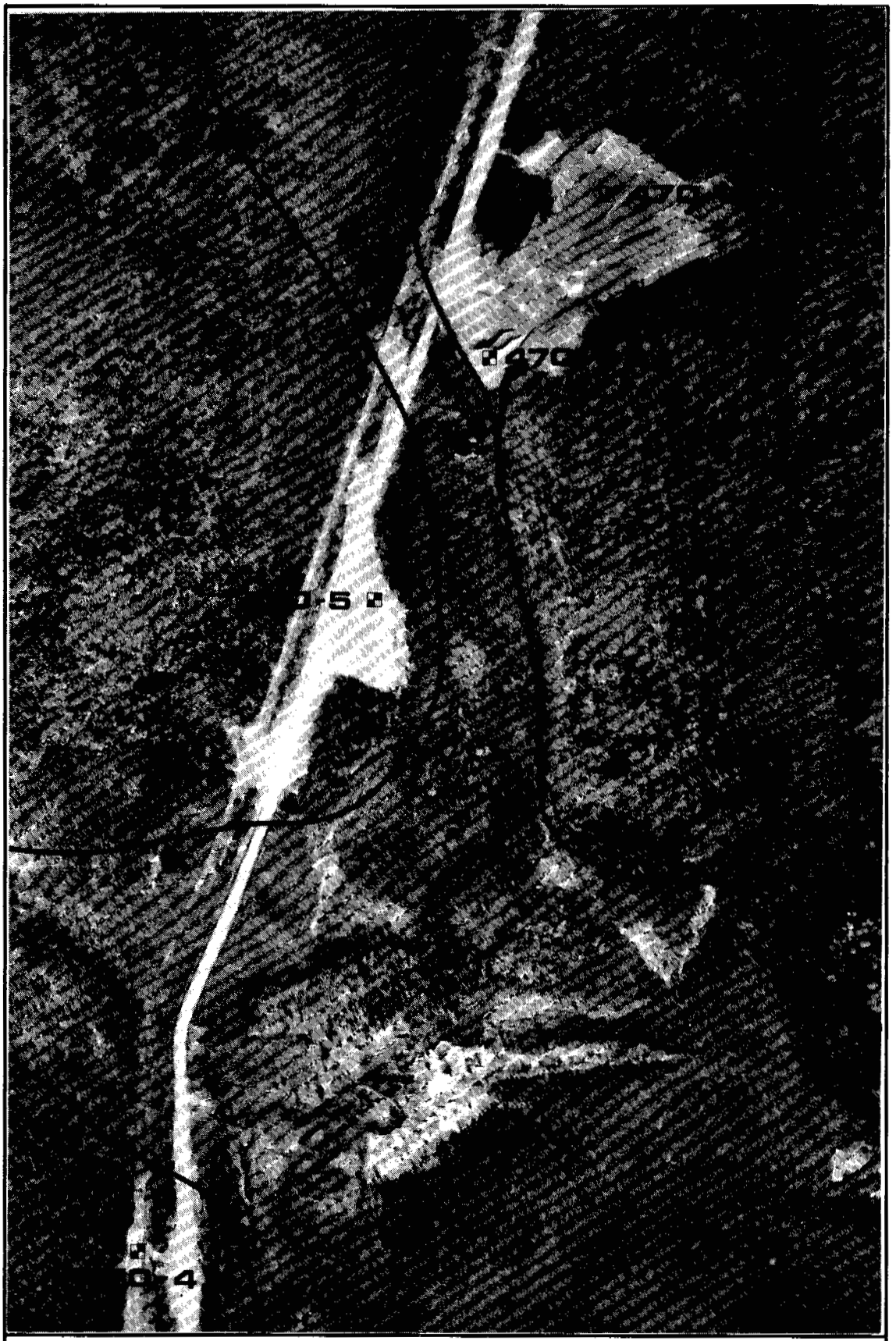
No development is recommended west of the Haines Road, within Kluane National Park.



SOURCE NO. 480 and 470 AIRPHOTOGRAPH NO. A24052-59

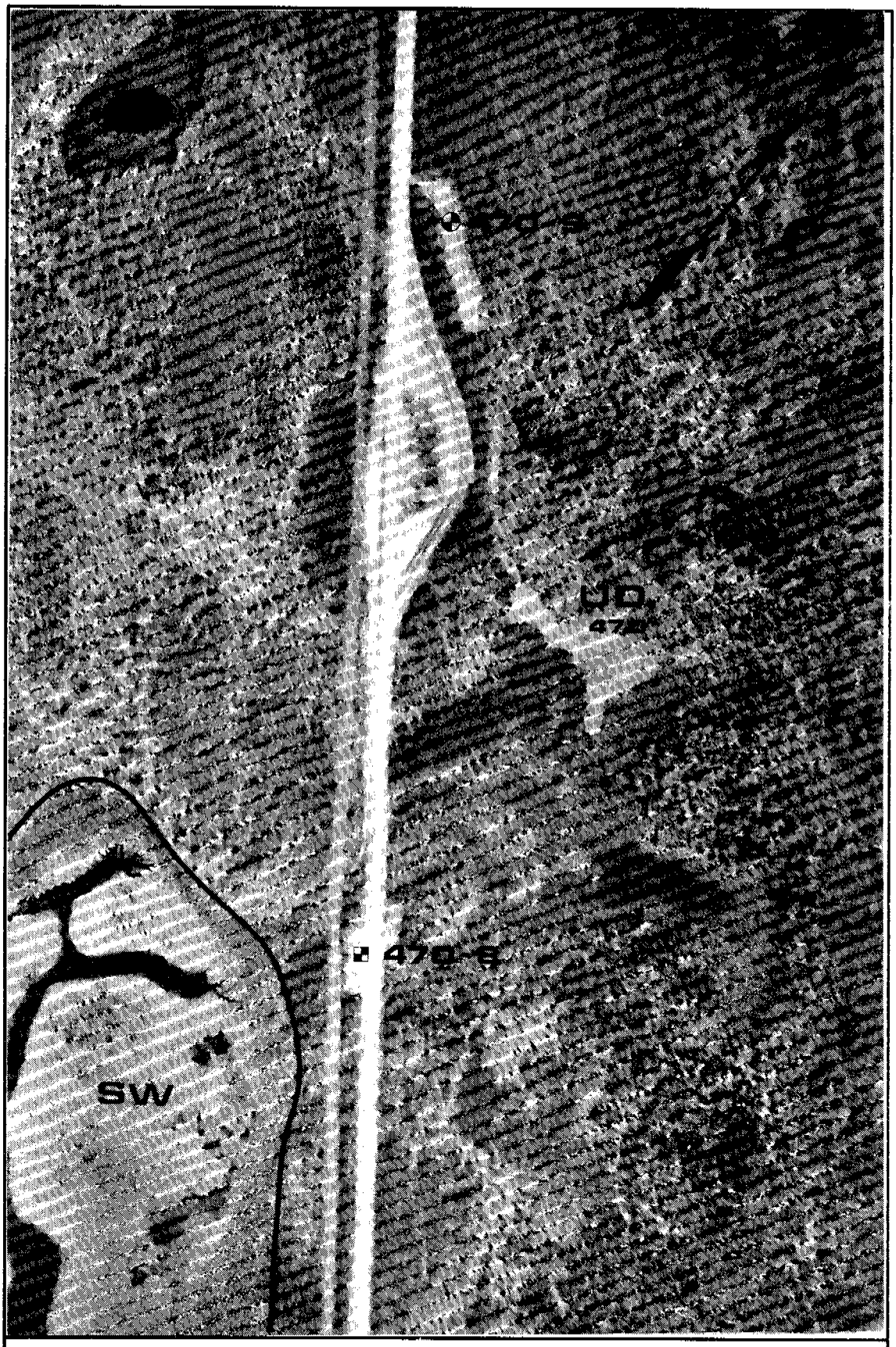


Source Nos. 470 and 490 Airphoto No. A24052-64

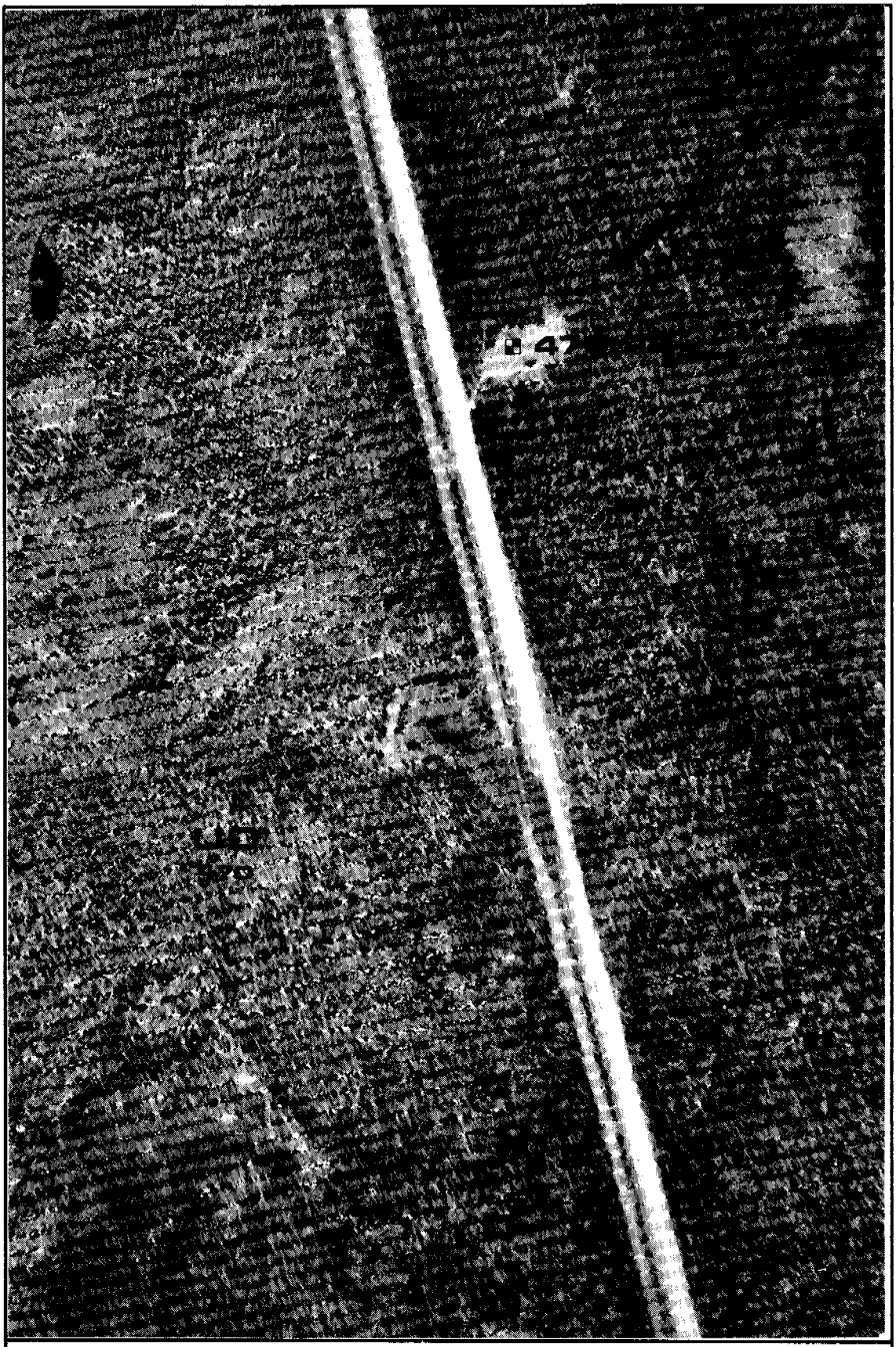


Source No. 470

Airphoto No. A24052-77

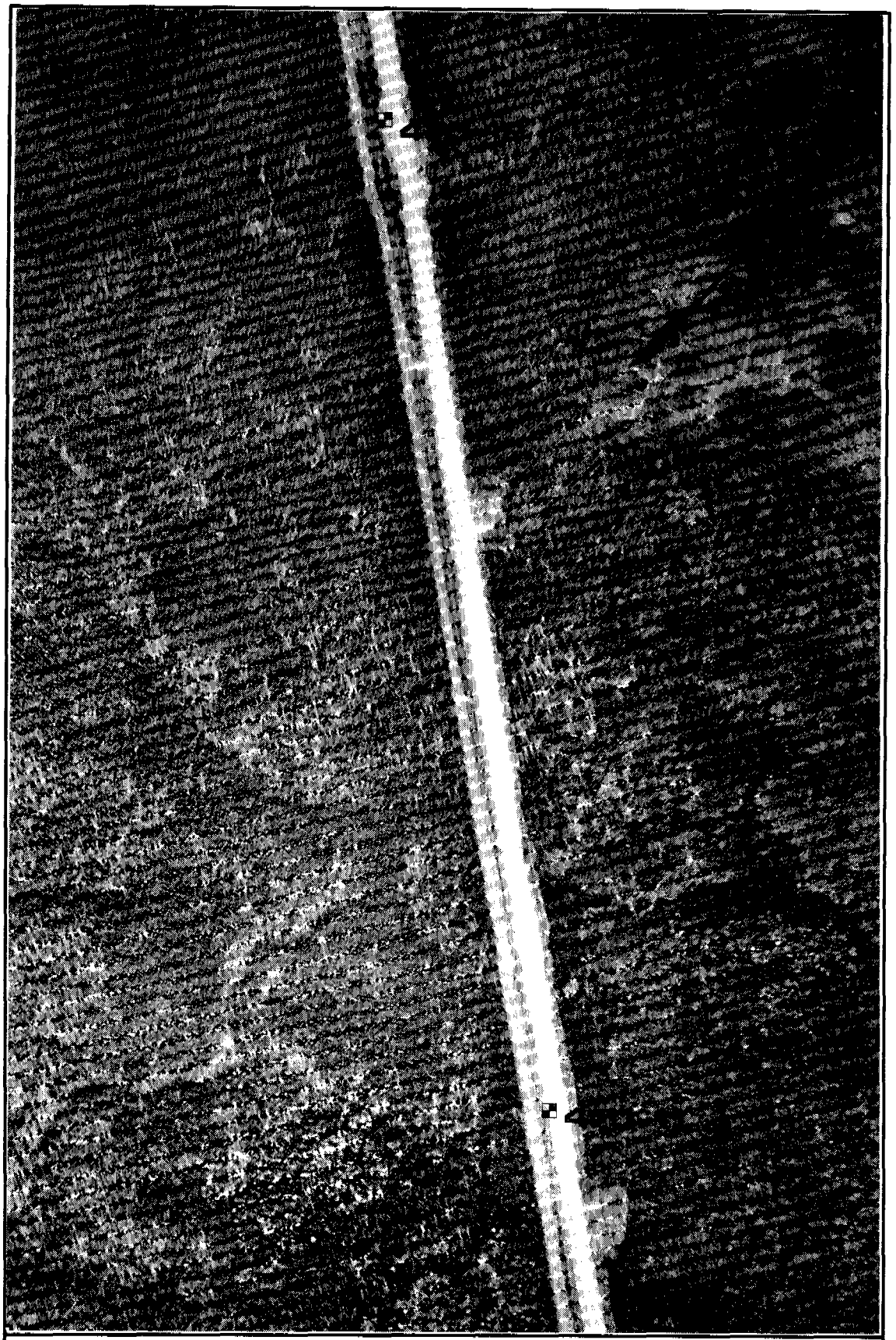


Source No. 470 Airphoto No. A24052-85

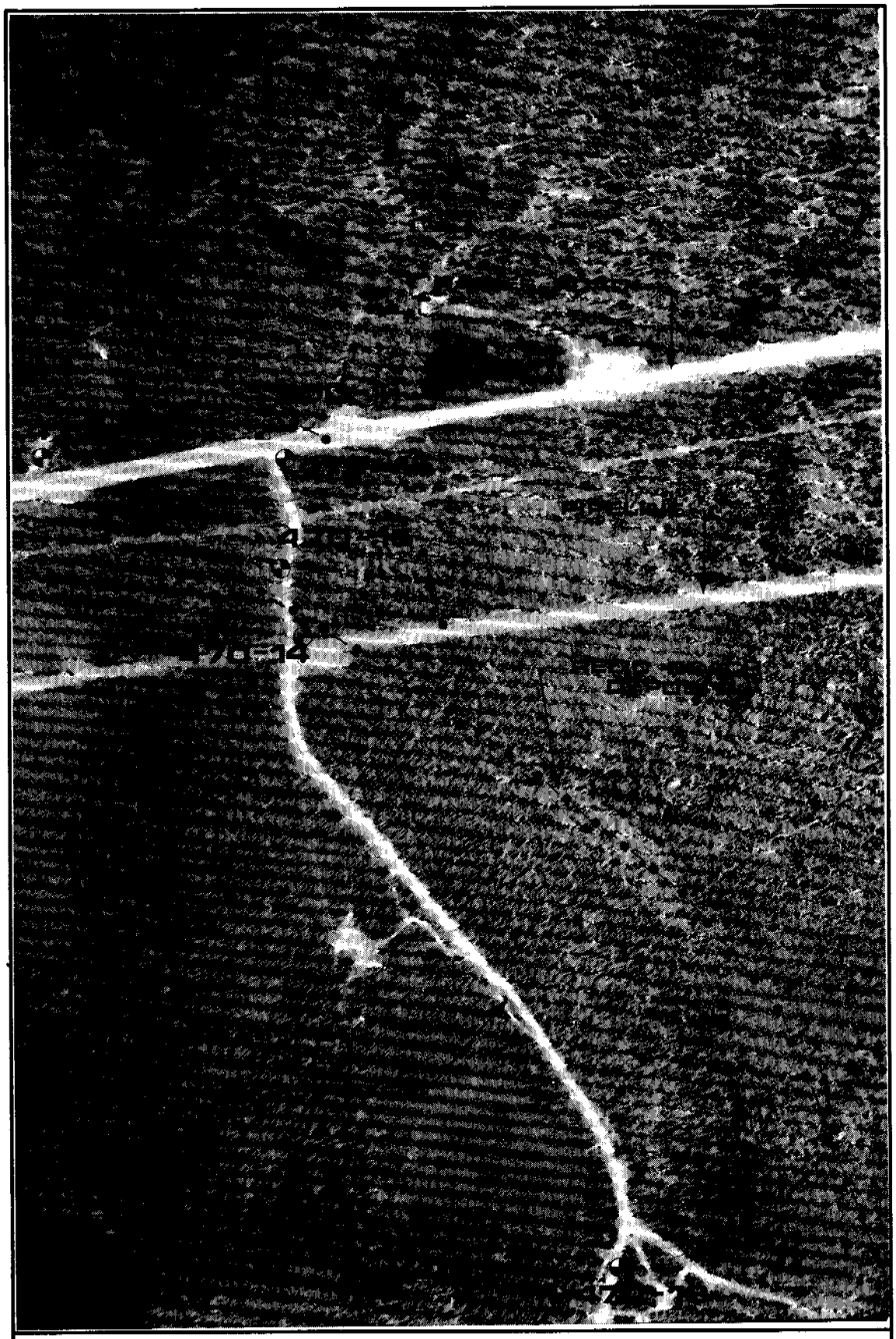


Source No. 470

Airphoto No. A24052-91



Source No. 470 Airphoto No. A24052-100



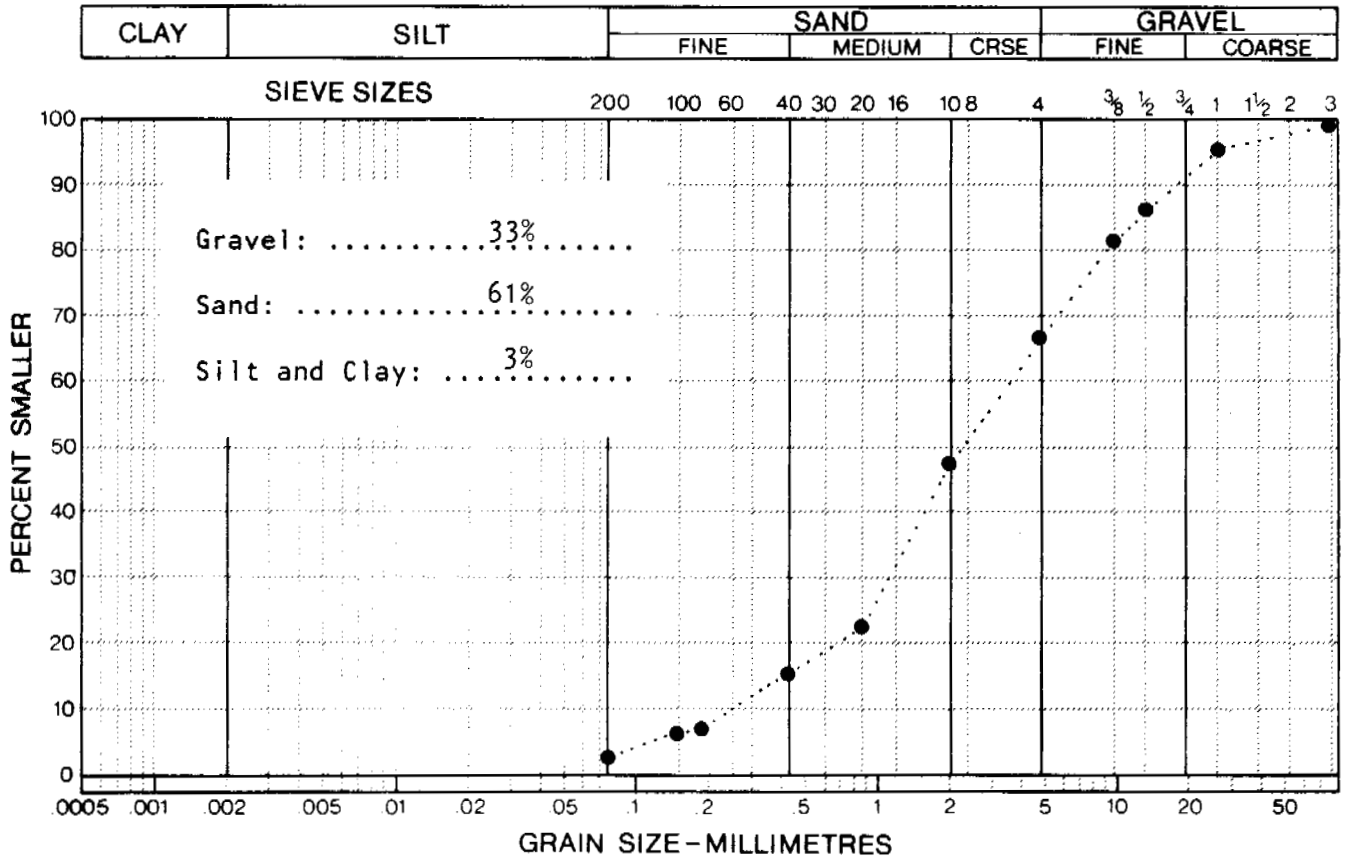
Source Nos. 470 and 550 Airphoto No. A24052-104

LABORATORY ANALYSIS

SOURCE NO. 470

PIT NO. 470-4

EXPOSURE: abandoned borrow area



MATERIAL TYPE: sand and gravel, trace of silt

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS:
quartzite 90%
sandstone 7%
granite 3%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

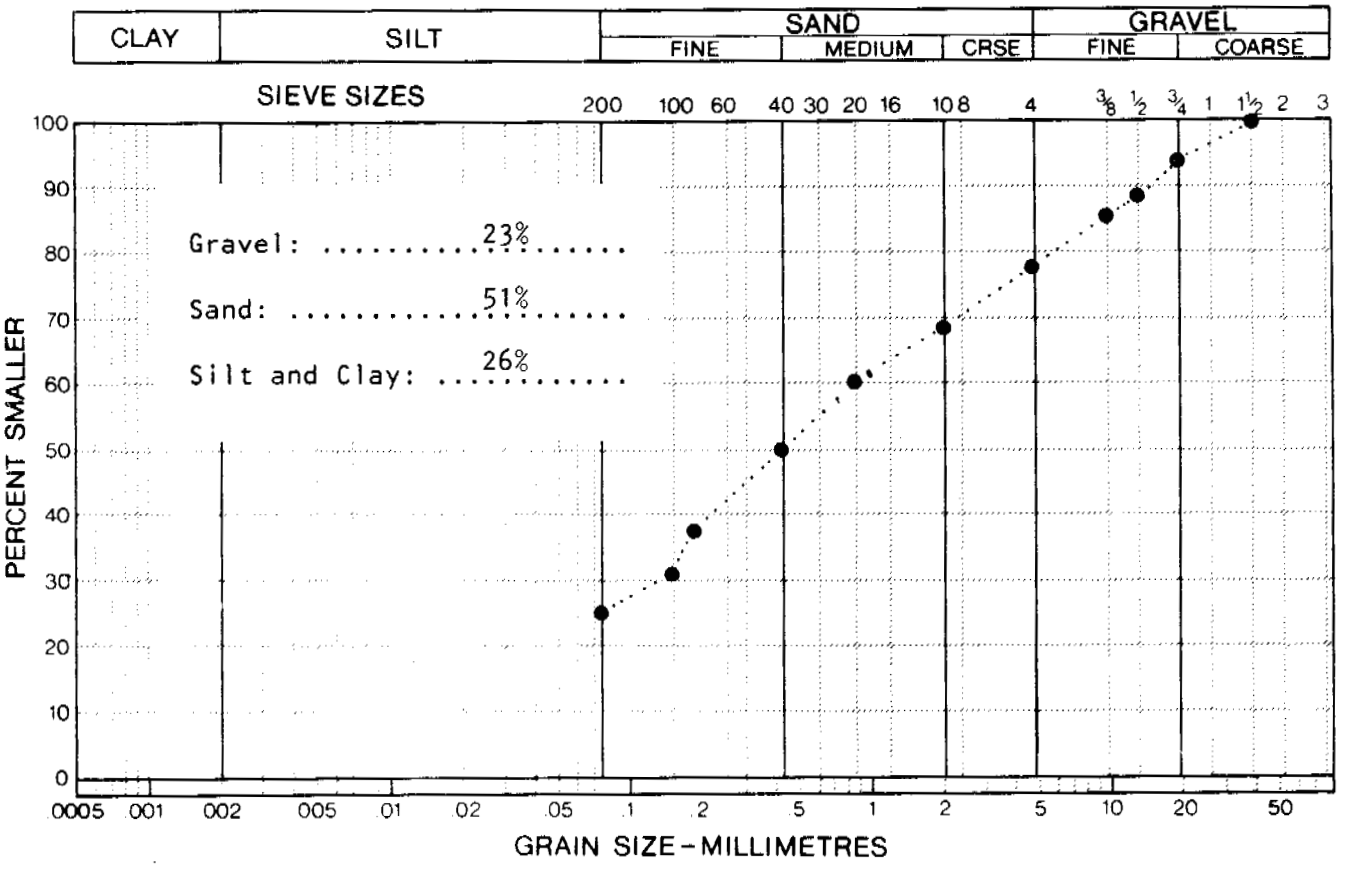
REMARKS: some calcareous coatings

LABORATORY ANALYSIS

SOURCE NO. 470

PIT NO. 470-5

EXPOSURE: abandoned borrow area



MATERIAL TYPE: silty, gravelly sand

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS:

quartzite 71%
slate 9%
diorite 9%
sandstone 5%
granodiorite 5%
gneiss 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, angular

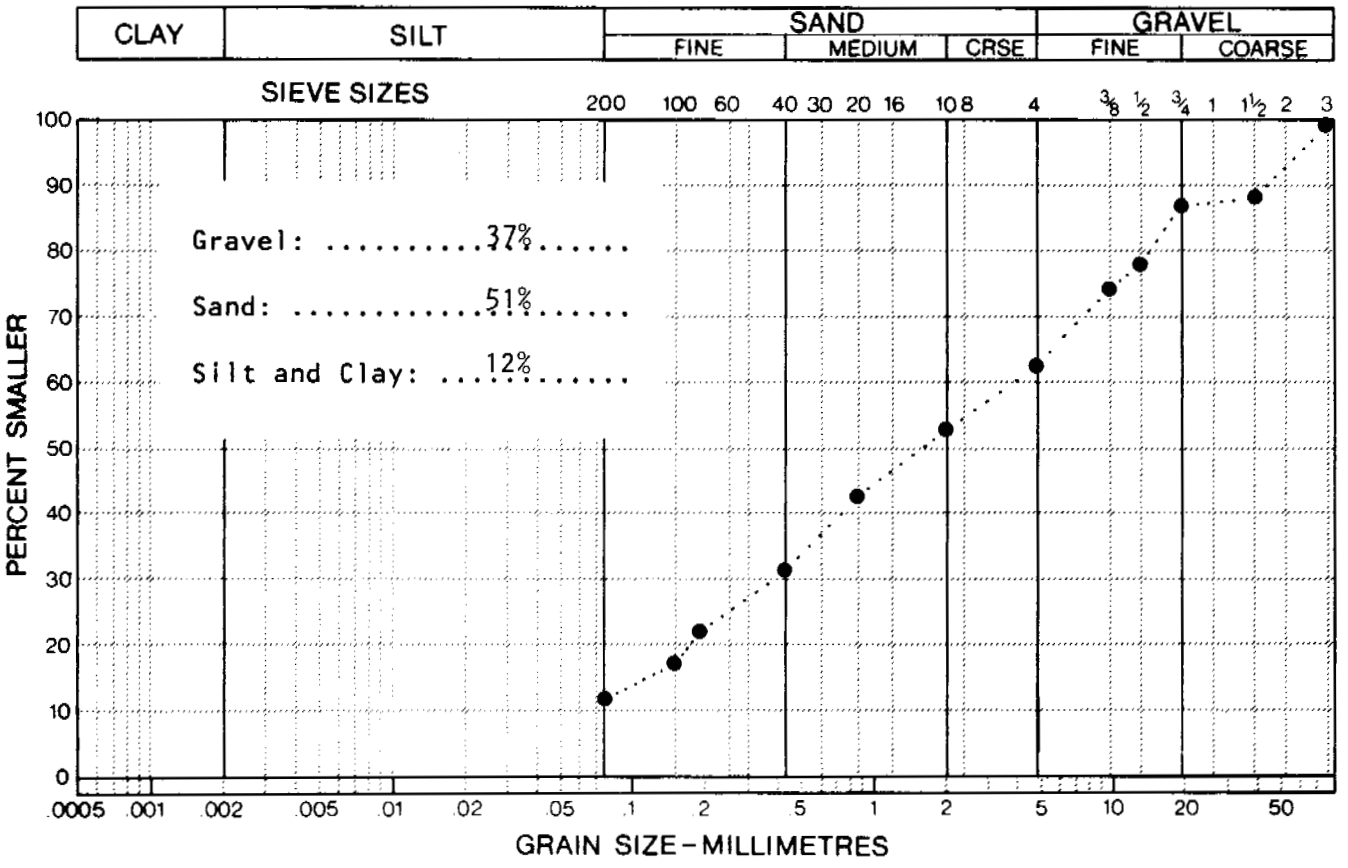
REMARKS: abundant clay coatings

LABORATORY ANALYSIS

SOURCE NO. 470

PIT NO. 470-6

EXPOSURE: borrow area



MATERIAL TYPE: sand and gravel, some silt, trace of cobbles

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS:

quartzite	82%
sandstone	18%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, angular

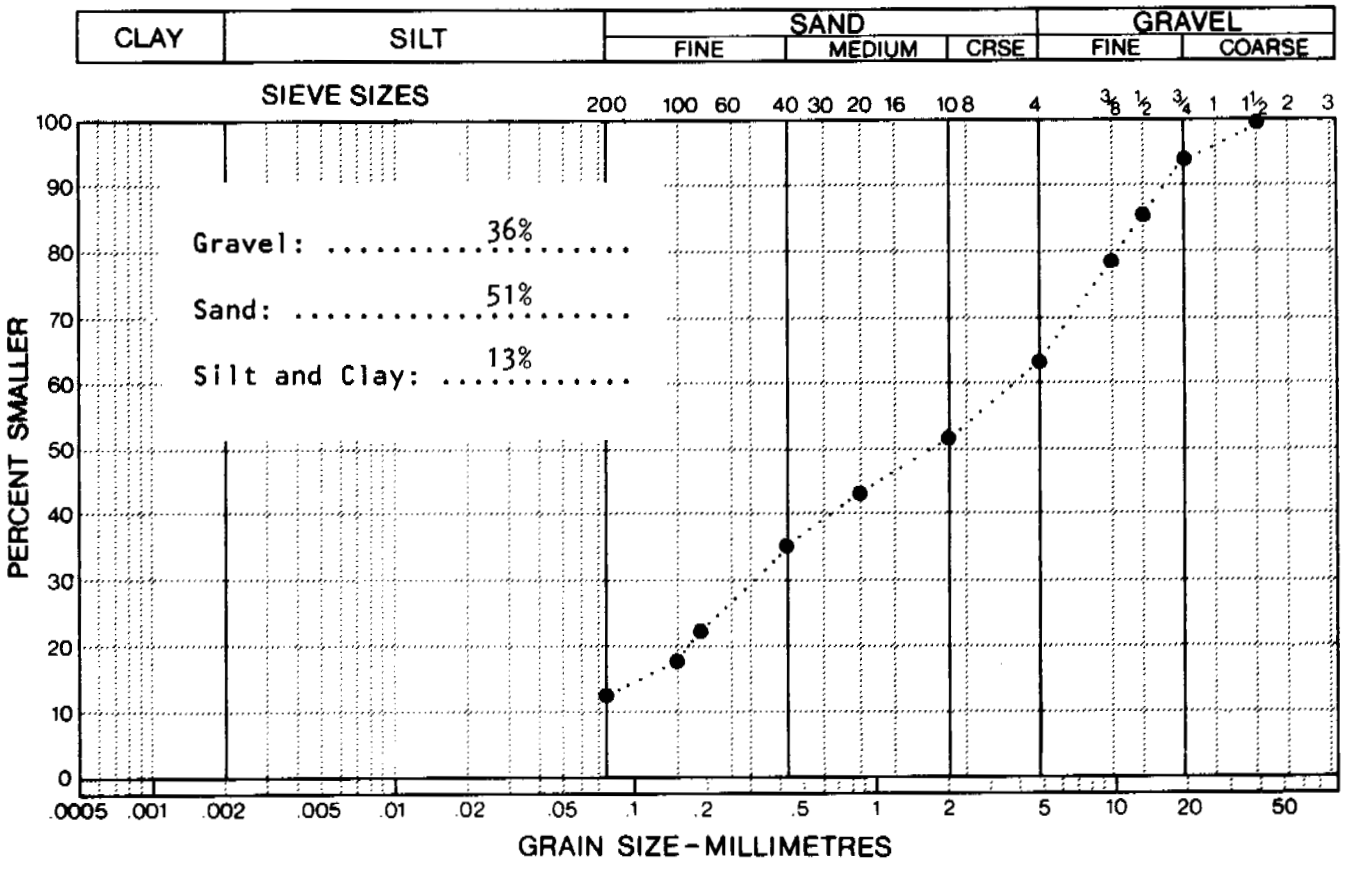
REMARKS: abundant clay coatings

LABORATORY ANALYSIS

SOURCE NO. 470

PIT NO. 470-7

EXPOSURE: stockpile sample



MATERIAL TYPE: sand and gravel, some silt

GENISIS (LANDFORM): screened material from stockpile

PETROGRAPHIC ANALYSIS:

quartzite 86%
slate 6%
granodiorite 4%
diorite 3%
sandstone 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades and spheroids, subangular to angular

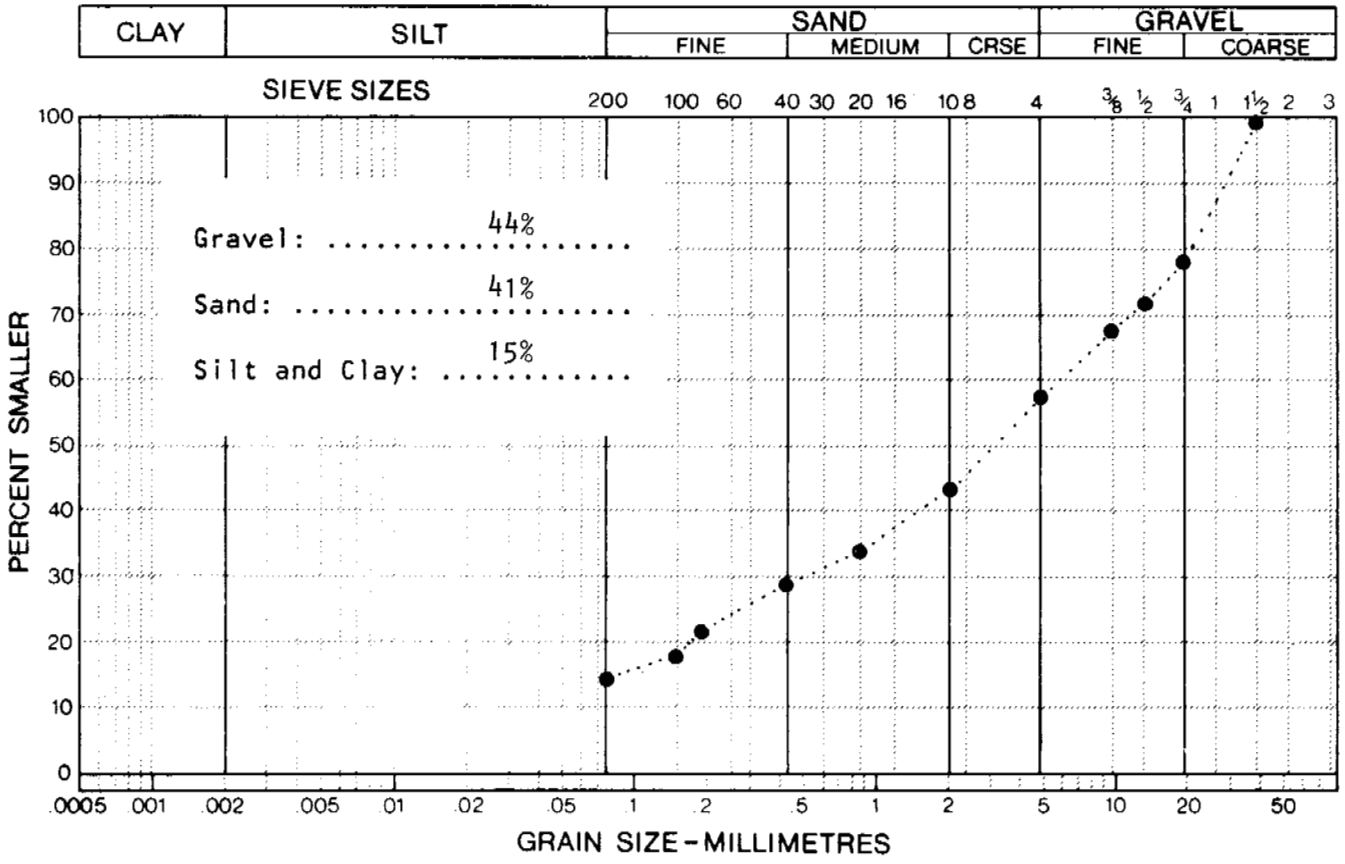
REMARKS: abundant calcareous coatings

LABORATORY ANALYSIS

SOURCE NO. 470

PIT NO. 470-8

EXPOSURE: abandoned borrow area



MATERIAL TYPE: gravel and sand, some silt, trace of cobbles

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS:
quartzite 93%
diorite 4%
slate 2%
schist 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades and spheroids, angular

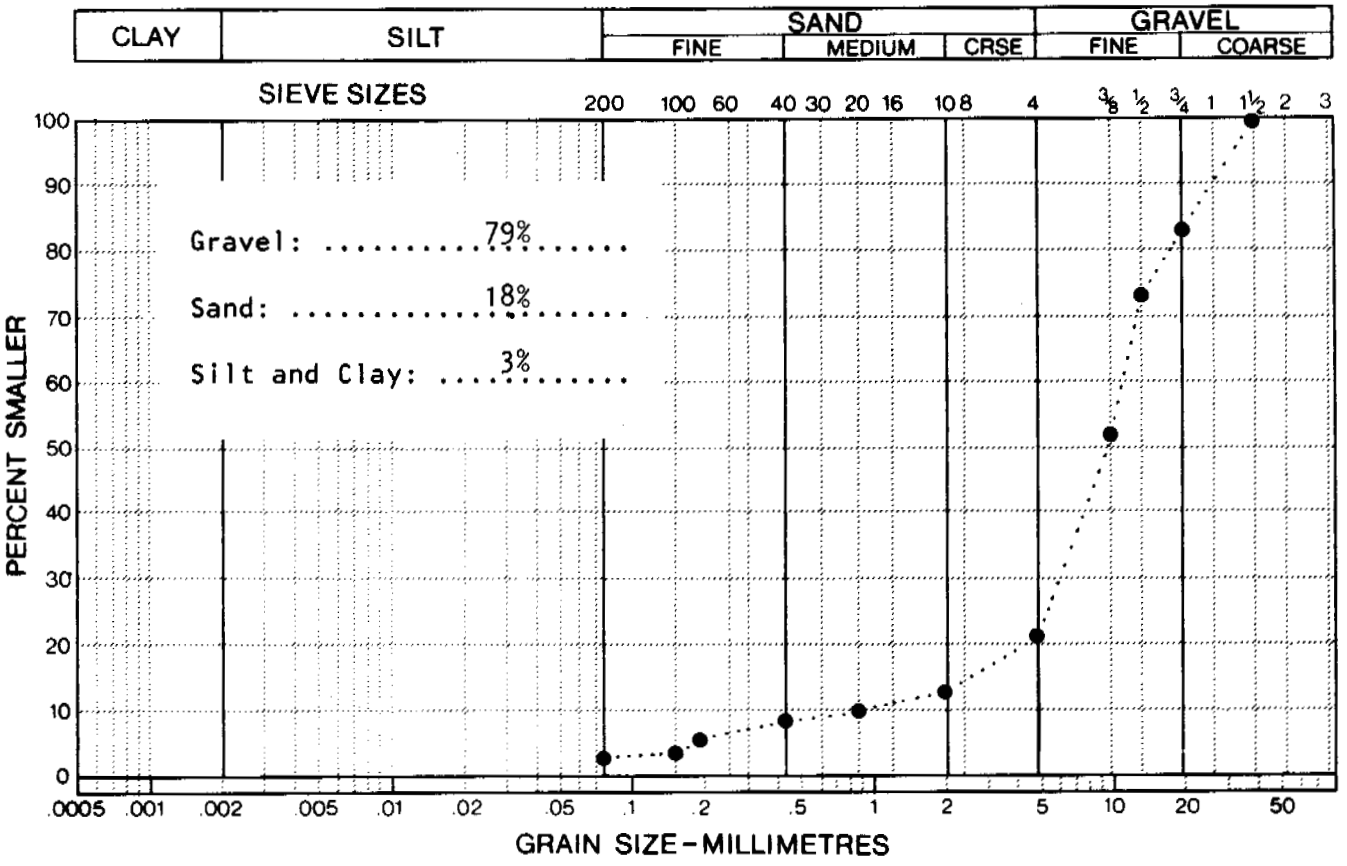
REMARKS: abundant calcareous coatings

LABORATORY ANALYSIS

SOURCE NO. 470

PIT NO. 470-10

EXPOSURE: borrow area



MATERIAL TYPE: sandy gravel, trace of silt and cobbles

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS:
quartzite 95%
diorite 3%
rhyolite 2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades and spheroids, subangular

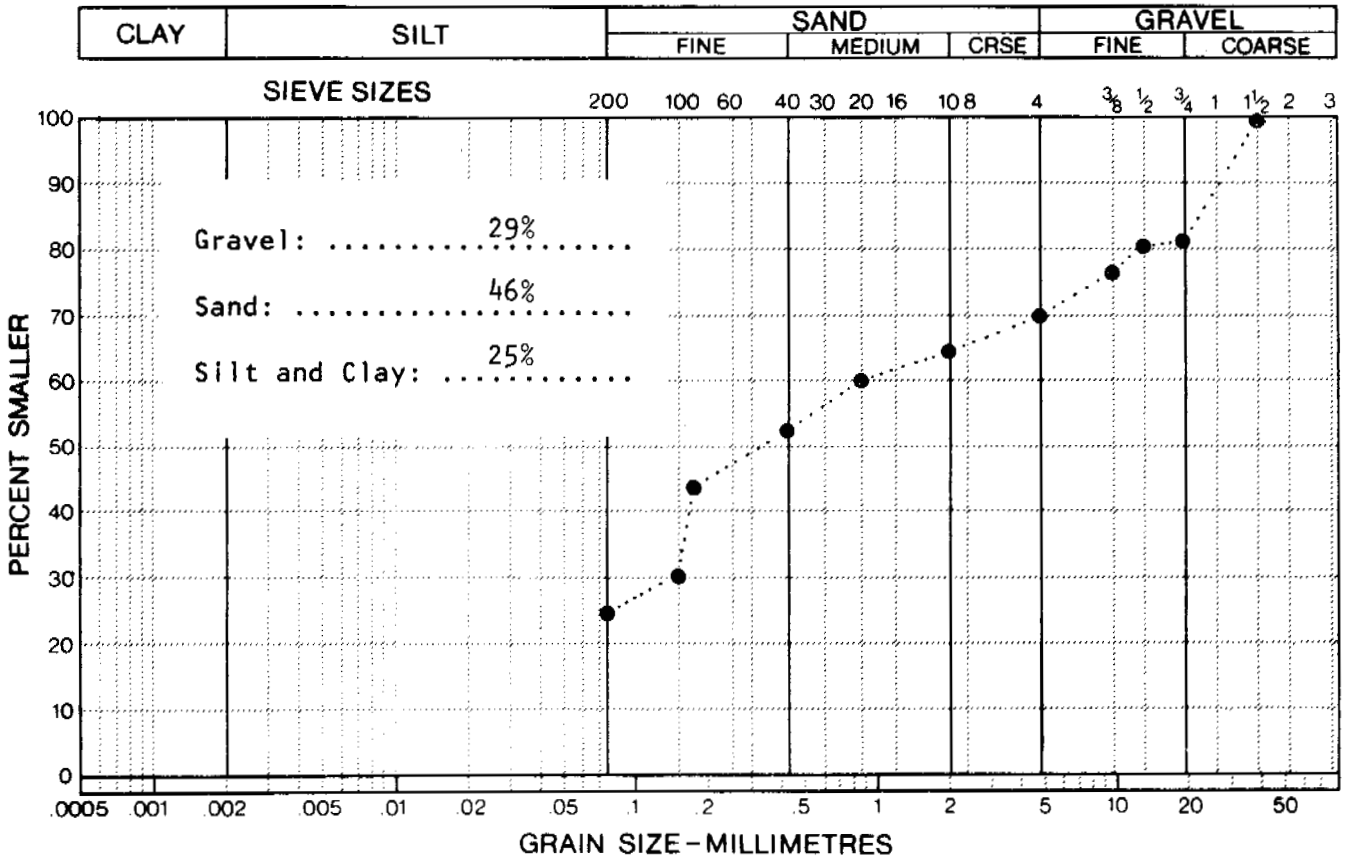
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 470

PIT NO. 470-11

EXPOSURE: hand excavated test pit



MATERIAL TYPE: gravelly, silty sand

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS: sample not analysed

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS:

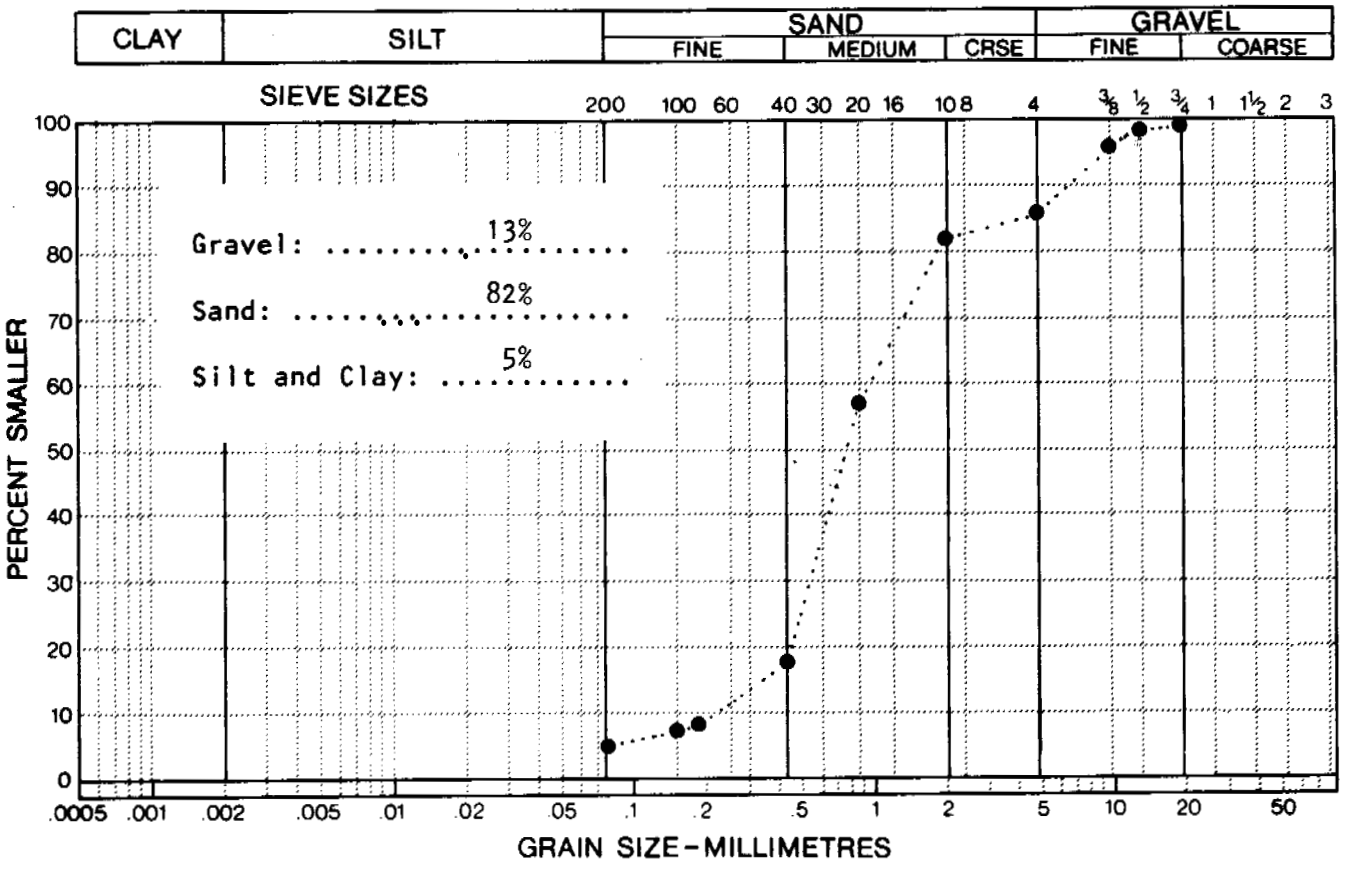
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 470

PIT NO. 470-12

EXPOSURE: hand excavated test pit



MATERIAL TYPE: sand, some gravel, trace of silt

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS:

quartzite 89%
granodiorite 5%
diorite 4%
sandstone 2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS:

SOURCE NO. 470

PIT NO. 470-1

EXPOSURE: borrow area

MATERIAL TYPE: thin drift over weathered bedrock

GENESIS (LANDFORM): D/B

REMARKS:

SOURCE NO. 470

PIT NO. 470-2

EXPOSURE: road cut

MATERIAL TYPE: thin drift over weathered bedrock

GENESIS (LANDFORM): D/B

REMARKS:

SOURCE NO. 470

PIT NO. 470-3

EXPOSURE: abandoned borrow area

MATERIAL TYPE: clayey silt, trace of gravel

GENESIS (LANDFORM): D/B

REMARKS:

SOURCE NO. 470

PIT NO. 470-5

EXPOSURE: abandoned borrow area

MATERIAL TYPE: silt, some gravel and sand

GENESIS (LANDFORM): D/B

REMARKS:

SOURCE NO. 470

PIT NO. 470-9

EXPOSURE: abandoned borrow area

MATERIAL TYPE: gravelly, sandy silt, trace of cobbles

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 470

PIT NO. 470-13

EXPOSURE: road cut

MATERIAL TYPE: silt, trace of sand

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 470

PIT NO. 470-14

EXPOSURE: pipeline cut

MATERIAL TYPE: silt, trace

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 470

PIT NO. 470-15

EXPOSURE: road cut

MATERIAL TYPE: sandy silt some gravel

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 470

PIT NO. 470-16

EXPOSURE: road cut

MATERIAL TYPE: sandy silt some gravel

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 470

PIT NO. 470-17

EXPOSURE: abandoned borrow area

MATERIAL TYPE: gravelly sand, trace of silt

GENESIS (LANDFORM): UD

REMARKS:

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	480
SAMPLE NOS.	480-1
LANDFORM AND LOCATION	spit along west side of Dezadeash Lake
MATERIAL	sand and gravel
ESTIMATED VOLUME	50 000 m^3
AIRPHOTO NOS.	HIGH LEVEL A23820-78
	LOW LEVEL A24052-59

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 480 is a triangular shaped point bar along the west side of Dezadeash Lake. Its elevation above the Lake is approximately 1 m near the narrow eastern shoreline, but rises to more than 10 m along the access road. Drainage on the site is excellent.

Biotic

Vegetation consists of stunted aspen and dwarfed spruce with some shrub willow. The understory is made up of kinnikinnick and juniper. The stunted, gnarled vegetation has obviously been affected by winds from the lake, and provides an attractive setting for the Territorial campsite situated at the location.

In view of the heavy use by campers there is little concern for terrestrial fauna but minor concerns for fish populations in Dezadeash Lake (trout, grayling and pike) may exist if the deposit were to be exploited.

The area is uniquely suited for the present recreational use.

GRANULAR RESOURCE

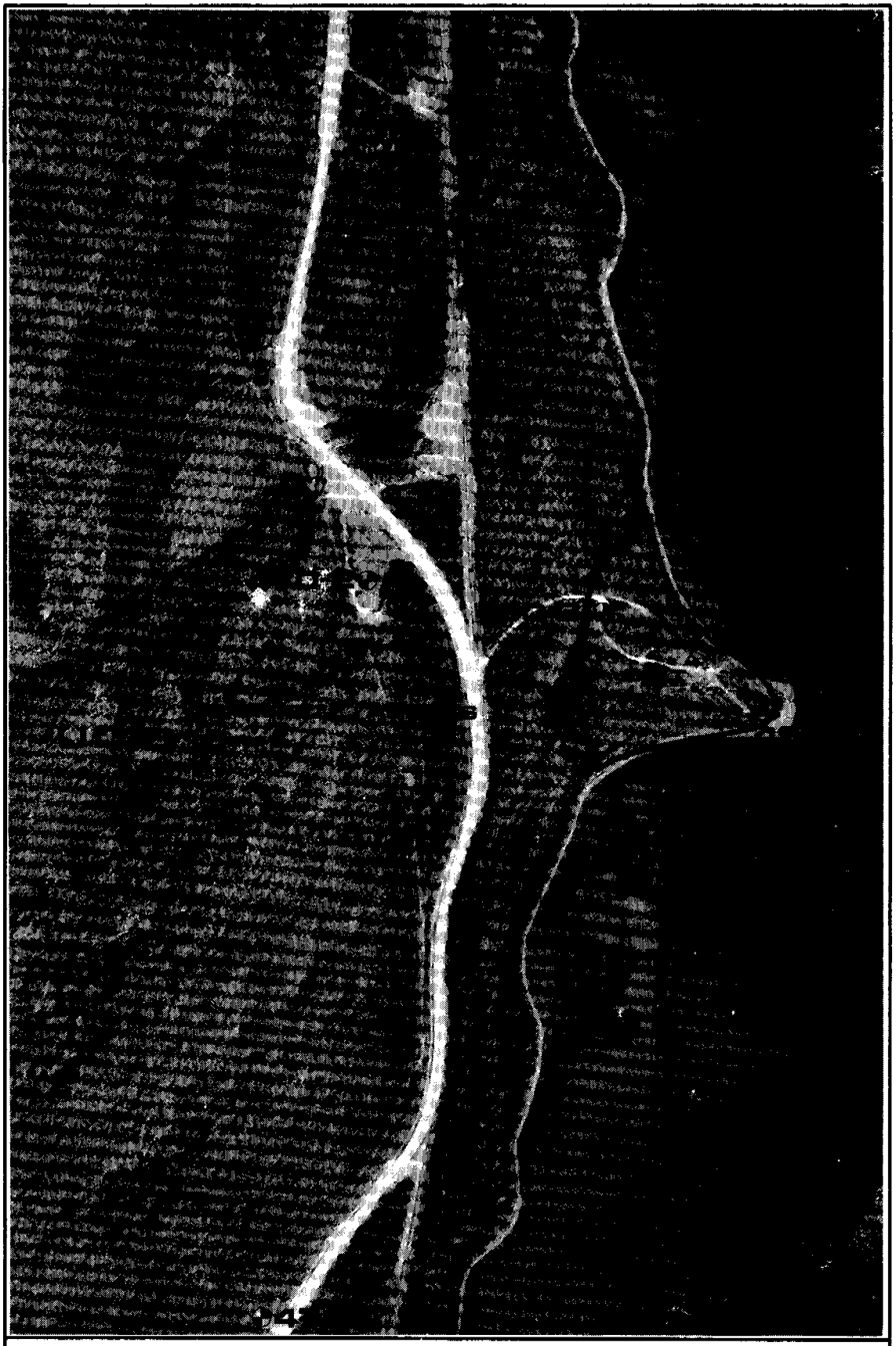
Quartzite constitutes more than 90% of the minerals within the sand and gravel sampled in pit 480-1. Approximately 60% of these have a blade shape, and most are subangular. Similar observations made at 480-2 indicate that both the grain size distribution and minerology of the deposit are extremely uniform. Near the shoreline the overburden is thin or absent. Up to 0.5 m were observed closer to the Haines Road in cuts along the campground access road.

On the basis of an average thickness of 1.5 m of recoverable borrow throughout the deposit, at least 40 000 m^3 of granular resource is available.

DEVELOPMENT

The material in Source No. 480 could probably be utilized for all purposes (concrete, asphalt, base and sub-base courses) with only minor amounts of crushing and screening, and the road to the campsite could provide adequate access if upgraded.

The presence of the campsite and picnic ground and the uniqueness of the landform itself, however, are considered limiting and no development is currently recommended.



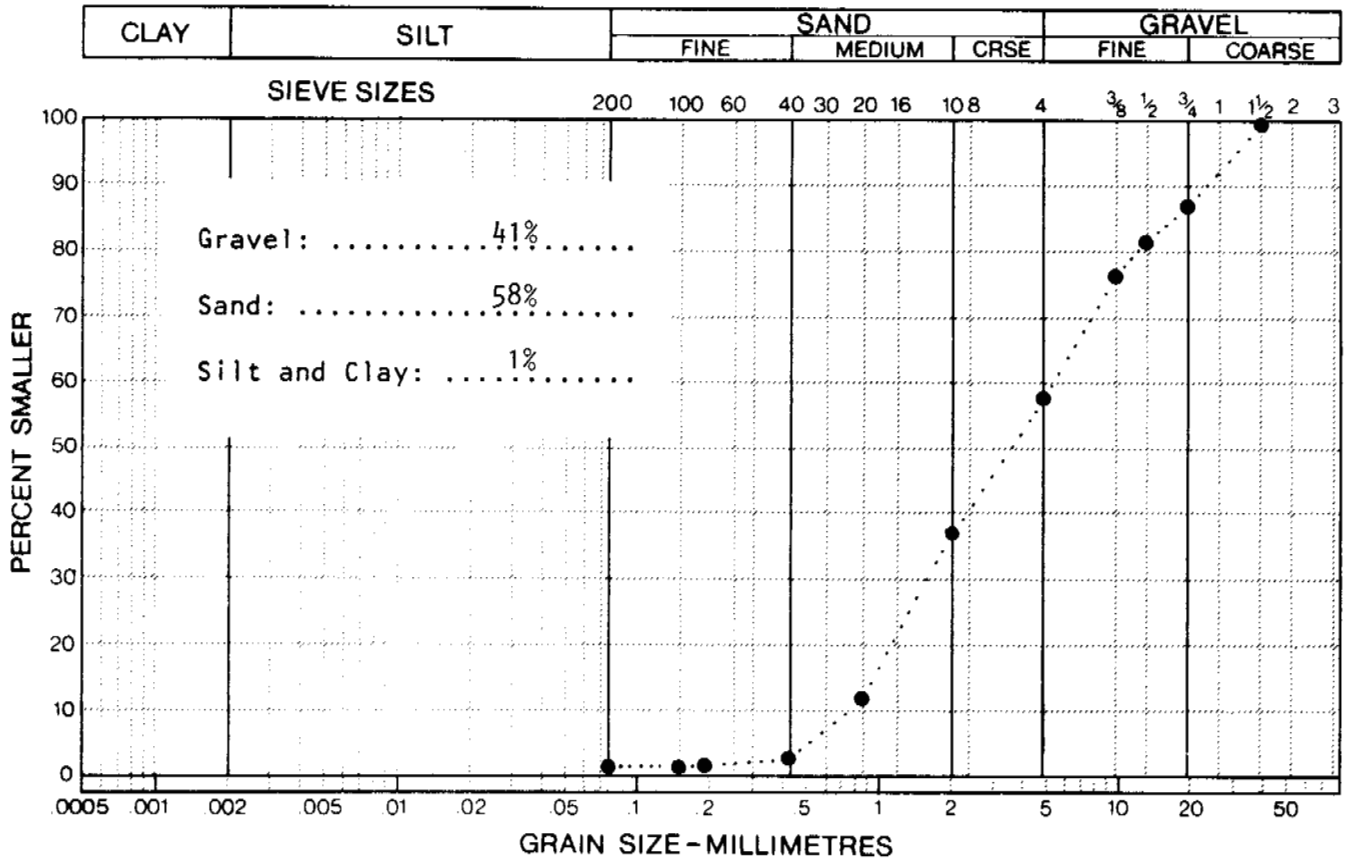
SOURCE NO. 480 and 470 AIRPHOTOGRAPH NO. A24052-59

LABORATORY ANALYSIS

SOURCE NO. 480

PIT NO. 480-1

EXPOSURE: hand excavated test pit



MATERIAL TYPE: sand and gravel, trace of silt

GENISIS (LANDFORM): spit on shore of Dezadeash Lake

PETROGRAPHIC ANALYSIS:
quartzite 92%
sandstone 6%
granite 2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS:

SOURCE NO. 480

PIT NO. 480-2

EXPOSURE: hand dug test pit

MATERIAL TYPE: sand and gravel

GENESIS (LANDFORM): S

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

SOURCE: 480

LANDFORM AND LOCATION: POINT BAR ON DEZADEASH LAKE SHORE

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	0
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	2
TERRESTRIAL FAUNA:	NO INVOLVEMENT	0
AQUATIC FAUNA:	TROUT, GRAYLING AND PIKE IN DEZADEASH LAKE	1
SURFACE WATER:	POTENTIAL FOR SLUMPING, EROSION, AND SILTATION	1
LAND STATUS AND USE:	YTG CAMPSITE/PICNIC SITE WATER-BASED RECREATION SPORT FISHING	5
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	INTERESTING LAKE FRONTAGE, LANDFORM AND VEGETATION	3

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO. 490

SAMPLE NOS. 490-1

LANDFORM AND LOCATION CAC on west side of Dezadeash Lake near kilometre post HR208

MATERIAL sandy gravel, trace of silt

ESTIMATED VOLUME 2 000 000 m^3

AIRPHOTO NOS. HIGH LEVEL A23820-75

LOW LEVEL A24052-64

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 490 is a pair of coalescing alluvial cones, over which the Haines Road is constructed. The cones originate in the Kluane Ranges and terminate on the banks of Dezadeash Lake. At the base the cones measure approximately 1 200 m in width. The abandoned pipeline right-of-way and telephone line also cross the source.

Biotic

Vegetation consists of open spruce and scattered aspen with some shurb willow. The upper reaches of the cones are within Kluane National Park.

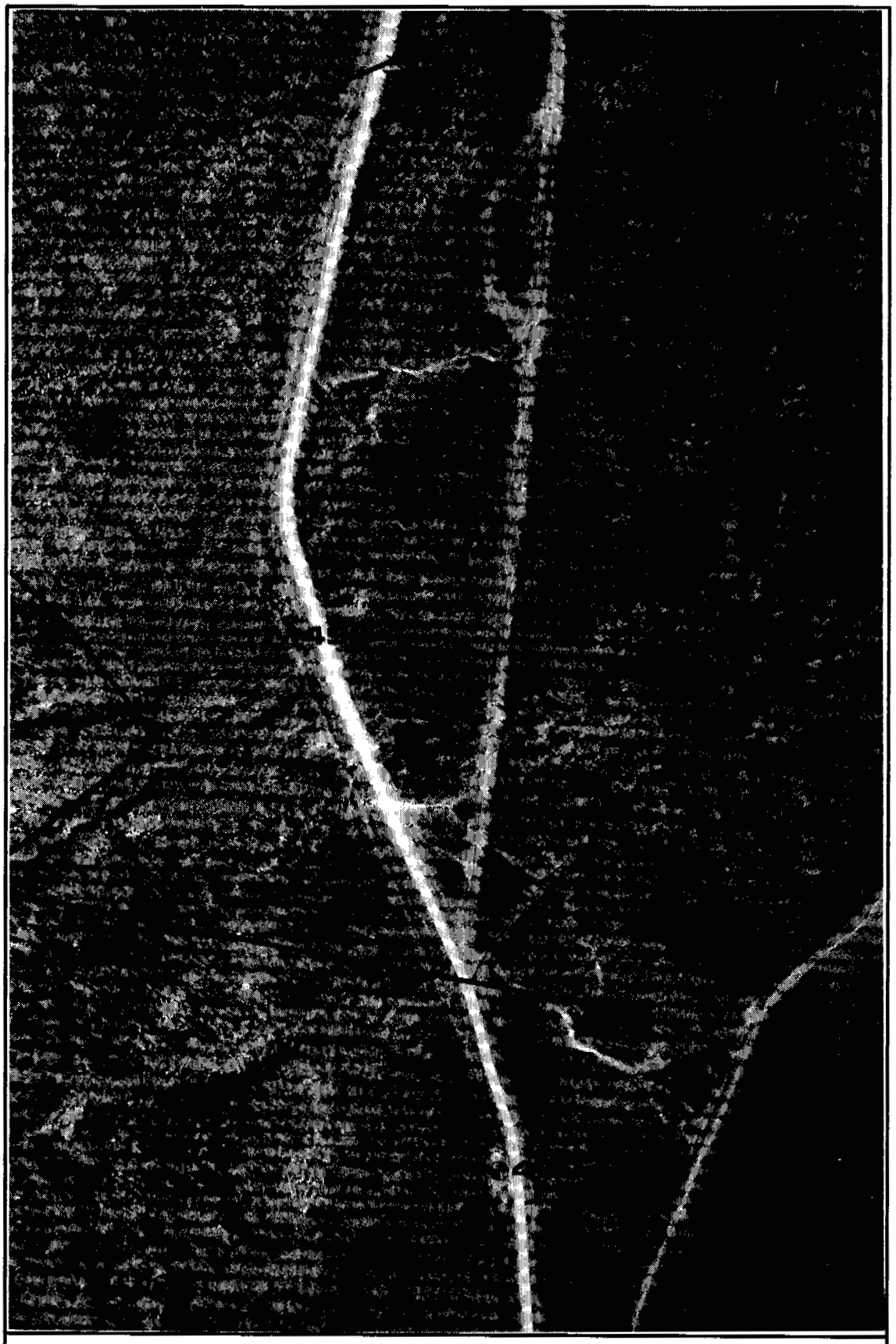
36-0260

GRANULAR RESOURCES

An analysis of material from a hand excavated test pit revealed that the granular materials consist of sandy gravel with a trace of silt. Quartzite (72%) is the main rock type with slate (24%) a major accessory. Volume calculations were made by assuming that granular material could be recovered to an average depth of 2 m over the entire area.

DEVELOPMENT

The high deleterious material content (slate) reduces the value of this deposit as a source of aggregate. As a source of base course sub-base material, however, the source has some potential. Minor screening may be necessary. Road access to the source is excellent and environmental concerns are minimal, providing that extensive siltation of Dezadeash Lake is avoided. Commitment of lands to the west of the Haines Road to park use is considered limiting to gravel extraction.



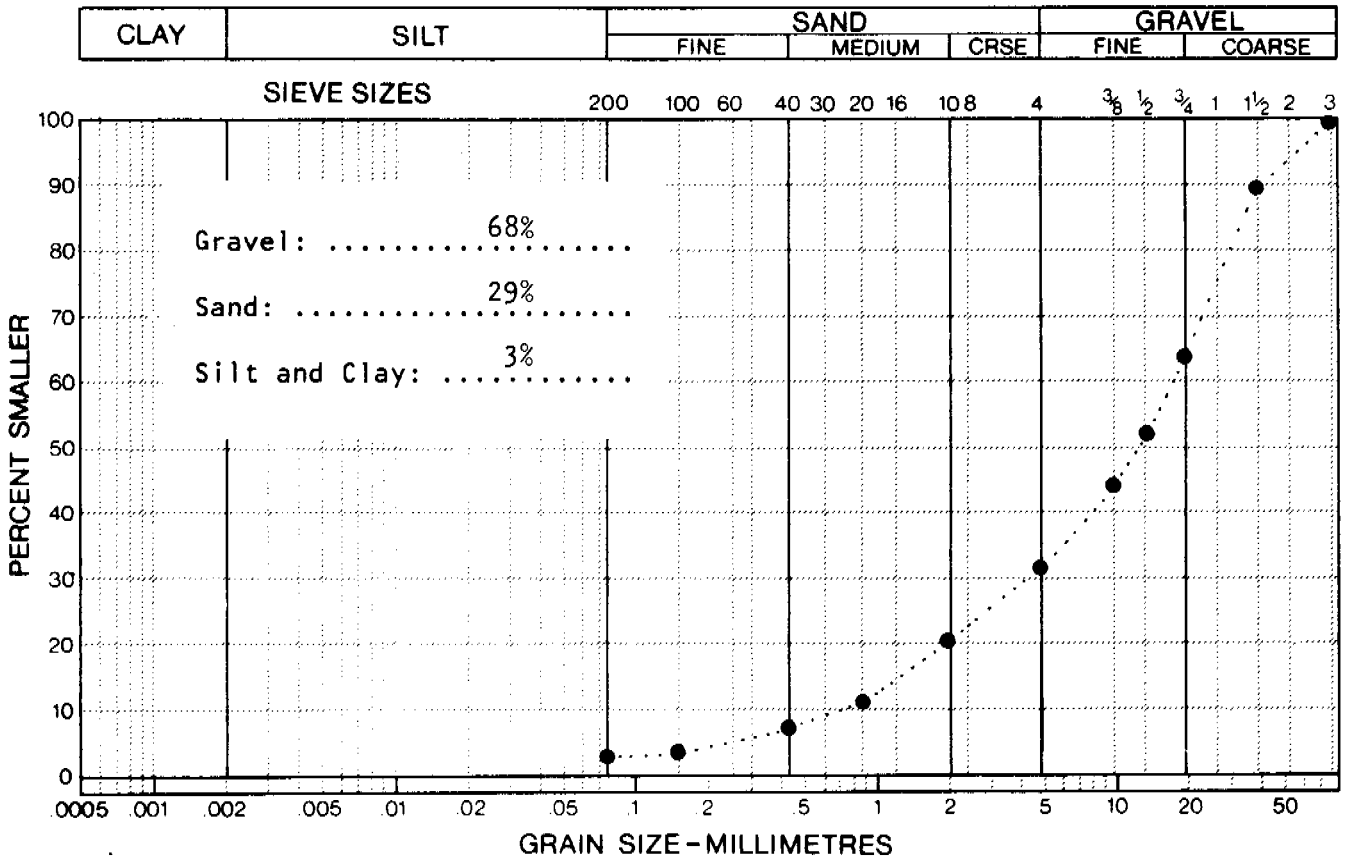
Source Nos. 470 and 490 Airphoto No. A24052-64

LABORATORY ANALYSIS

SOURCE NO. 490

PIT NO. 490-1

EXPOSURE: hand excavated test pit



MATERIAL TYPE: sandy gravel, trace of silt

GENISIS (LANDFORM): coalescing alluvial cone

PETROGRAPHIC ANALYSIS:
quartzite 72%
slate 24%
granite 4%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS: some clay coatings

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	500
SAMPLE NOS.	none taken
LANDFORM AND LOCATION	RG - glaciers located on the upper slopes west of Dezadeash Lake
MATERIAL	coarse angular cobbles and boulders
ESTIMATED VOLUME	not sampled
AIRPHOTO NOS.	HIGH LEVEL A23820-70 to -75
	LOW LEVEL A24052-68

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 500 is composed of large rock glaciers originating in the upper slopes of the Kluane Range. The terminus of the rock glacier immediately north of Source No. 510 comes within 300 m of the Haines Road.

Biotic

Vegetation on the rock glaciers consists of a few scattered trees, mosses and lichens.

Recreation

The rock glaciers lie within Kluane National Park. A Parks Canada trail leading to one of these features was under construction at the time of the field reconnaissance.

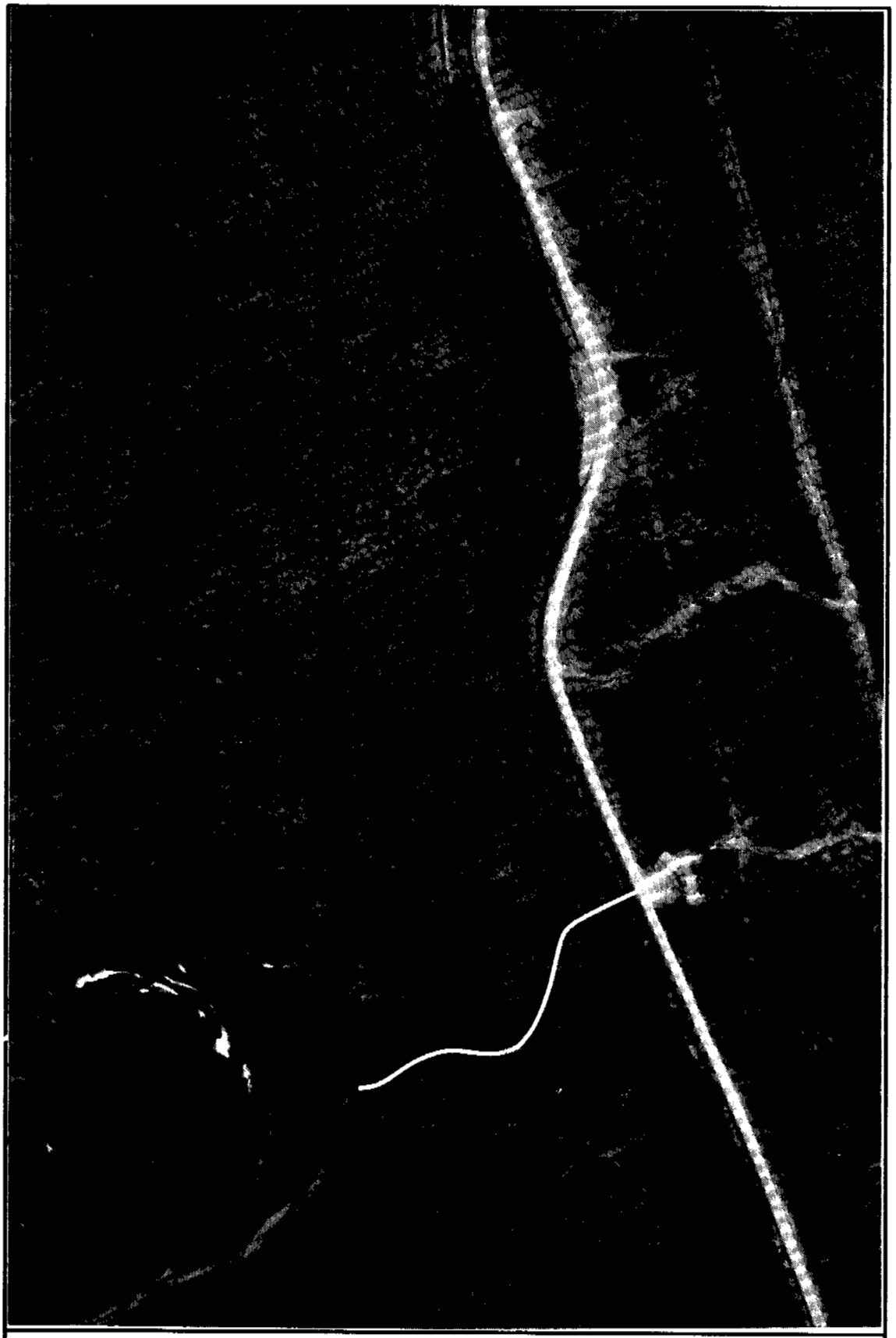
36-0260

GRANULAR RESOURCES

Vast amounts of granular materials in the form of course, angular talus exist within the rock glaciers. The source nearest the Haines Road was examined in the field. Because of the coarseness of the material a representative sample could not be taken. Quartzite is the main rock type.

DEVELOPMENT

These deposits are located within Kluane National Park and are of geologic interest. Development is not recommended.



Source No. 500

Airphoto No. A24052-68

SOURCE NO. 500

PIT NO. 500-1

EXPOSURE: surface samples

MATERIAL TYPE: cobbles and boulders

GENESIS (LANDFORM): RG

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	510
SAMPLE NOS.	510-1 510-2
LANDFORM AND LOCATION	AC intersecting the Haines Road near kilometre post HR210
MATERIAL	gravel and sand, some cobbles, trace of silt
ESTIMATED VOLUME	3 000 000 m^3
AIRPHOTO NOS.	HIGH LEVEL A23820-73 LOW LEVEL A24052-66

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 510 is an alluvial cone on the west side of Dezadeash Lake. A prominent intermittent stream exists near the centre of the cone. At the time of the field reconnaissance the stream was dry and there was evidence that borrow material had been removed from the stream bed. The Haines Road, abandoned pipeline right-of-way and telephone line traverse the source.

Biotic

Vegetation consists of open spruce and scattered aspen with some shrub willow. Willow stands are thickest along the stream. Moose sign and game trails were observed.

Recreation

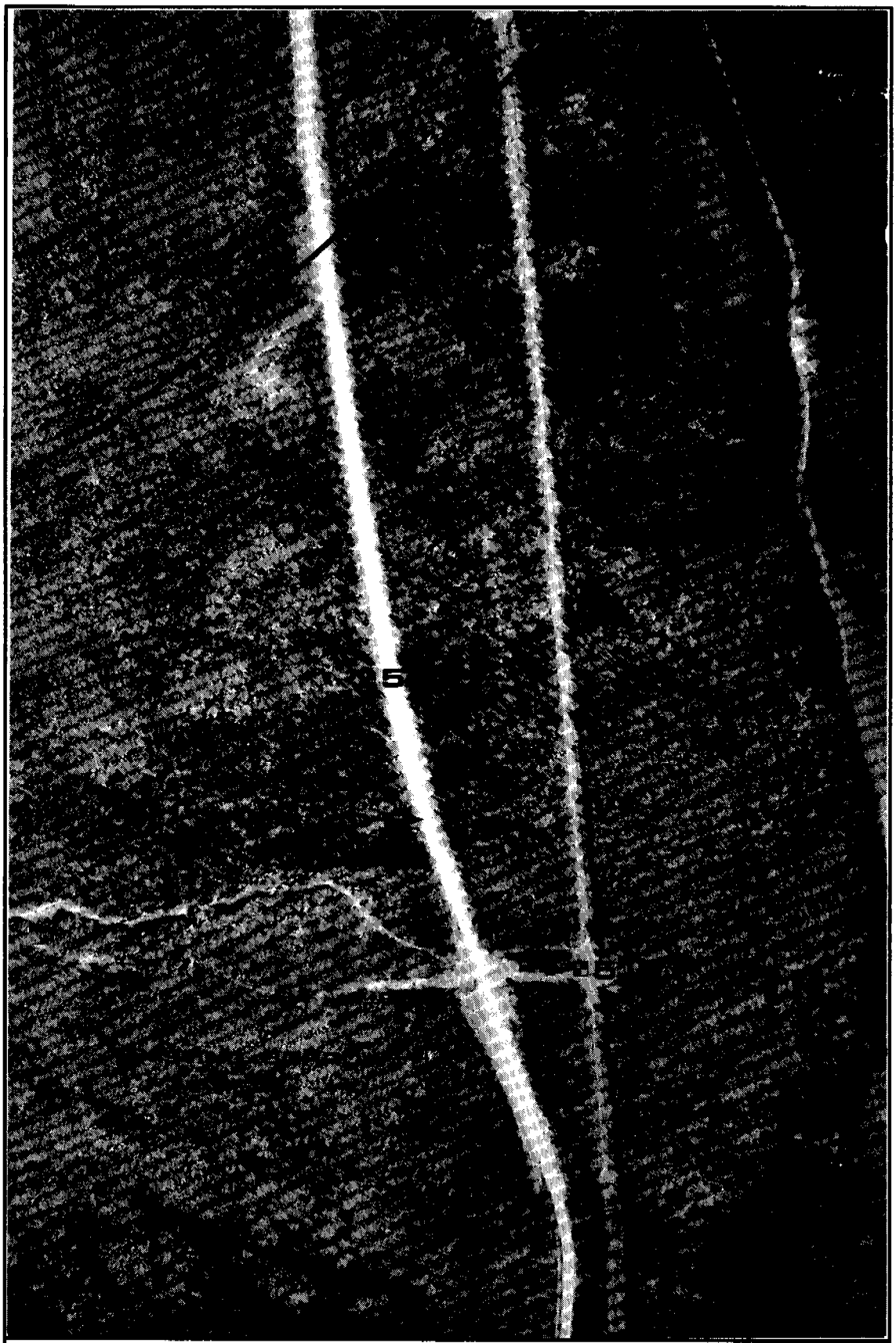
Most of the source, west of the Haines Road, is within Kluane National Park.

GRANULAR RESOURCES

Source No. 510 may contain as much as 3 000 000 m^3 of sand and gravel based on an average recoverable depth of 2 m. Silt contents measured in the sampled areas ranged from 2 to 8 percent. Quartzite is the main rock type (average 90%) with slate and sandstone as minor constituents. Road access to the source is excellent.

DEVELOPMENT

In general granular material within the source may be suitable as sub-base without processing and may also be marginally acceptable as base course. The sandy gravel observed in the dry stream bed also has potential as a concrete aggregate, although some screening would be necessary. Development should be restricted to that part of the source outside the Kluane National Park.



Source No. 510

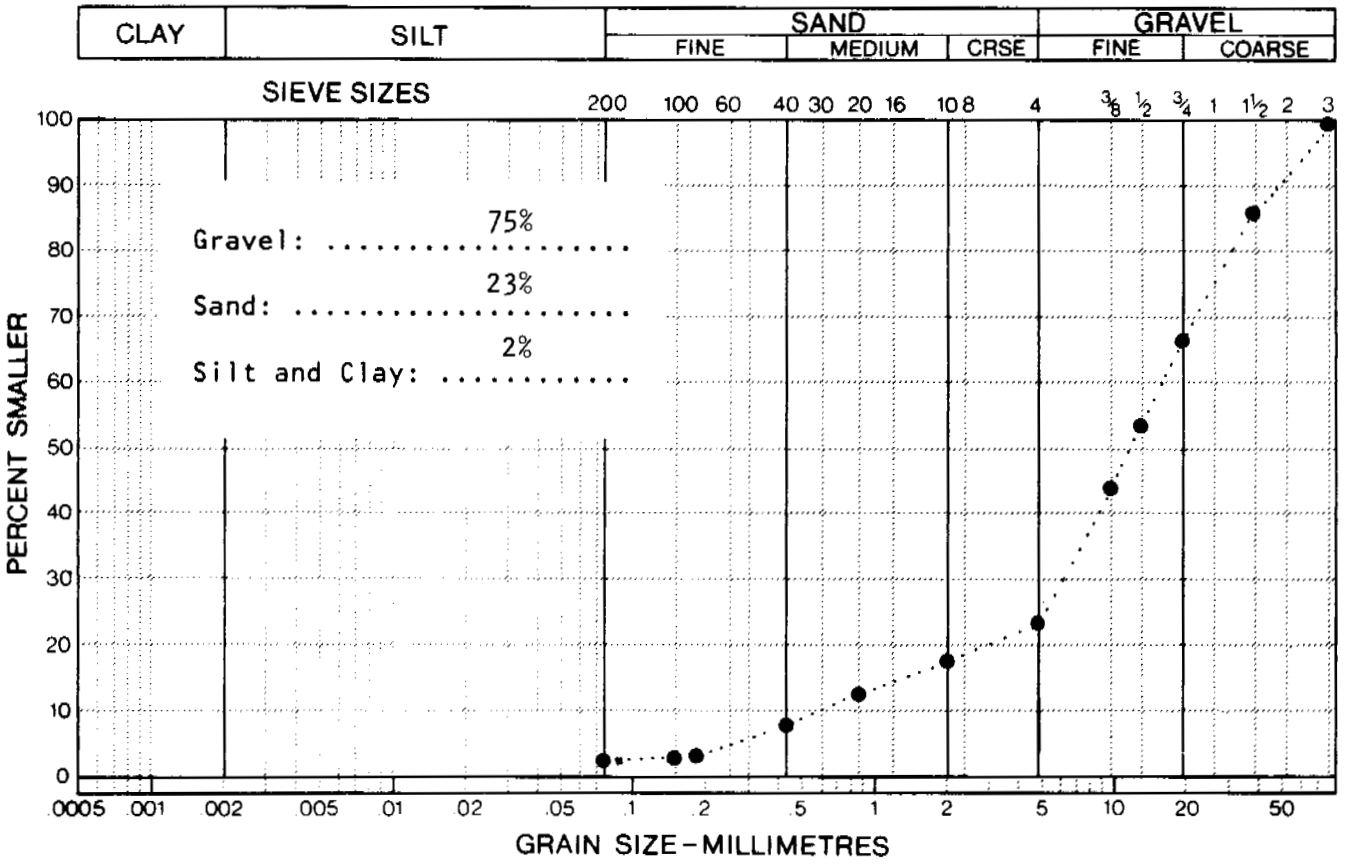
Airphoto No. A24052-66

LABORATORY ANALYSIS

SOURCE NO. 510

PIT NO. 510-1

EXPOSURE: dry stream bed



MATERIAL TYPE: sandy gravel, some cobbles, trace of silt

GENISIS (LANDFORM): alluvial cone

PETROGRAPHIC ANALYSIS:

quartzite	92%
slate	6%
sandstone	2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

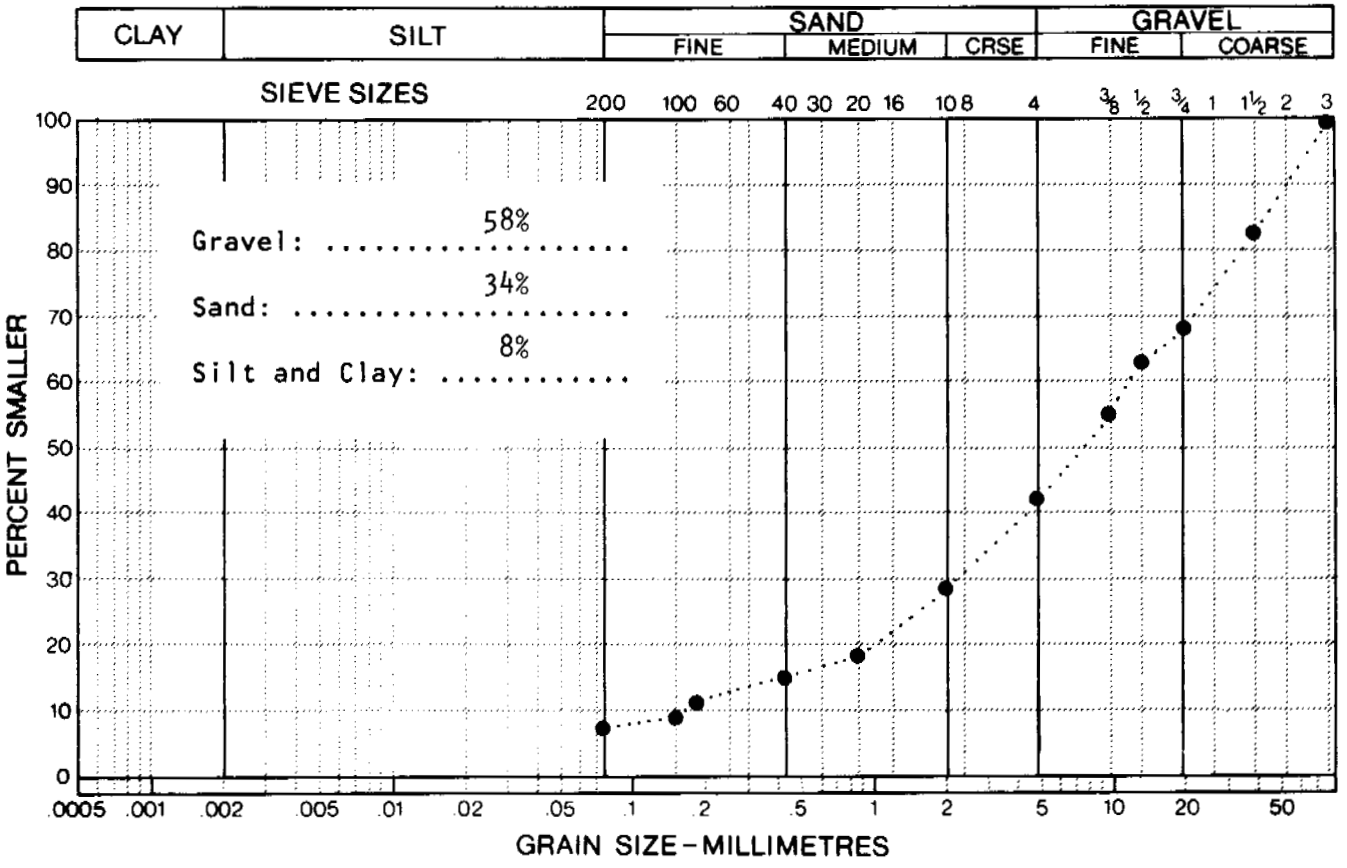
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 510

PIT NO. 510-2

EXPOSURE: road cut



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): alluvial cone

PETROGRAPHIC ANALYSIS: quartzite 88%
slate 8%
sandstone 4%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, angular

REMARKS: some clay coatings

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	520
SAMPLE NOS.	not sampled
LANDFORM AND LOCATION	low ridges along the west side of Dezadeash Lake
MATERIAL	unknown
ESTIMATED VOLUME	not calculated
AIRPHOTO NOS.	HIGH LEVEL A23820-70
	LOW LEVEL A24052-71

COMMENTS

The low ridges along the western margin of Dezadeash Lake have little potential as granular material sources and were not ground checked during the field investigation. It is suspected that most of this material is a silty drift which would only be suitable as a source of ground fill.

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	530
SAMPLE NOS.	530-1 530-2
LANDFORM AND LOCATION	BD, north end of Dezadeash Lake
MATERIAL	sand and gravel, trace of silt
ESTIMATED VOLUME	200 000 m^3
AIRPHOTO NOS.	HIGH LEVEL A23820-68 LOW LEVEL A24052-75

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 530 is a relic beach deposit along the north and northwest shores of Dezadeash Lake. The series of low ridges at the north end of the lake cover an area approximately 1 500 m long by 400 - 600 m wide. A single smaller (50 m by 350 m) ridge along the west shore was also sampled during the study. The average elevation of these ridges above lake level is approximately 1 to 2 m, although some of those in the interior may exceed this figure. For the most part these ridges are composed of coarse granular material swales between these ridges are generally fine grained, and often wet. Thus while drainage from each ridge is good, it is extremely poor in the intervening areas.

Biotic

Vegetation consists of scattered spruce and poplar, with extensive areas of shrub willows and alders and open areas covered with wetland grasses and sedges.

Beaver cut was observed and grouse were present. There was little sign of moose browse but the area appears suitable as moose habitat. Waterfowl are reported to use the north end of Dezadeash Lake for staging.

A clear stream flowing through the site was observed to be approximately 4 m wide and 0.5 m deep and probably supports resident and spawning trout and grayling.

A tourist lodge with lake frontage has been established in the area. The attractive pebble and sand beaches have considerable recreation potential as well as geologic interest.

GRANULAR RESOURCES

Samples recovered from Source No. 530 included both gravel and sand in varying amounts, with a trace of silt sized particles. Quartzite/meta greywacke (73 - 85%) appears to be the dominant rock type, with slate (5 - 15%), soft sandstone (4 - 10%) and granite (4 - 8%) also being common. No particle coatings were observed. Petrographically, the beach ridge deposit sampled at 530-2 appears to be slightly superior to that at 530-1. The uniformity of this deposit is expected to vary somewhat between ridges, but little variation is expected along ridges of the same age. The overburden appears to be thin on the tops of the ridges, generally not exceeding 0.3 m in depth. Using an average height of ridge of 1.5 m, and an average width of 50 m, it is estimated that approximately 200 000 m^3 of sand and gravel may be available.

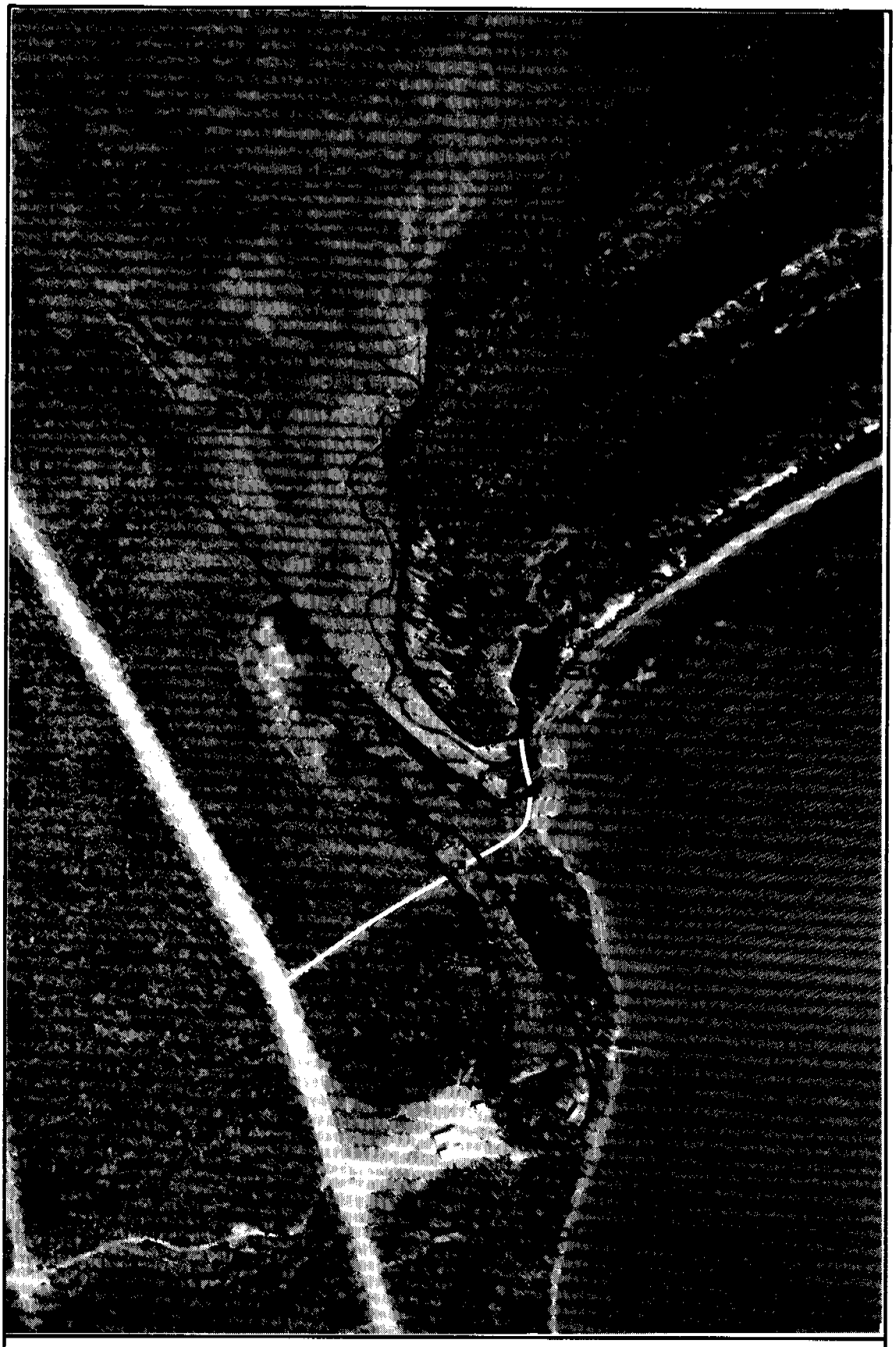
DEVELOPMENT

Access to the site, at the present time, may be gained along the road which borders the fenced property line along the north margin of the tourist lodge. The development of an active pit at this site would necessitate the introduction of special measures to ensure that minimal deterioration of the present land status and use would result. Such measures would undoubtedly include contruction of a new access route over swampy terrain, and the limitation of pit development (and hence the actual recoverable resources) to about 65% of that which is available.

The use of snow roads over swampy areas would reduce the cost of providing suitable access, but would also impose seasonal restrictions on pit development.

Depending on the exact characteristics of the source material, some processing may be necessary for the production of concrete or asphalt aggregate. Base and sub-base courses could be produced with only minimal screening and blending.

Since this source offers definite prospects for production of sand, as well as gravel, it is recommended that further detailed field and laboratory assessments be conducted to provide additional information or the uniformity of the granular material and its performance characteristics.



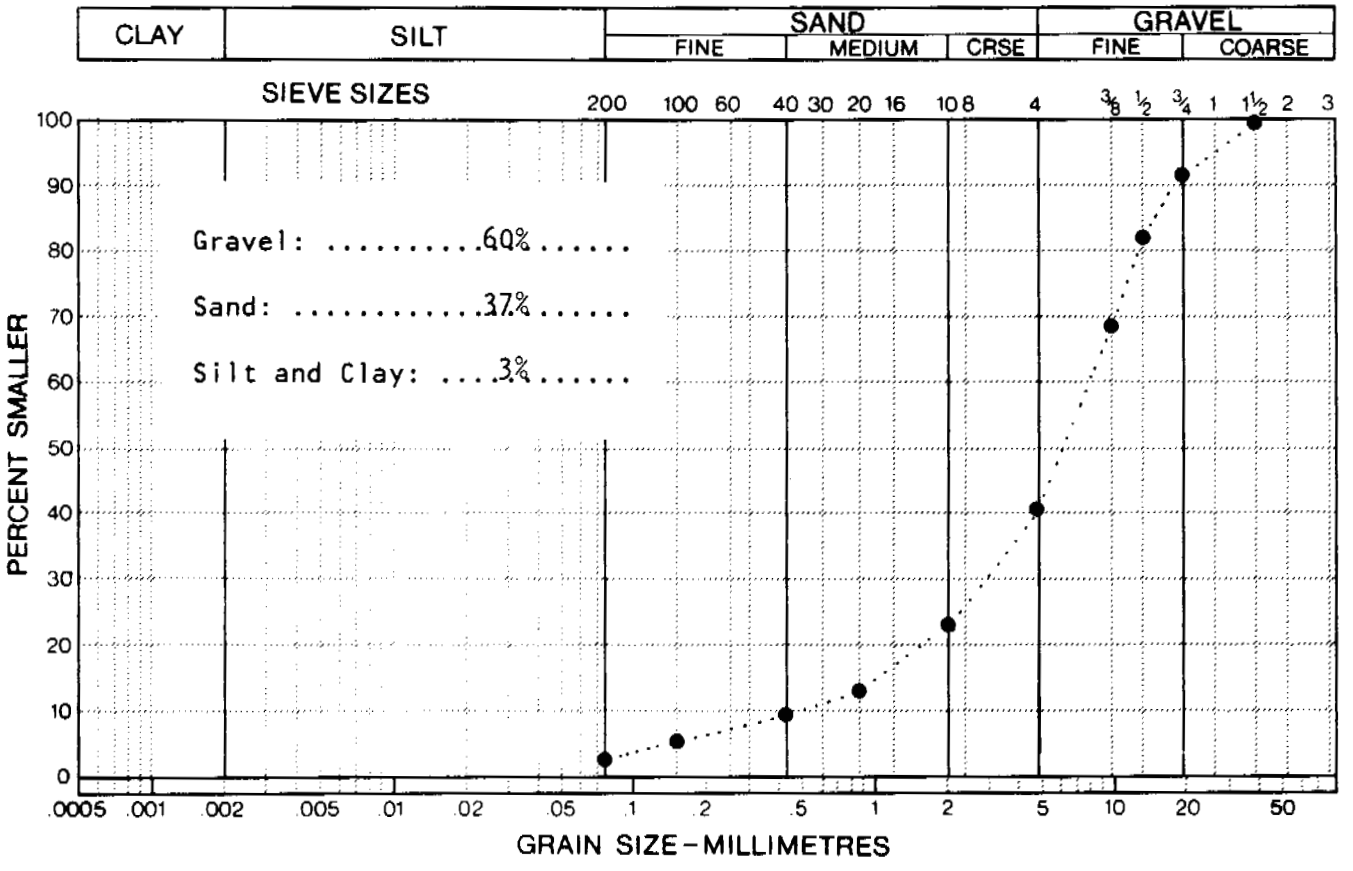
Source No. 530 Airphoto No. A24052-75

LABORATORY ANALYSIS

SOURCE NO. 530

PIT NO. 530-1

EXPOSURE: test pit along access road



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): relic beach deposit

PETROGRAPHIC ANALYSIS:

quartzite 63%
slate 19%
granite 8%
soft sandstone 10%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: irregular, subangular to subrounded

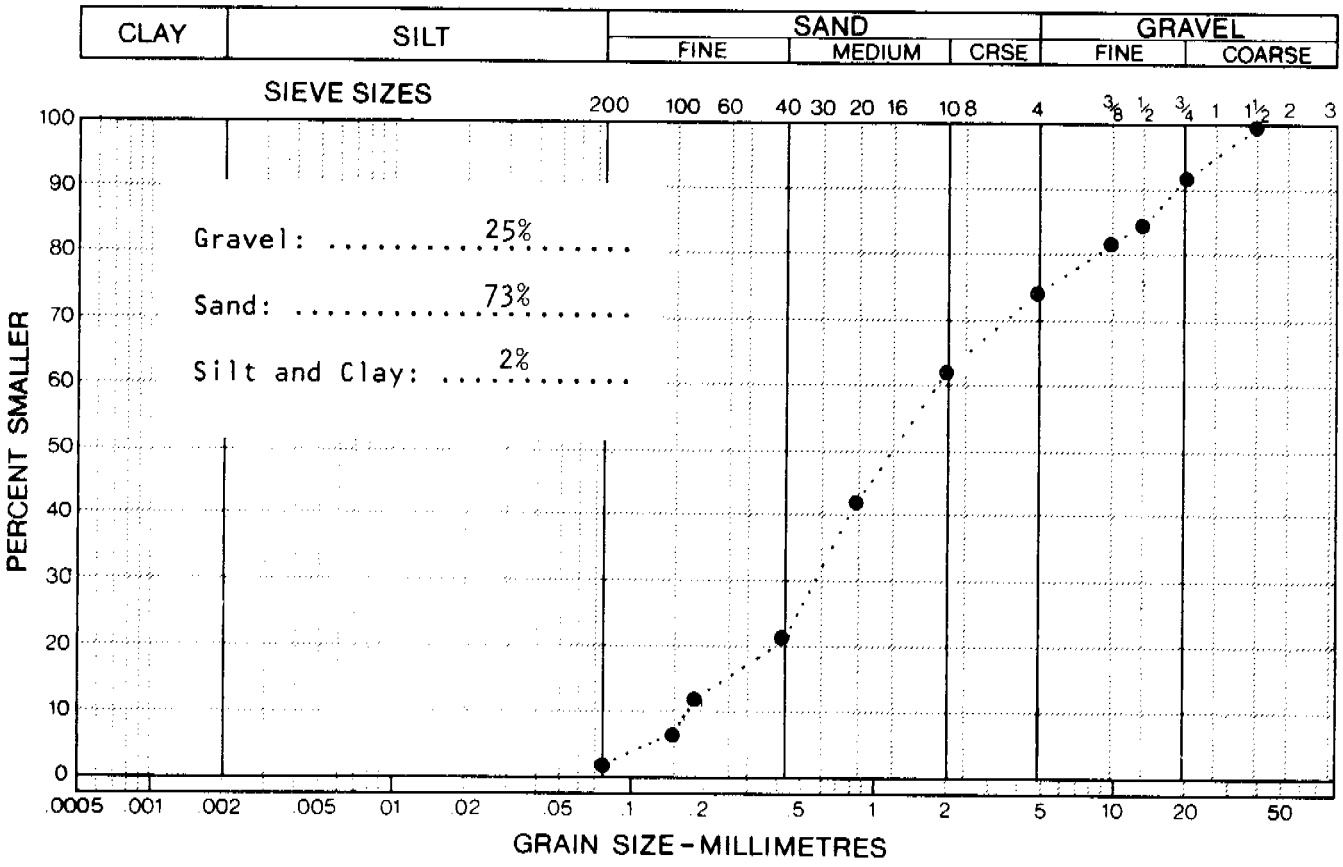
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 530

PIT NO. 530-2

EXPOSURE: test pit in beach ridge



MATERIAL TYPE: gravelly sand, trace of silt

GENISIS (LANDFORM): relic beach deposit

PETROGRAPHIC ANALYSIS:

quartzite 85%
slate 5%
sandstone 4%
granite 4%
diorite 2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: bladed, subangular

REMARKS:

SOURCE NO. 530

PIT NO. 530-2

EXPOSURE: hand dug test pit

MATERIAL TYPE: sand with some gravel

GENESIS (LANDFORM): BD

REMARKS: north end of Dezadeash Lake

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

SOURCE: 530

LANDFORM AND LOCATION: BEACH TERRACES

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	2
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	BEAVER HABITAT WATERFOWL HABITAT	2
AQUATIC FAUNA:	TROUT, GRAYLING AND PIKE IN DEZADEASH LAKE	2
SURFACE WATER:	POTENTIAL FOR SLUMPING, EROSION, SILTATION AND ALTERATION OF EXISTING DRAINAGE PATTERNS	1
LAND STATUS AND USE:	TOURIST LODGE WATER-BASED RECREATION SPORT FISHING RECREATION POTENTIAL HUNTING/TRAPPING AREA OUTFITTER/GUIDING AREA	3
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	INTERESTING GEOLOGIC LANDFORM	3

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	540
SAMPLE NOS.	not sampled
LANDFORM AND LOCATION	AC west of Haines Road at north end of Dezadeash Lake
MATERIAL	unsorted sand and gravel, some silt and cobbles (assumed)
ESTIMATED VOLUME	not calculated
AIRPHOTO NOS.	HIGH LEVEL A23820-68
	LOW LEVEL none available

COMMENTS

This deposit was not examined during the ground check, but is expected to contain unsorted granular material similar in grain size to the alluvial cones investigated south of Klukshu Lake. Since it originates in the Kluane Ranges west of the Haines Road, the cone is probably composed of metamorphosed flysch deposits, principally quartzite and meta-greywackes. Since the entire deposit is located within Kluane Park no development is recommended.

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO. 550

SAMPLE NOS. 550-1

LANDFORM AND LOCATION BD crossing Haines Road east of Kathleen Lake

MATERIAL gravel and sand, trace of silt

ESTIMATED VOLUME not calculated

AIRPHOTO NOS. HIGH LEVEL A23792-90

LOW LEVEL A24052-104

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 550 is a sinuous beach deposit extending northeastward from the shores of Kathleen Lake. These deposits represent an ancient strand line of Glacial Lake Champagne. Total relief of the deposit averages approximately 3 m. The Haines Road cuts through the beach near Kathleen Lake Lodge and the deposit was sampled at this location.

Biotic

Vegetation is composed of open spruce and aspen with a few shrub willow. The ground cover is sparse, mainly kinnikinnick.

Canada geese and other waterfowl use the east arm of Kathleen Lake. The site appears suitable for grouse but none were observed.

There would be considerable concern for the Kokanee, trout and char populations of the Kathleen Lakes in the face of extensive gravel removal. These lakes contain the only native rainbow trout population in Yukon Territory.

Recreation

West of the Haines Road, the site lies within Kluane National Park and includes the Parks Canada Kathleen Lake campsite. The source has been used for borrow by Parks Canada to construct campground roads.

East of the Haines Road the site is within a registered outfitter/ guiding area and trapping area. A cottage subdivision has been proposed for the east arm of Kathleen Lake but no development has been initiated. Sport fishing is very active throughout the chain of lakes and in the Kathleen River.

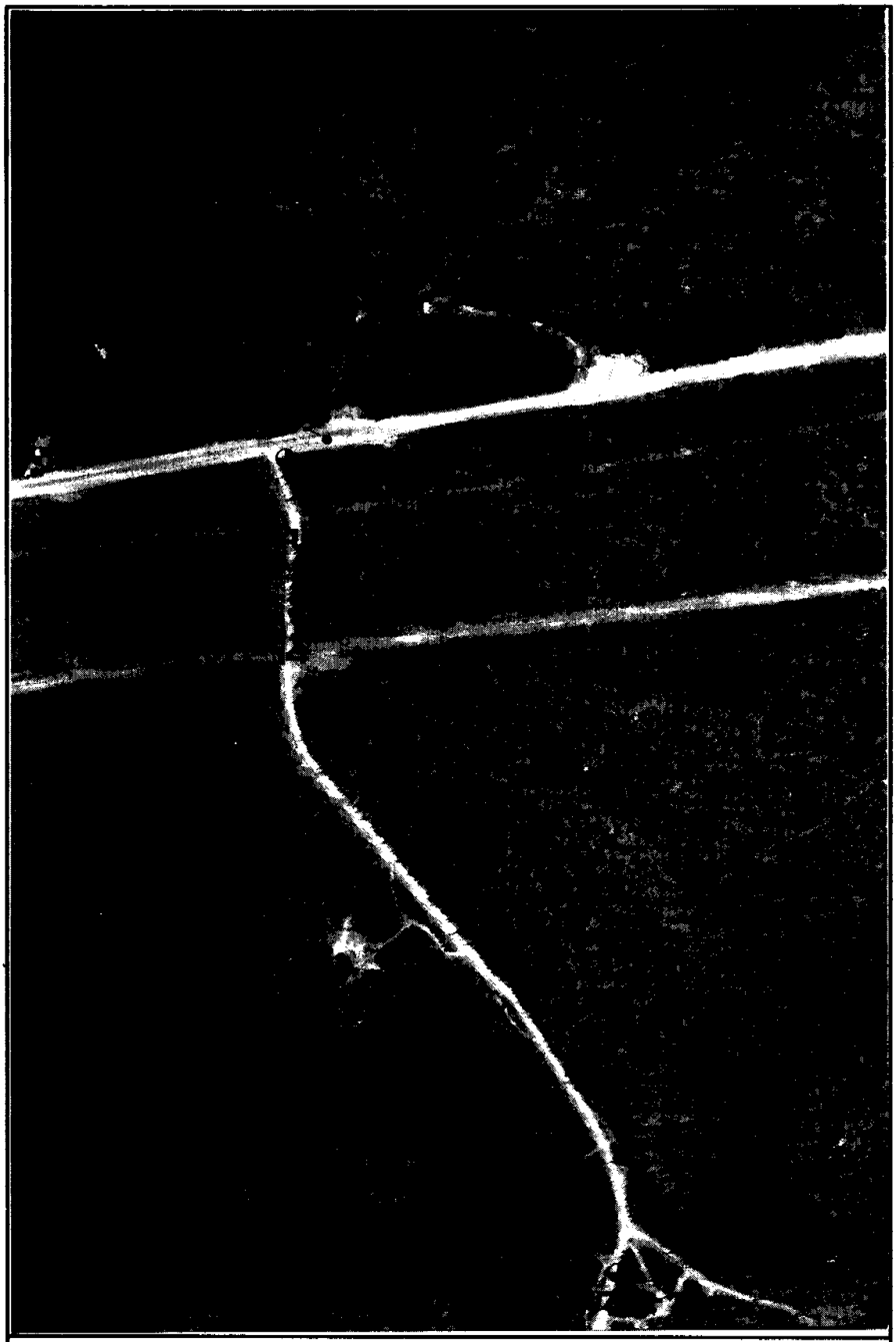
GRANULAR RESOURCES

The sample taken from at 500-1 consisted of stratified sands and gravels with traces of silt. The uniformity of the deposit is difficult to predict, as other beach deposits to the north contained appreciable amounts of silt. Slate and quartzite are the main rock types.

DEVELOPMENT

Development of the source west of the Haines Road is not recommended in recognition of established park-use. East of the road the deposit contains material suitable for sub-base course, and superior material may also be available in other areas not sampled.

Future development of this source would require further extensive investigation to define both the quantity and quality of materials available, and their location. In view of the other material available in the same area, no present development is recommended.



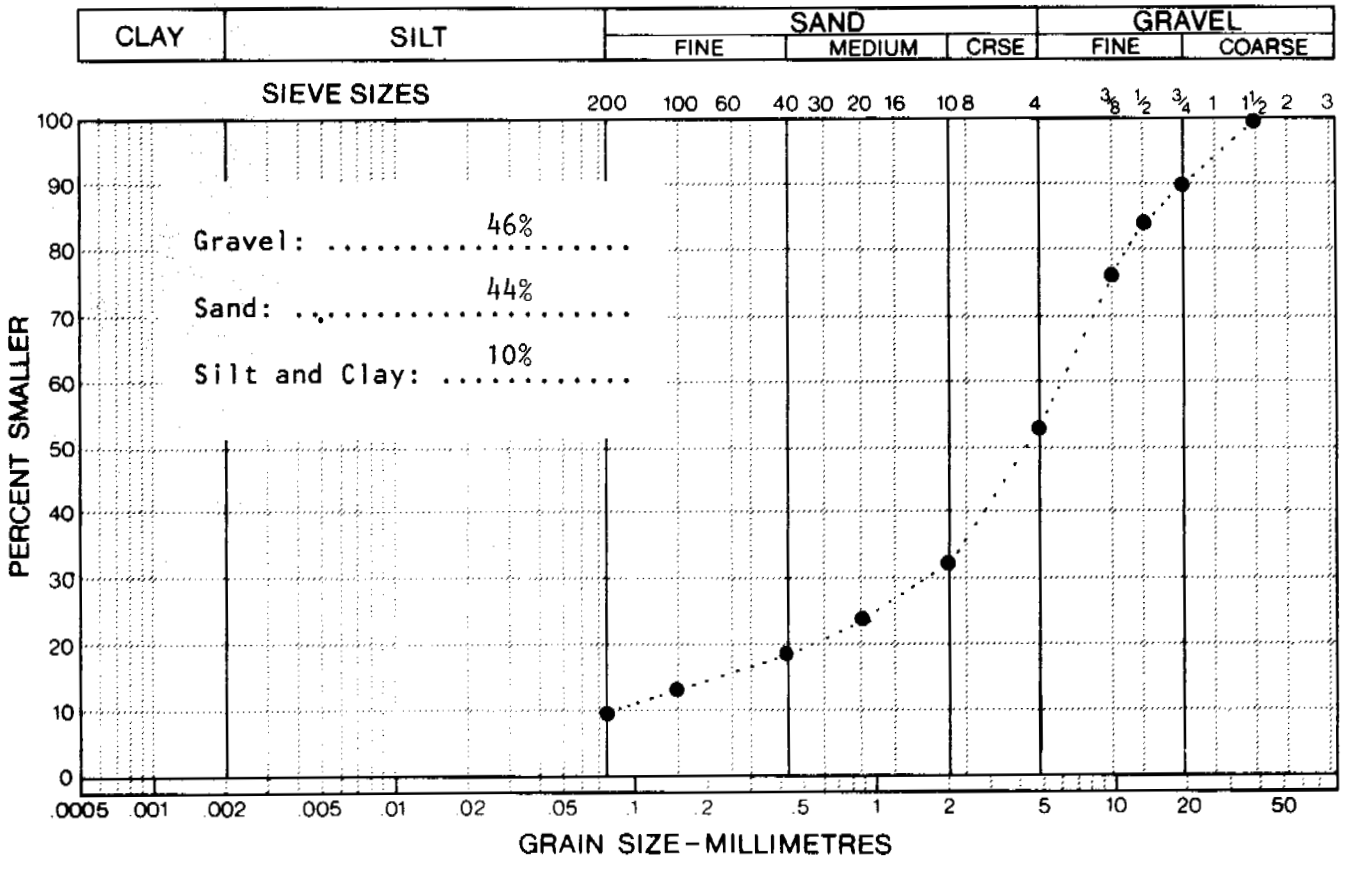
Source Nos. 470 and 550 Airphoto No. A24052-104

LABORATORY ANALYSIS

SOURCE NO. 550

PIT NO. 550-1

EXPOSURE: road cut



MATERIAL TYPE: sand and gravel, trace of silt

GENISIS (LANDFORM): beach deposit

PETROGRAPHIC ANALYSIS: slate 63%
quartzite 37%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS: some calcareous coatings

SOURCE: 550

LANDFORM AND LOCATION: BEACH TERRACES (EAST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	1
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	WATERFOWL HABITAT	1
AQUATIC FAUNA:	KOKANEE, TROUT AND CHAR IN KATHLEEN LAKE ADJACENT TO SITE	2
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	INDUSTRIAL (ABANDONED PIPELINE) RESIDENTIAL RECREATION POTENTIAL TRAPPING AREA HUNTING AREA OUTFITTER/GUIDING AREA	3
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

SOURCE: 550

LANDFORM AND LOCATION: BEACH TERRACES (WEST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	1
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	WATERFOWL HABITAT	1
AQUATIC FAUNA:	KOKANEE, TROUT AND CHAR IN KATHLEEN LAKE	2
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	NATIONAL PARK KATHLEEN LAKE CAMPSITE SPORT FISHING RECREATION POTENTIAL	5
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

DETAILED SOURCE ASSESSMENT SHEET

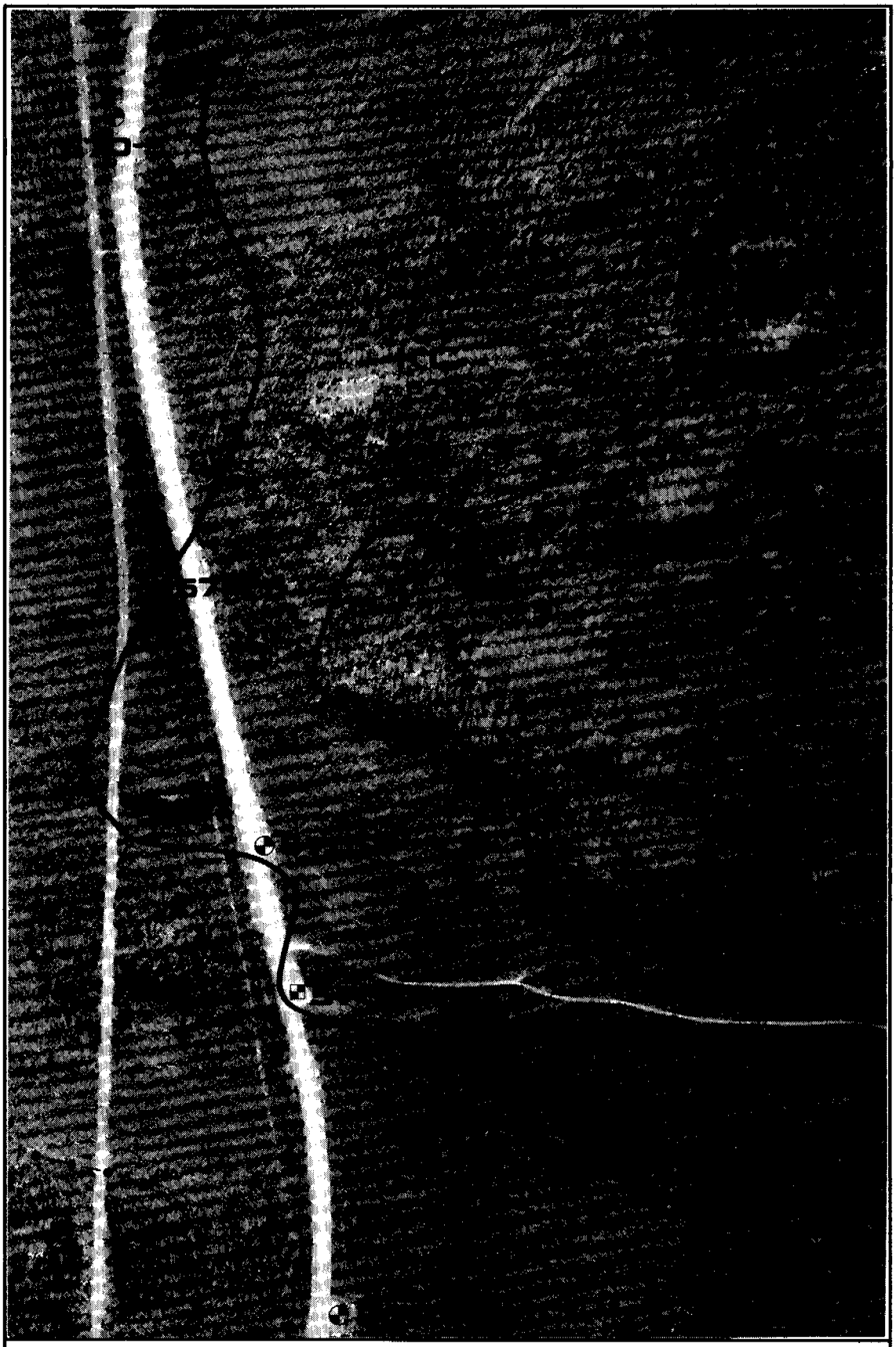
SOURCE NO.	560
SAMPLE NOS.	none taken
LANDFORM AND LOCATION	BD near Kathleen Lakes
MATERIAL	uniform silt, traces of sand
ESTIMATED VOLUME	not estimated
AIRPHOTO NOS.	HIGH LEVEL A23792-98
	LOW LEVEL A24052-112

COMMENTS

Source No. 560 consists of a number of relic beach deposits which bordered Glacial Lake Champagne. Where examined, these deposits are composed of uniform silt, and therefore do not appear to be prospective sources of granular material.

Source No. 560

Airphoto No. A24052-112



Source Nos. 560 and 570 Airphoto No. A24052-112

SOURCE NO. 560

PIT NO. 560-1

EXPOSURE: hand excavated test pit

MATERIAL TYPE: uniform silt, trace of fine sand

GENESIS (LANDFORM): BD

REMARKS:

SOURCE NO. 560

PIT NO. 560-2

EXPOSURE: hand excavated test pit

MATERIAL TYPE: uniform silt, trace of fine sand

GENESIS (LANDFORM): BD

REMARKS:

SOURCE NO. 560

PIT NO. 560-3

EXPOSURE: abandoned borrow area

MATERIAL TYPE: silt, trace of clay

GENESIS (LANDFORM): BD

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO. 570

SAMPLE NOS. 570-1
570-7
570-8

LANDFORM AND LOCATION EC and adjacent KC northeast of Kathleen Lakes

MATERIAL gravel and sand

ESTIMATED VOLUME 1 000 000 m^3 to 2 000 000 m^3, depending on thickness

AIRPHOTO NOS. HIGH LEVEL A23792-205

LOW LEVEL A24052-112
A24052-114
A24052-116

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 570 is an esker kame complex situated northeast of Kathleen Lakes, approximate kikometre post HR236 to HR238. The deposit is flanked on the east side by the Quill Creek inactive flood plain and on the west by a series of relic beach terraces. While some of the reticulated eskers are found immediately adjacent to kame complexes, both eskers and kames are also found separately.

The crests of both eskers and kames may stand as much as 6 m above the surrounding plateau, and generally appear to be well drained.

Biotic

Vegetation on this site, which has been partially burned, consists of open spruce stands with a scattering of aspen and a sparse understory of shrub, birch and willow. The ground cover is kinnikinnick.

The site appears to offer suitable grouse habitat. No fisheries concerns are involved.

West of the highway the deposit lies within Kluane National Park and is traversed by the abandoned pipeline. The highland at this point has been proposed for a visitor viewpoint over Kathleen Lake.

East of the highway, the south end of the deposit straddles the access trail to Rainbow Lake. Granular material from an area near the Rainbow Lake road is used by Parks Canada for campsite construction and maintenance. The area is within a registered outfitter/guiding area and trapping area.

GRANULAR RESOURCES

Sand and gravel constitute the major components of this source. Most of the grains appear to be quartzite (78%) but deleterious materials in the form of slate (8%), soft sandstone (5%) and schist (1%) are also present. Material retained on the #4 sieve was generally composed of subangular blades and spheroids, and about 60% of those sampled had a thick coating of $CaCO_3$.

Overburden appears to be thin (less than 0.2 m) on the tops of the eskers and kames, and slightly thicker in the low areas. Some of these low areas appear to infilled with coarse material very similar in grain size and petrology to that encountered in the eskers.

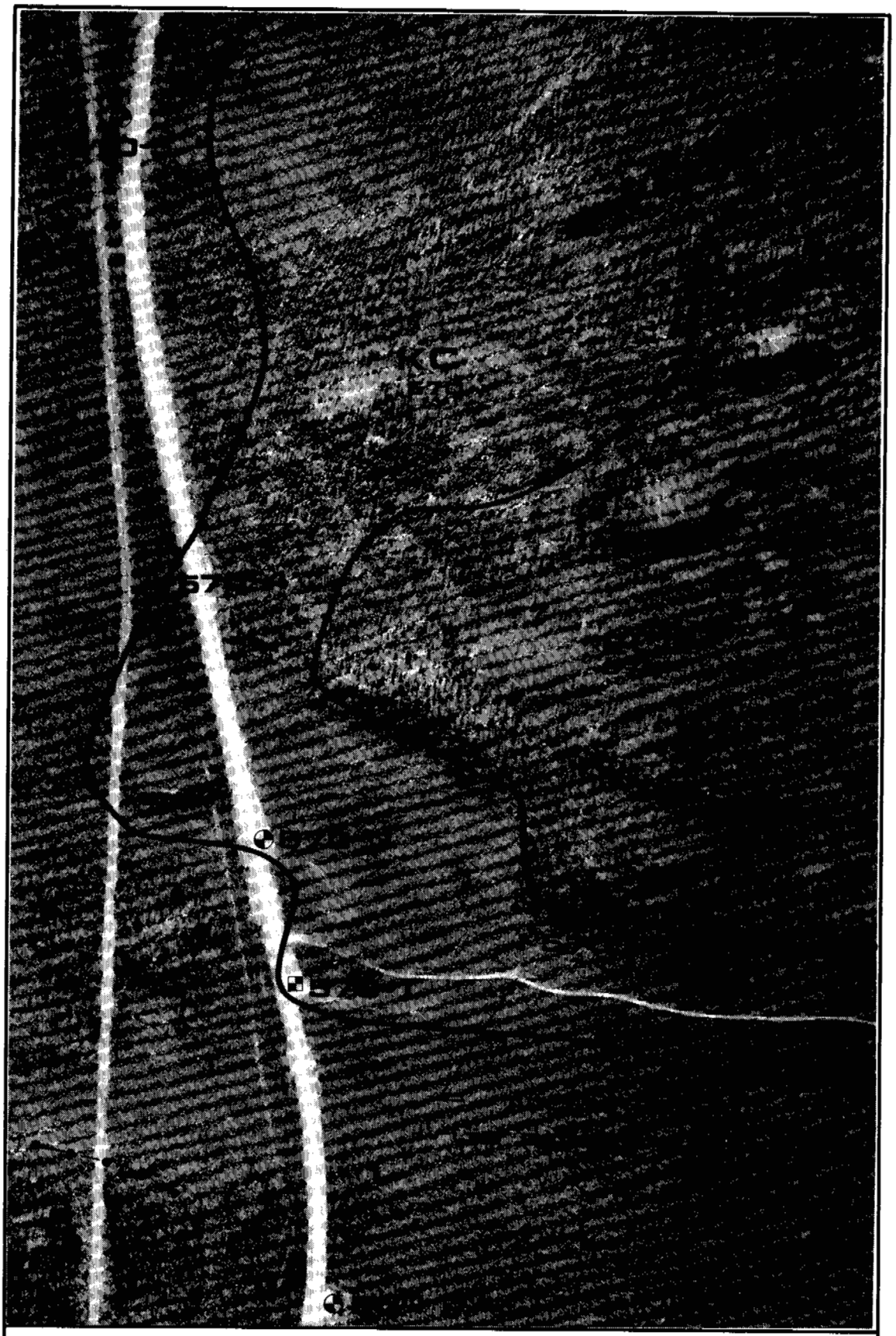
The uniformity of such a large deposit is difficult to judge. On the basis of the three samples obtained here, however, grain size and petrology characteristics do not appear to vary significantly, even in the inter-esker and inter-kame areas.

Using an average thickness of gravel and sand of 3 m, and an effective recovery rate of 30% of the area shown enclosed on the east side of the highway on the airphoto mosaics (west of the highway is within the National Park), it is estimated that at least 1 000 000 m^3 of borrow material would be available.

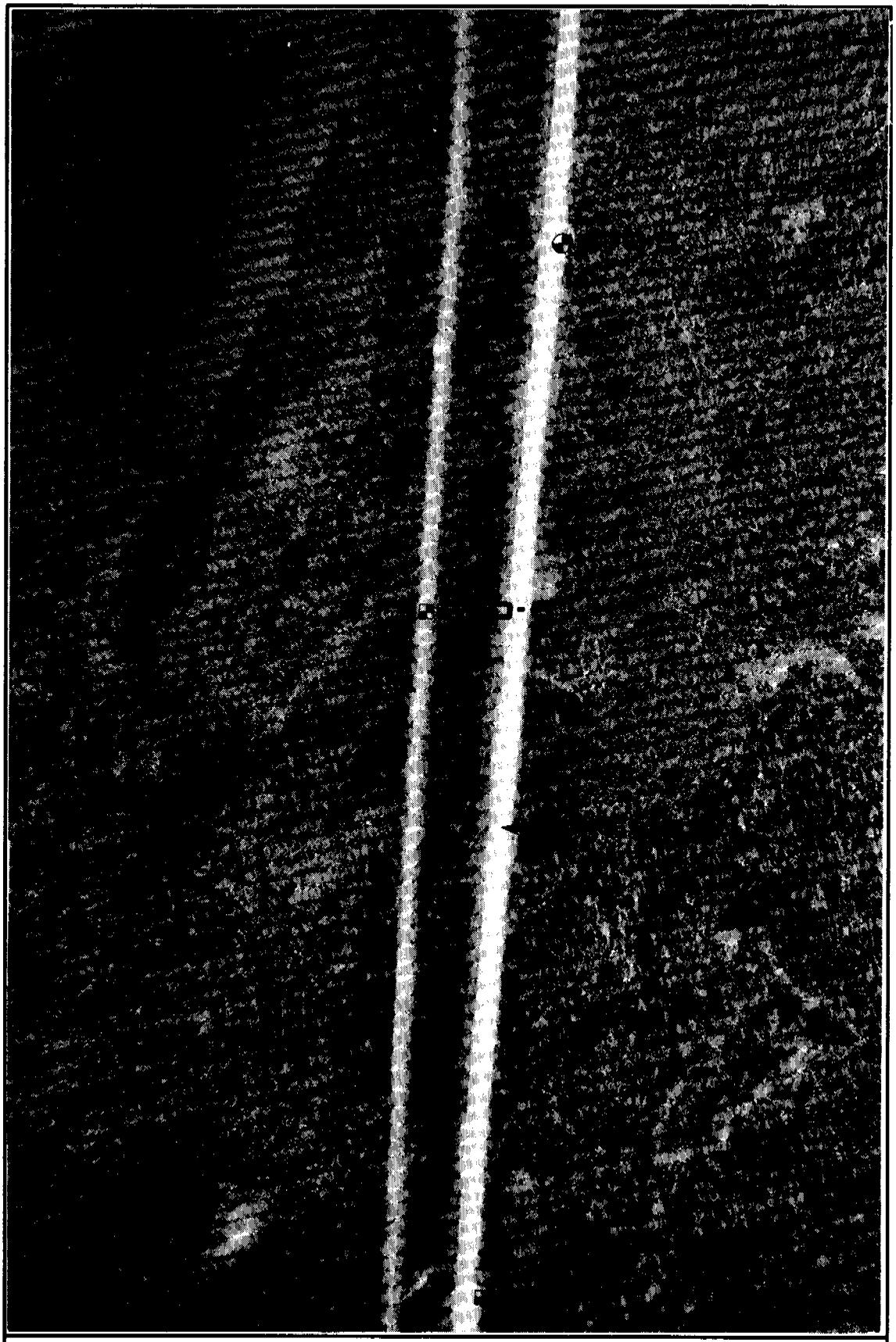
An existing access road to Rainbow Lake could be upgraded during pit development, and potential additional access routes at the north end could be constructed without much difficulty.

GENERAL RECOMMENDATIONS

Although the grain size distribution curves indicate that the material would be suitable for almost all purposes with some amount of crushing and blending, the presence of $CaCO_3$ coatings and deleterious substances reduces the value of this deposit as a source of concrete and asphalt aggregate. The deposit could, however, be used for base courses, sub-bases and general fill. Excavation could continue on a year-round basis.



Source Nos. 560 and 570 Airphoto No. A24052-112



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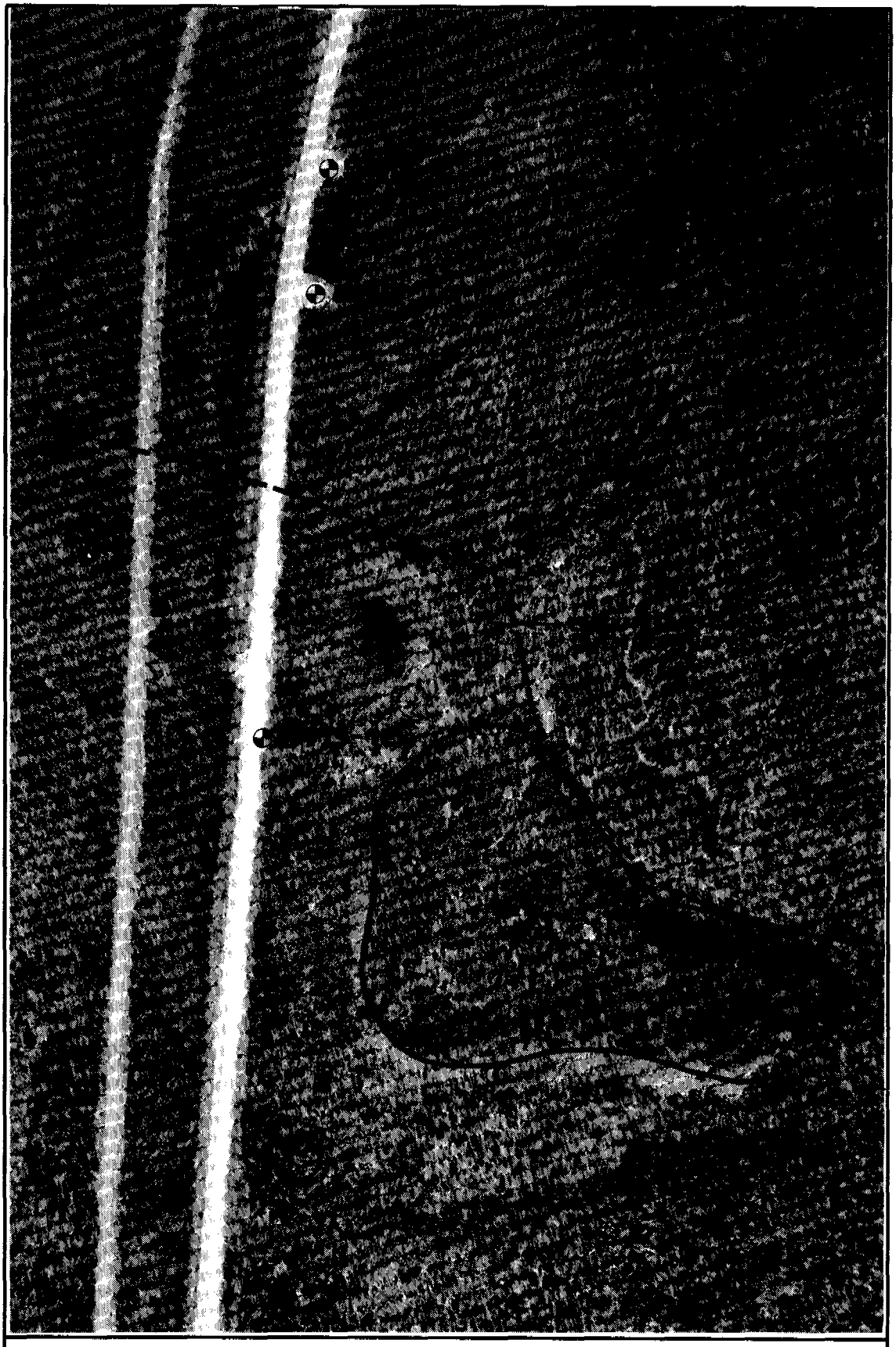


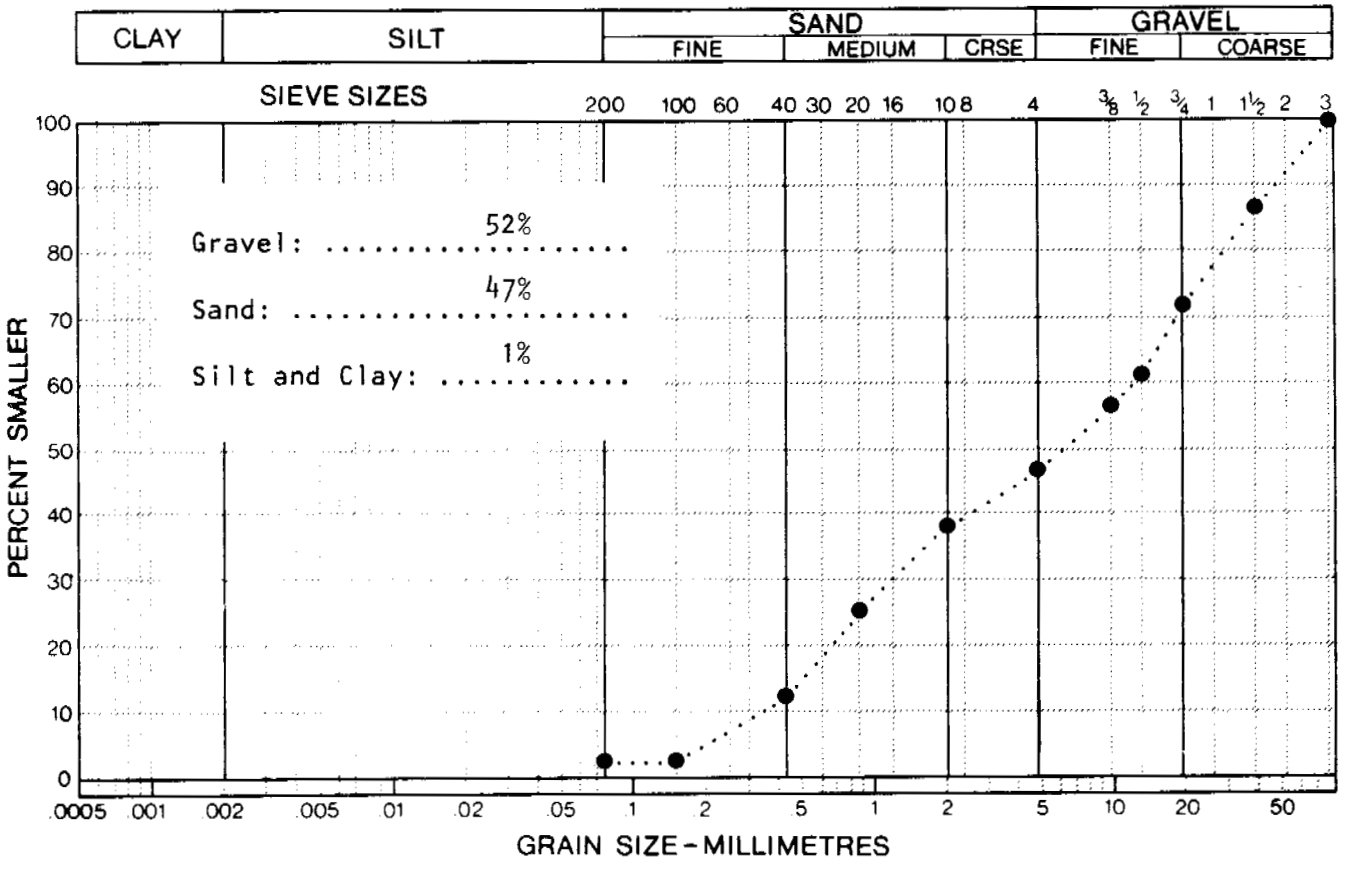
Source Nos. 570 and 580 Airphoto No. A24052-116

LABORATORY ANALYSIS

SOURCE NO. 570

PIT NO. 570-1

EXPOSURE: road cut



MATERIAL TYPE: gravel and sand

GENISIS (LANDFORM): kame complex

PETROGRAPHIC ANALYSIS:
quartzite 78%
slate 8%
sandstone 5%
diorite 5%
granite 3%
schist 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades and spheroids, subangular

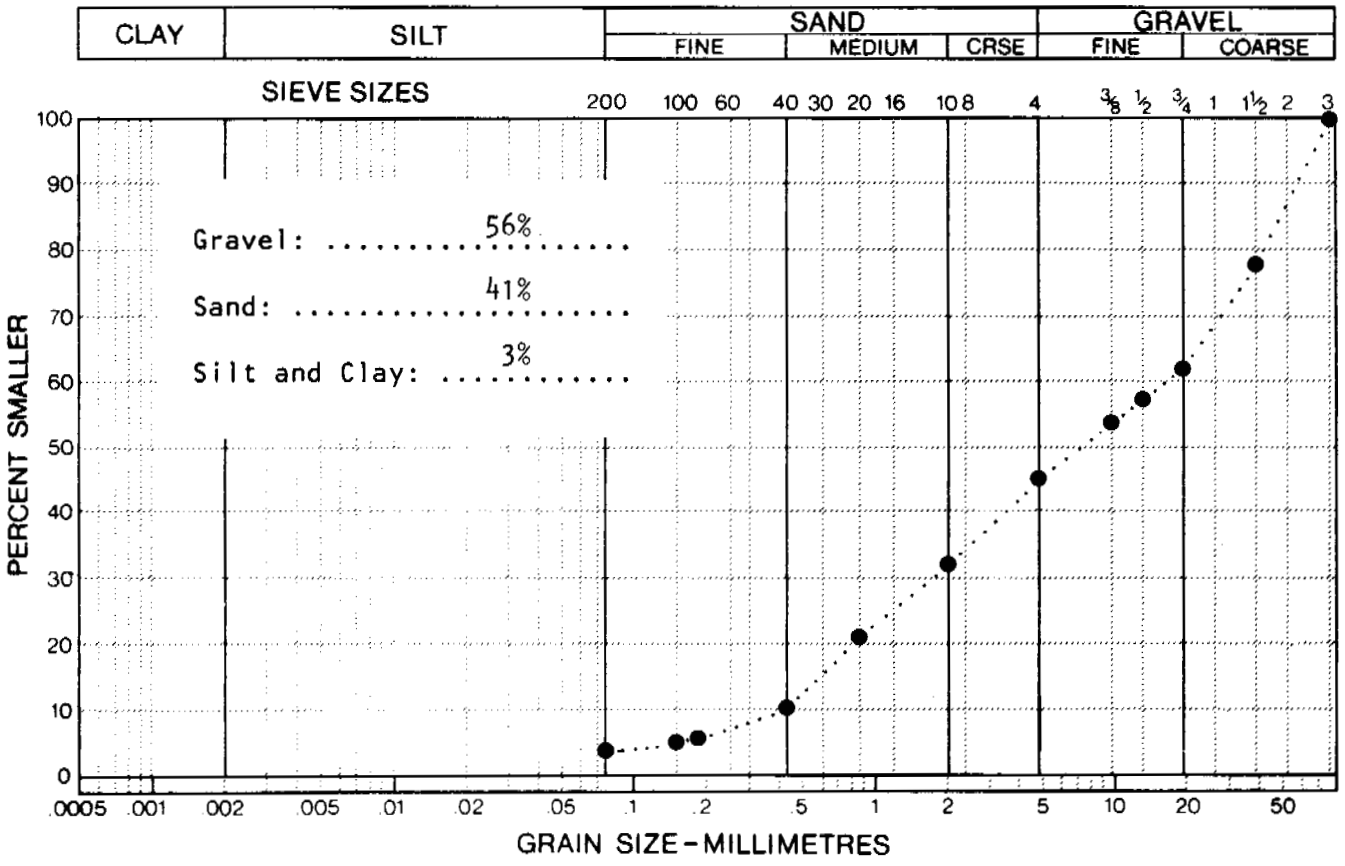
REMARKS: abundant calcareous coatings

LABORATORY ANALYSIS

SOURCE NO. 570

PIT NO. 570-7

EXPOSURE: road cut



MATERIAL TYPE: gravel and sand, trace of silt and cobbles

GENISIS (LANDFORM): kame deposit

PETROGRAPHIC ANALYSIS:

quartzite 42%
diorite 31%
granite 16%
slate 11%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades and spheroids, subangular

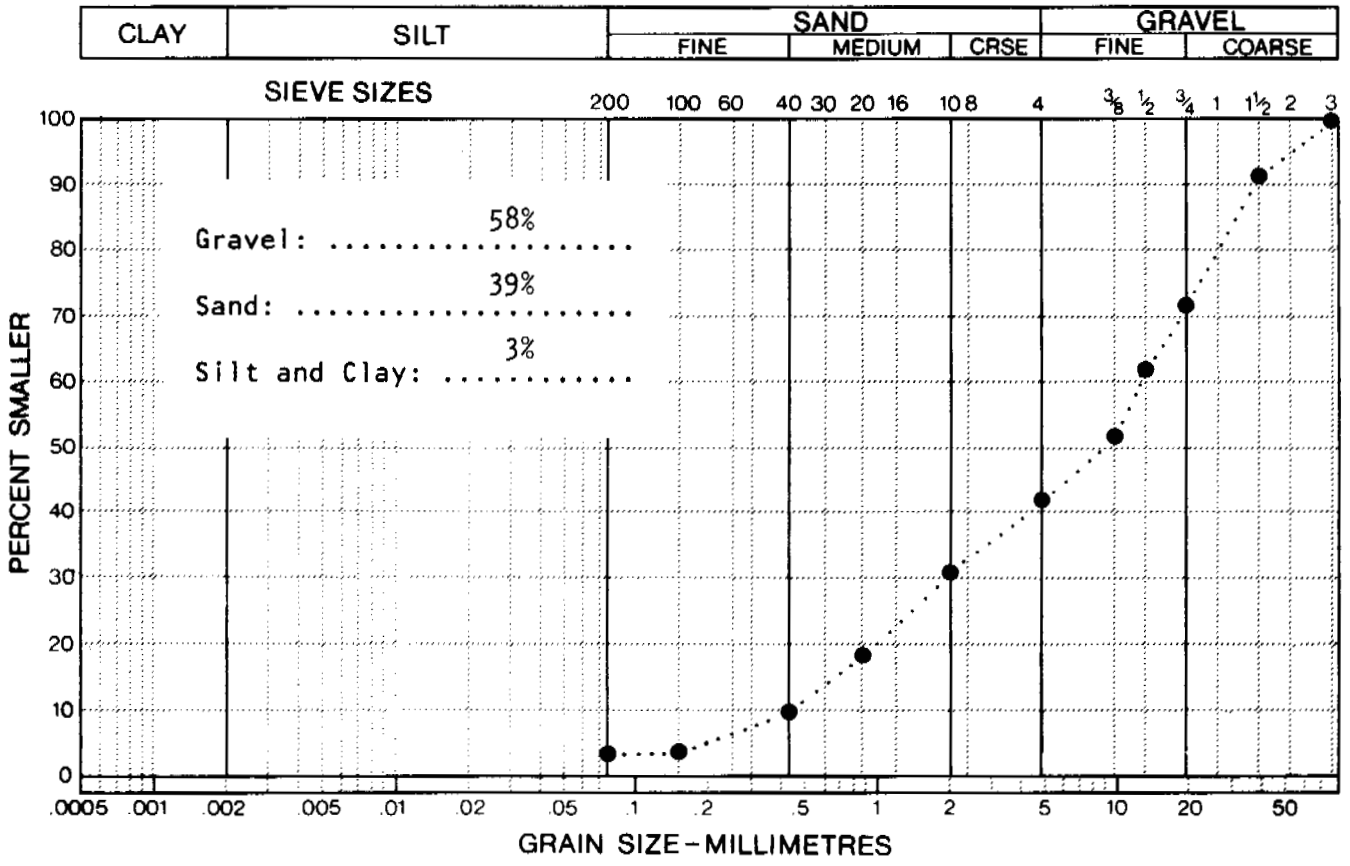
REMARKS: abundant calcareous coatings

LABORATORY ANALYSIS

SOURCE NO. 570

PIT NO. 570-8

EXPOSURE: hand excavated test pit on pipeline right-of-way



MATERIAL TYPE: gravel and sand, trace of silt and cobbles

GENISIS (LANDFORM): kame deposit

PETROGRAPHIC ANALYSIS:
quartzite 74%
slate 18%
diorite 7%
sandstone 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades and spheroids, subangular

REMARKS:

SOURCE NO. 570

PIT NO. 570-2

EXPOSURE: road cut

MATERIAL TYPE: sandy gravel

GENESIS (LANDFORM): EKC

REMARKS:

SOURCE NO. 570

PIT NO. 570-3

EXPOSURE: road cut

MATERIAL TYPE: sandy gravel

GENESIS (LANDFORM): EKC

REMARKS:

SOURCE NO. 570

PIT NO. 570-5

EXPOSURE: road cut

MATERIAL TYPE: medium sand

GENESIS (LANDFORM): EKC

REMARKS:

SOURCE NO. 570

PIT NO. 570-6

EXPOSURE: road cut

MATERIAL TYPE: sand and gravel

GENESIS (LANDFORM): EKC

REMARKS:

SOURCE NO. 570

PIT NO. 570-9

EXPOSURE: road cut

MATERIAL TYPE: sand and gravel, trace of cobbles

GENESIS (LANDFORM): EKC

REMARKS:

SOURCE NO. 570

PIT NO. 570-10

EXPOSURE: road cut

MATERIAL TYPE: sand and gravel

GENESIS (LANDFORM): EKC

REMARKS:

SOURCE: 570

LANDFORM AND LOCATION: BEACH AND ESKERS (WEST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	1
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	0
TERRESTRIAL FAUNA:	GENERAL HABITAT	1
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	NATIONAL PARK POTENTIAL VIEWPOINT OVER KATHLEEN LAKE	5
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	HEIGHT OF LAND SUITABLE FOR HIGHWAY VIEWPOINT	0

SOURCE: 570

LANDFORM AND LOCATION: BEACH AND ESKERS (WEST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	1
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	0
TERRESTRIAL FAUNA:	GENERAL HABITAT	1
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	INDUSTRIAL USE (ABANDONED PIPELINE) EXISTING BORROW SOURCE FOR NATIONAL PARK HUNTING AREA OUTFITTER/GUIDING AREA TRAPPING AREA	1
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

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DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	580
SAMPLE NOS.	580-3 580-4 580-6
LANDFORM AND LOCATION	broad IFP containing Quill Creek
MATERIAL	gravel and sand, some silty areas
ESTIMATED VOLUME	no estimate
AIRPHOTO NOS.	HIGH LEVEL A23792-207 LOW LEVEL A24052-117 A24052-168

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Immediately north of the large esker kame complex (Source No. 570) lies a broad inactive floodplain surrounding the torrential watercourse known as Quill Creek. The oldest margins of the floodplain which have long been abandoned, have been designated at Source No. 580. North of the creek the IFP envelopes a series of undifferentiated drift highs, and is generally swampy.

Biotic

Vegetation includes mature spruce and aspen up to 40 feet high, with an understory of sparse willow and kinnikinnick ground cover. No aquatic concerns are evident.

West of the highway this IFP is entirely within the National Park. East of the road, however, designated hunting and trapping areas are the only existing land uses.

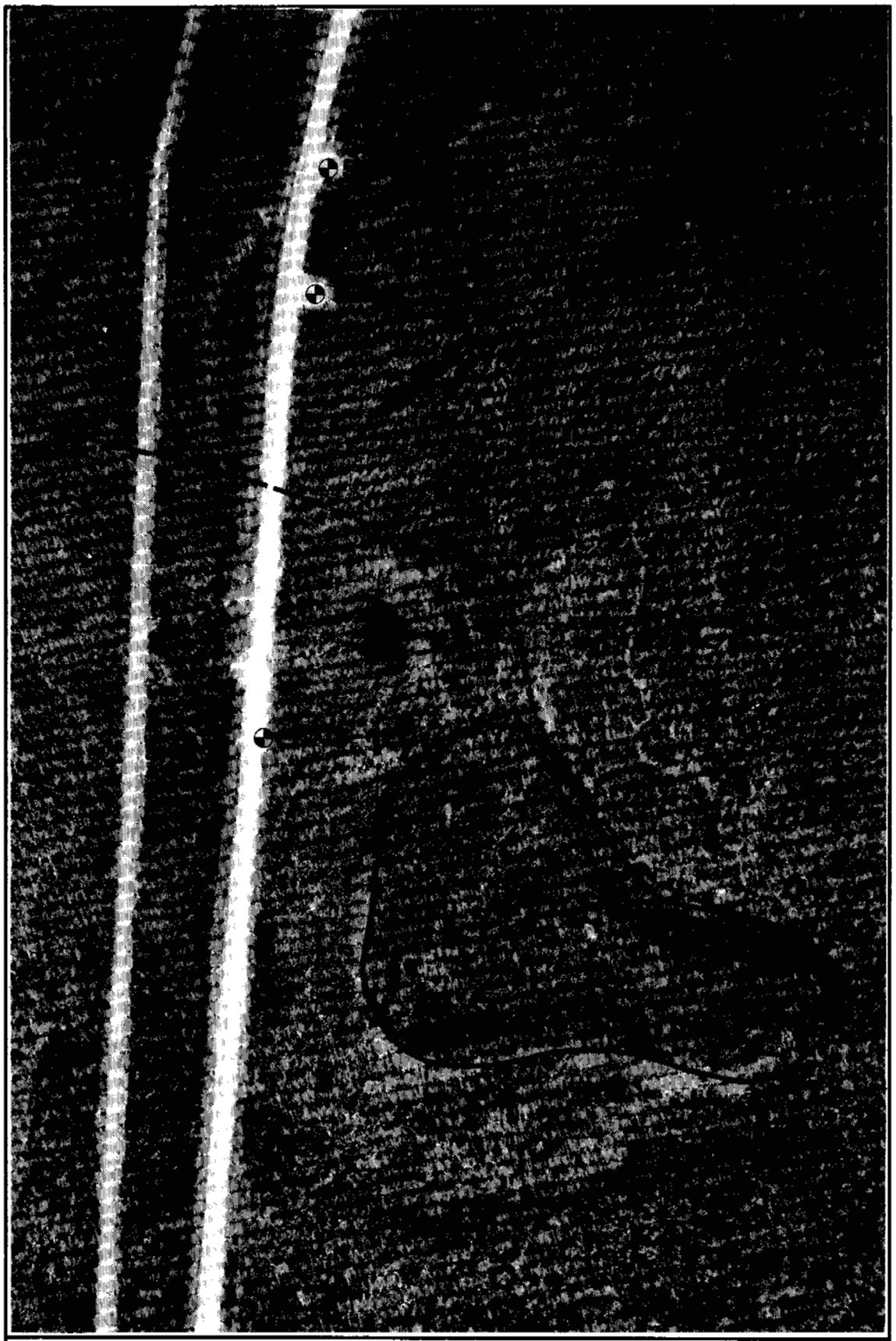
GRANULAR RESOURCES

Many of the pits dug in this deposit encountered only silts or silty gravels at the surface. Samples taken from 580-3 and 580-4, however, show that some areas within the IFP may be underlain by sand and gravel with only a trace of silt. Like the recent deposits associated with the present Quill Creek watercourse, the principal rock type is an argillaceous quartzite (98%). No deleterious minerals were apparent, although calcareous coatings and iron staining were encountered on some specimens.

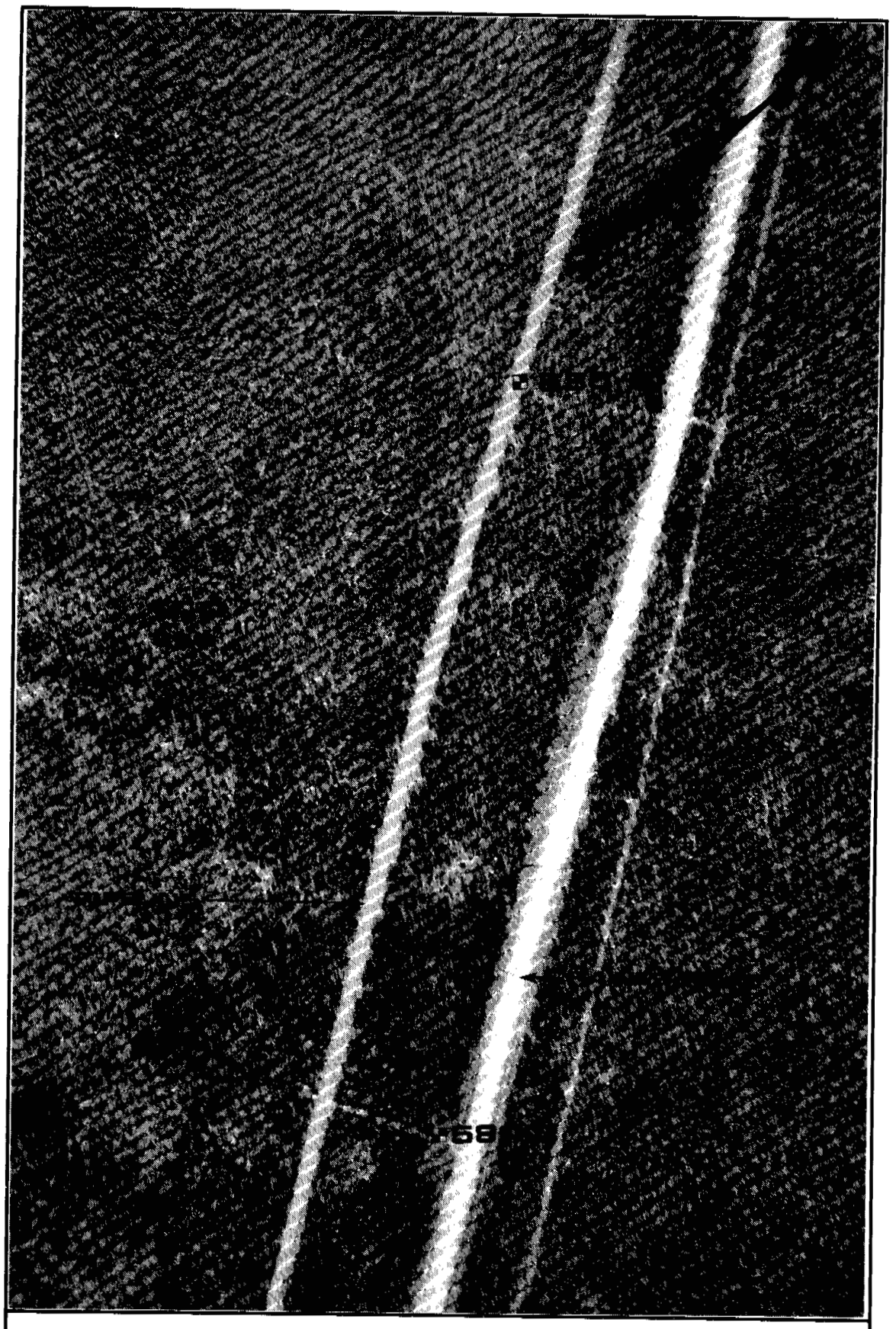
DEVELOPMENT

While much of the deposit is too silty to be useful for anything other than general fill, the granular material at 580-3 and 580-4 would be suitable for use as asphalt and concrete aggregates with some processing, and could be directly utilized as base or sub-base material.

Since only those areas east of the Haines Road and outside the park boundary could prently be developed, further exploration would have to be carried out to assess the nature and distribution of the potential aggregate material.

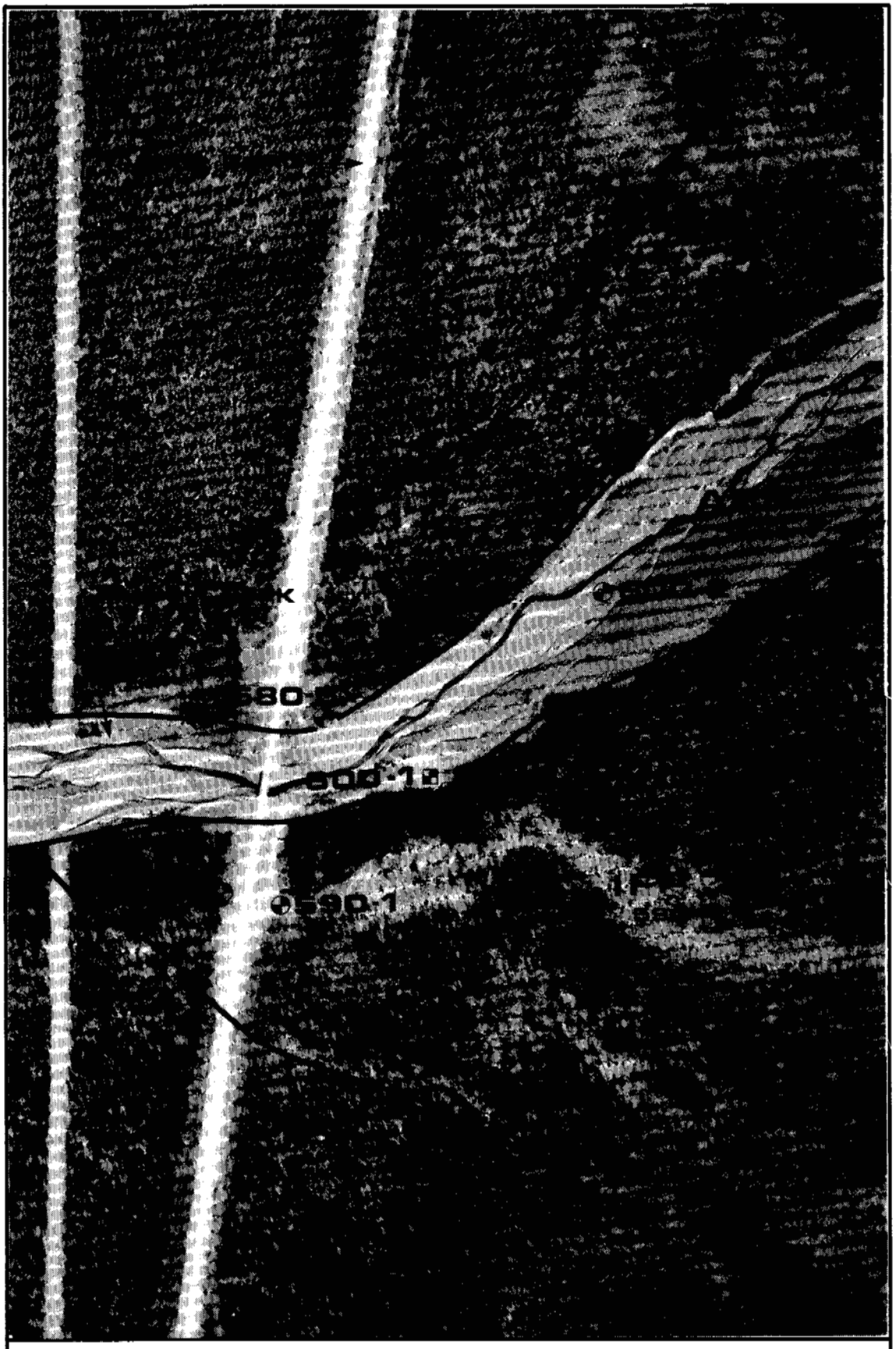


Source Nos. 570 and 580 Airphoto No. A24052-116

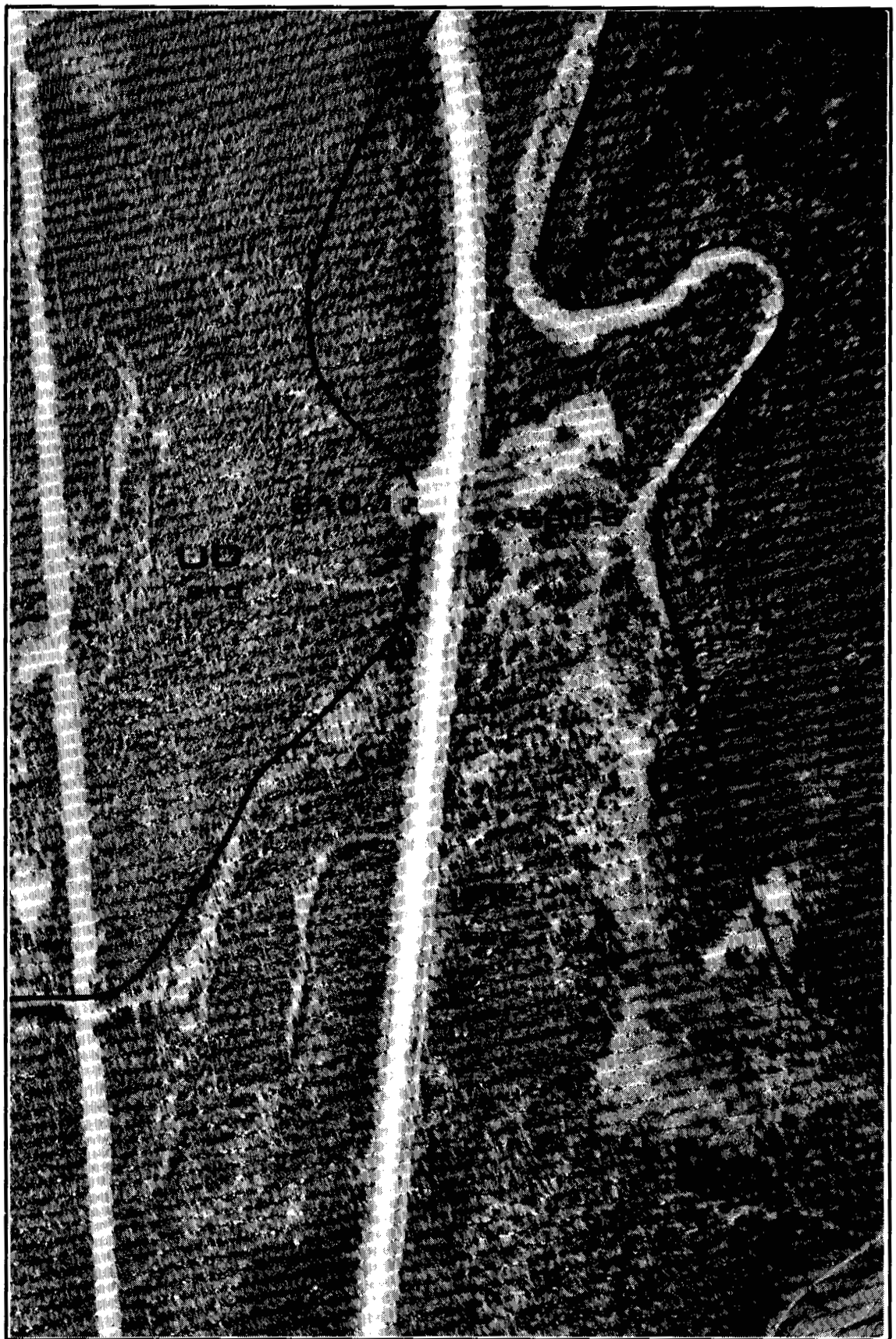


Source No. 580

Airphoto No. A24052-117



Source Nos. 580, 590 and 600 Airphoto No. A24052-171



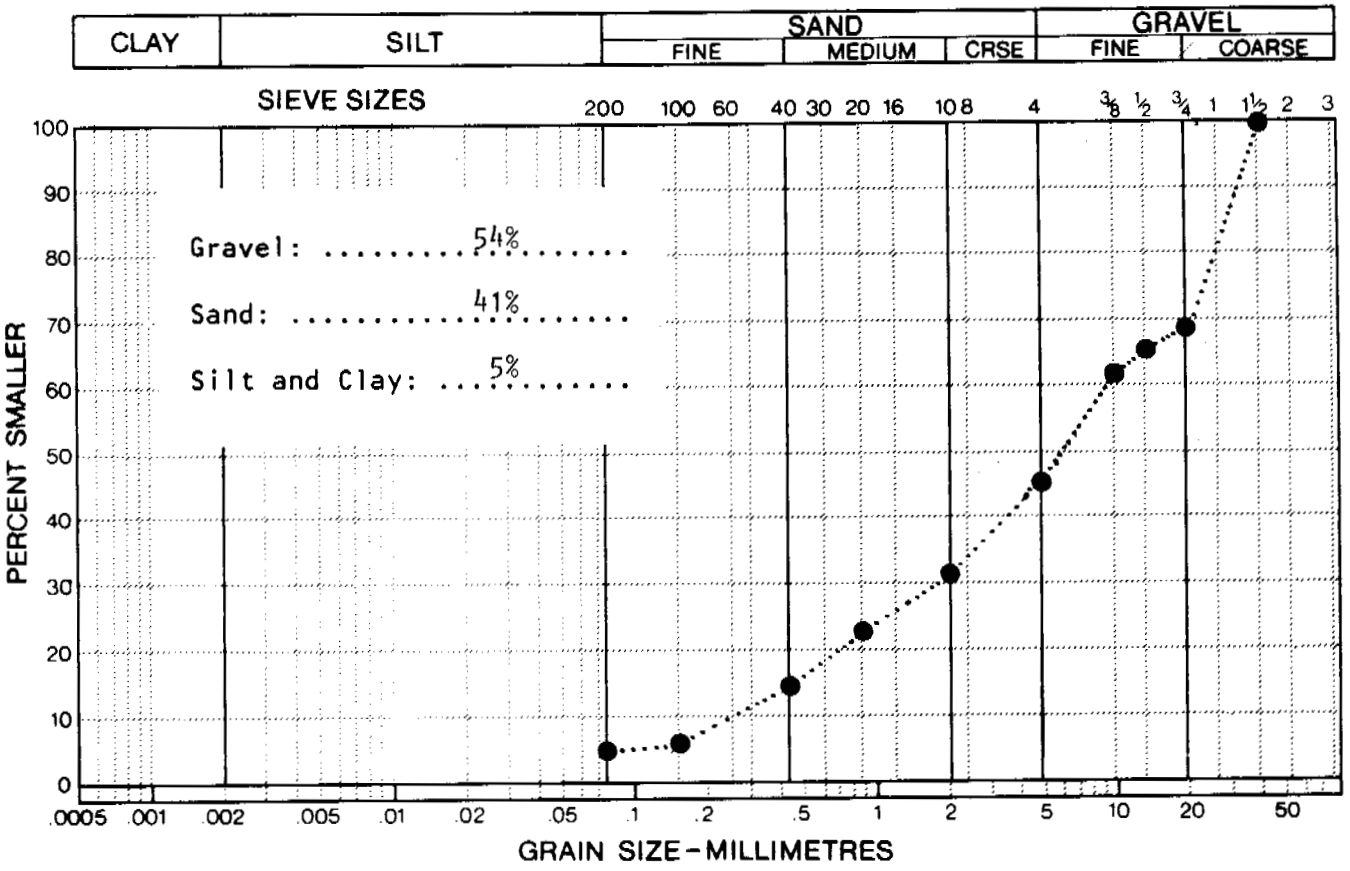
Source Nos. 580 and 610 Airphoto No. A24052-168

LABORATORY ANALYSIS

SOURCE NO. 580

PIT NO. 580-3

EXPOSURE: hand excavated test pit



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): inactive flood plain

PETROGRAPHIC ANALYSIS: quartzite 99%
granite 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subrounded

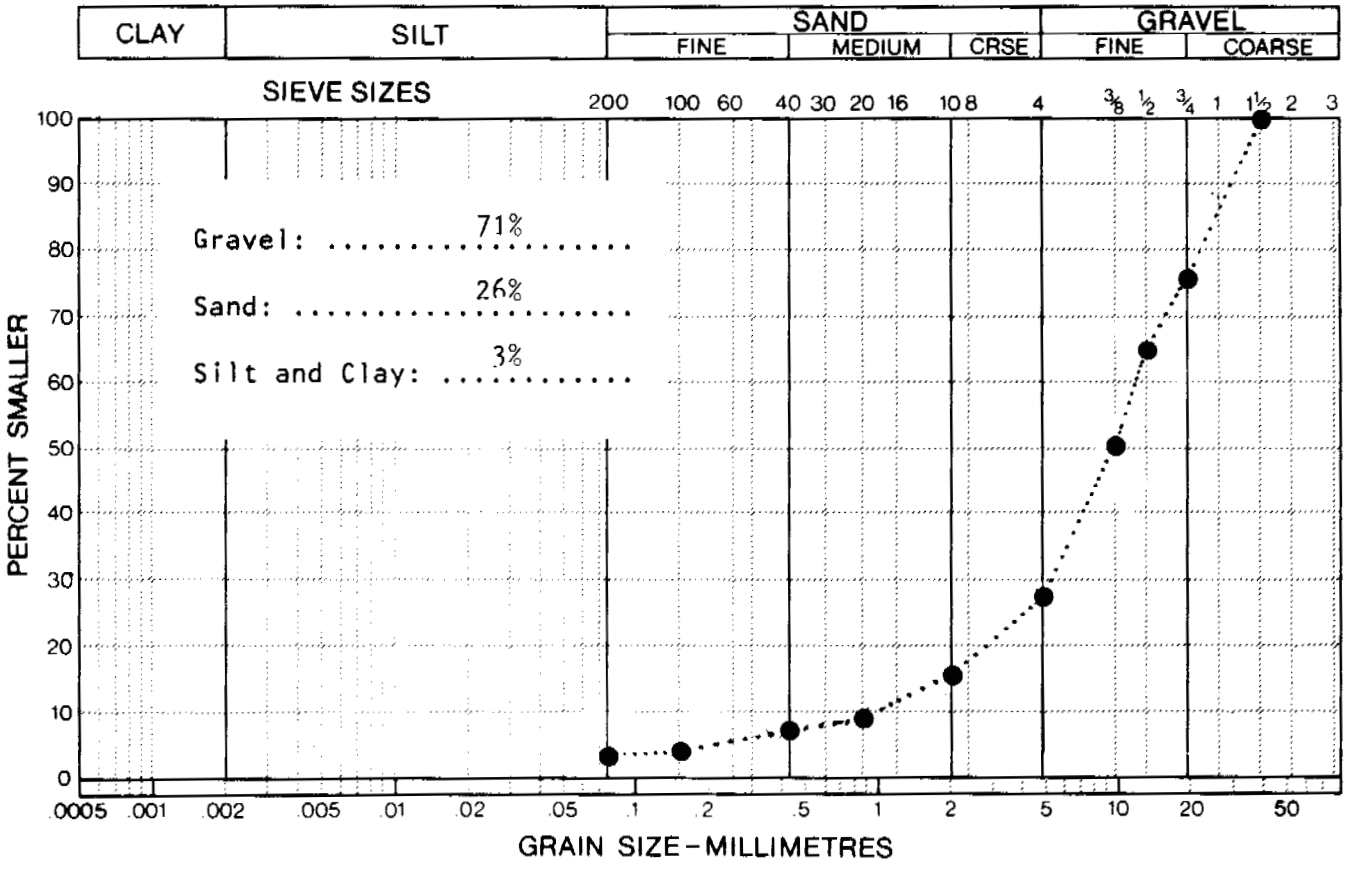
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 580

PIT NO. 580-4

EXPOSURE: hand excavated test pit



MATERIAL TYPE: sandy gravel, trace of silt

GENISIS (LANDFORM): inactive flood plain

PETROGRAPHIC ANALYSIS: quartzite 98%
granite 2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular to subrounded

REMARKS:

SOURCE NO. 580

PIT NO. 580-1

EXPOSURE: abandoned borrow area

MATERIAL TYPE: gravelly sand, some silt

GENESIS (LANDFORM): IFP

REMARKS:

SOURCE NO. 580

PIT NO. 580-2

EXPOSURE: abandoned borrow area

MATERIAL TYPE: gravelly sand, some sand

GENESIS (LANDFORM): IFP

REMARKS:

SOURCE NO. 580

PIT NO. 580-5

EXPOSURE: hand excavated test pit

MATERIAL TYPE: fine sand, some silt and gravel

GENESIS (LANDFORM): IFP

REMARKS:

SOURCE NO. 580

PIT NO. 580-6

EXPOSURE: hand excavated test pit

MATERIAL TYPE: fine uniform silty sand

GENESIS (LANDFORM): IFP

REMARKS:

SOURCE NO. 580

PIT NO. 580-7

EXPOSURE: hand excavated test pit

MATERIAL TYPE: sandy silt, trace of gravel

GENESIS (LANDFORM): IFP

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

SOURCE: 580

LANDFORM AND LOCATION: FLOODPLAIN DEPOSIT (EAST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	2
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	GENERAL HABITAT	2
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	HUNTING AREA OUTFITTER/GUIDING AREA TRAPPING AREA	1
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

SOURCE: 580

LANDFORM AND LOCATION: FLOODPLAIN DEPOSIT (WEST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	2
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	GENERAL HABITAT	2
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	NATIONAL PARK INDUSTRIAL USE (ABANDONED PIPELINE)	5
HERITAGE RESOURCE:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	590
SAMPLE NOS.	none taken
LANDFORM AND LOCATION	IFP immediately adjacent to south side of Quill Creek
MATERIAL	gravelly sand and silt
ESTIMATED VOLUME	250 000 m^3 to 750 000 m^3, with an additional 500 000 m^3 possible
AIRPHOTO NOS.	HIGH LEVEL A23742-210 LOW LEVEL A24052-171

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 590 consists of recent flood plain deposits of Quill Creek which presently lie outside the active watercourse. Located entirely along the south side of the creek, and east of the Haines Road, this deposit is composed of braided channels filled with sand and gravel, separated by stratified sand and silt outliers. At pit 590-1 the elevation of the ground surface is approximately 4 m to 5 m above Quill Creek. Drainage is excellent along the abandoned channels, represented by the light toned areas on the airphotographs but poorer in the silty areas (dark on the airphoto). Source No. 590 is identical in origin to Source No. 580, but represents a generally more recent, higher energy stage of stream development.

Biotic

Vegetation consists of an open stand of mature spruce and aspen. The spruce have attained heights to 14 m with dbh to 0.3 m. The understory is very sparse willow and the ground cover is kinnikinnick. Conditions at this site have produced better timber stands than on any other site examined.

Little browse sign was observed. The mature spruce stand has a low value for wildlife habitat.

Quill Creek bordering the site may support grayling in its lower reaches, but there are no existing land uses other than the designated hunting and trapping areas.

GRANULAR RESOURCES

It appears from 590-1 that sandy gravel with some cobbles and boulders constitute most of the material within the inactive stream channels. Although no laboratory analyses were undertaken, field assessment indicates that this portion of the deposit has grain size and petrographic characteristics identical to that for Source No. 660.

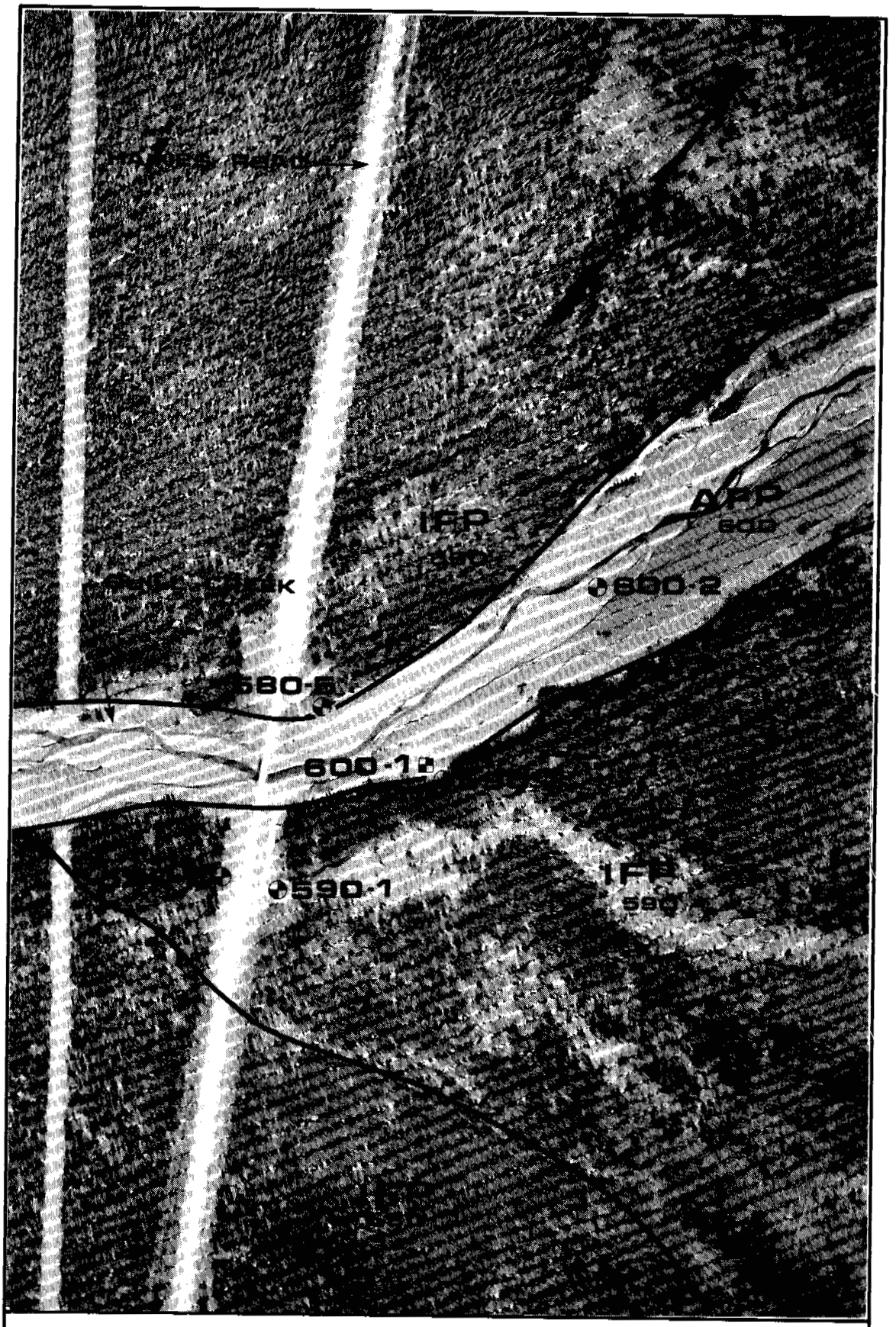
Overburden cover is very thin to absent where the substrata are coarse grained, but up to 0.5 m of organic silt may be found at the surface where well stratified silts and sands predominate.

It is estimated that from 10% to 20% of Source No. 590 may be coarse granular material suitable for development. This would probably amount to between 250 000 m^3 and 750 000 m^3 of sand and gravel within the study corridor, depending on the average depth of recovery.

Another possible 500 000 m^3 might be available if development is continued up to 3 km from the highway.

DEVELOPMENT

The source appears to be one of the more important encountered during the present study. If further tests on the quality of the aggregate confirm its suitability, this site could offer excellent potential. Unlike Source No. 600, borrow operations here could be easily hidden from highway view. In addition, some of the generally silty areas which separate former channels may contain enough clean sand to permit blending operations to be carried out at this location. Since the average elevation of this deposit is at least 5 m above the AFP of Quill Creek, development will not likely be hampered by spring flooding. Environmental factors are not judged to be limiting to development.



Source Nos. 580, 590 and 600 Airphoto No. A24052-171

SOURCE NO. 590

PIT NO. 590-1

EXPOSURE: abandoned borrow area

MATERIAL TYPE: sandy gravel, some cobbles and boulders

GENESIS (LANDFORM): IFP

REMARKS:

SOURCE NO. 590

PIT NO. 590-2

EXPOSURE: hand excavated test pit

MATERIAL TYPE: sandy gravel, some cobbles and boulders

GENESIS (LANDFORM): IFP

REMARKS:

SOURCE: 590

LANDFORM AND LOCATION: FLOODPLAIN DEPOSIT

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	0
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	3
TERRESTRIAL FAUNA:	GENERAL HABITAT	1
AQUATIC FAUNA:	GRAYLING IN QUILL CREEK BORDERING SITE	1
SURFACE WATER:	POTENTIAL FOR SILTATION AND ALTERATION OF EXISTING DRAINAGE PATTERNS	2
LAND STATUS AND USE:	HUNTING AREA OUTFITTER/GUIDING AREA TRAPPING AREA	1
HISTORIC RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	600
SAMPLE NOS.	600-1
LANDFORM AND LOCATION	AFP - Quill Creek
MATERIAL	gravel and sand, trace of silt
ESTIMATED VOLUME	120 000 m^3 to 300 000 m^3 depending on extent of development
AIRPHOTO NOS.	HIGH LEVEL A23792-210 LOW LEVEL A24052-171

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 660 is the broad bouldery floodplain of Quill Creek, a tributary of the Kathleen River (Dezadeash-Alsek System) whose active channel crosses the Haines Road at approximate kilometre post HR242.

Abandoned channels within the torrential watercourse form a series of coarse granular terraces approximately 150 m wide near the highway, and more than 300 m wide downstream.

Biotic

Vegetation is absent on the lower terraces, but some young spruce exist on the uppermost level. The active flood plain would not support terrestrial fauna, but may support grayling in its lower reaches west of the highway. Quill Creek is within the National Park, and therefore,

has some potential as a hiking route. East of the highway there are no existing uses except the designated hunting and trapping areas.

GRANULAR RESOURCES

More than 99% of the sample 600-1 consisted of either quartzite or greywacke particles. The quartzite was usually in the form of a recrystallized very fine grained, black coloured quartz sandstone with considerable impurities, whereas the greywacke was commonly a recrystallized, poorly sorted, medium to fine grained "salt and pepper" sandstone. Approximately 1% of the sample consisted of a black, fissile siltstone with light weathering. Grain size analyses indicate that most of the sample obtained was gravel (63%) and sand (33%), with less than 4% smaller than #200 sieve. Approximately 50% of the grains showed some sign of calcium carbonate coating. Cobbles and boulders of apparently similar mineralogy were also observed in the field, but none were sampled.

No overburden of any type is present near the active stream channel, or on the adjacent terraces of the AFP. The deposit appears to be remarkably uniform, both across its width and downstream.

On the assumption that no mining would take place within 400 m of the Haines Road bridge, and that an average of 100 m^2 of channel cross-sectional area could be developed without serious disruption of the water course, it is estimated that approximately 120 000 m^3 of gravel and sand could be removed from within the study area.

Since access along the AFP margin is already excellent, it is feasible that this deposit may be mined a greater distance from the highway. Thus if development proceeds downstream for a distance of 3.2 km, instead of the original 1.6 km, the recoverable resources would easily increase to more than 300 000 m^3.

Sulphate soundness tests performed on sample 600-1 produced only at 3.1% loss on the fine fraction and 0.7% loss on the coarse fraction during 5 cycles. This is well within the acceptable limits outlined in the Shakwak Project Specifications.

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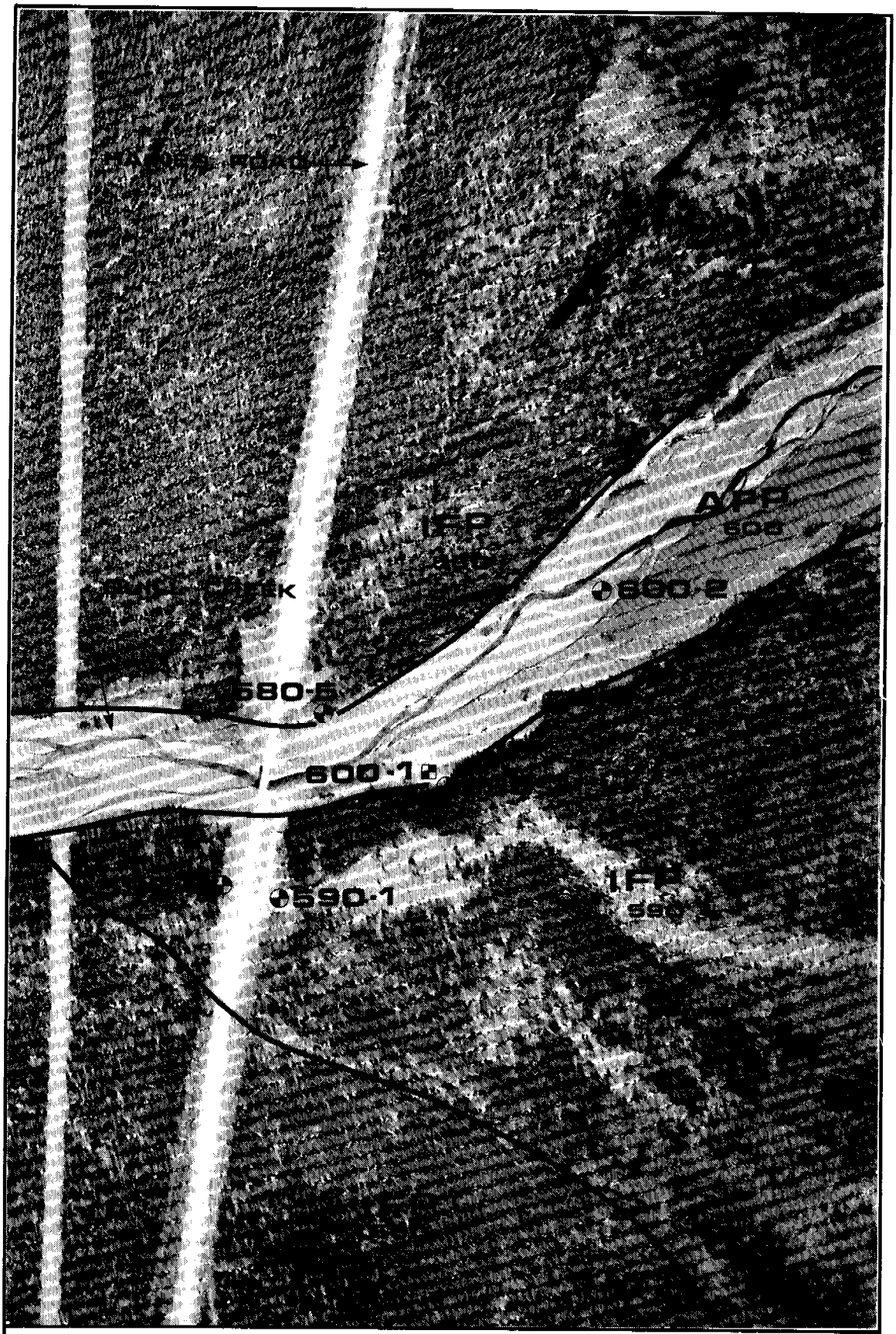
DEVELOPMENT

The grain size curve for sample 600-1 suggests that the material could be used directly for the production of base and sub-base courses with minimal screening of the cobbles and boulders. Some washing may be necessary for the manufacture of concrete aggregate, and asphalt production would also necessitate some additional blending with sand. While deleterious rock types do not appear to be a problem at this site, the significance of the calcium carbonate coatings may require further assessment before concrete or asphalt manufacture is undertaken.

Torrential spring flooding within the AFP would require careful pit design to ensure that erosion and concomitant downstream siltation are avoided during development.

In spite of potential siltation downstream and alteration of the existing stream bed development of this site is recommended.



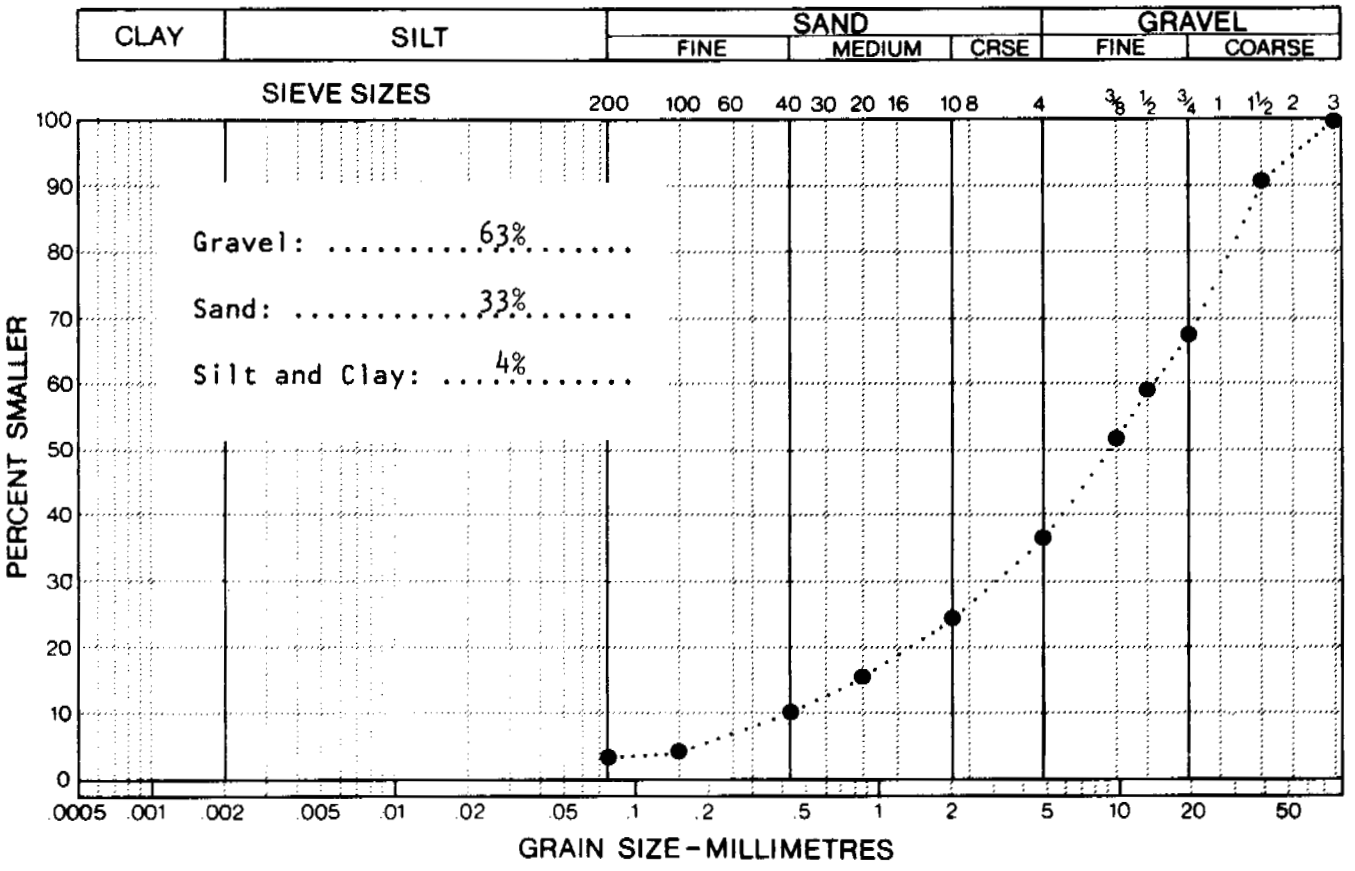
Source Nos. 580, 590 and 600 Airphoto No. A24052-171

LABORATORY ANALYSIS

SOURCE NO. 600

PIT NO. 600-1

EXPOSURE: test pit on AFP terrace



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): active flood plain, Quill Creek

PETROGRAPHIC ANALYSIS: quartzite 99%
siltstone 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS: abundant clacareous coatings
sulphate soundness loss (5 cycles) coarse 0.7%, fine 3.1%

SOURCE NO. 600

PIT NO. 600-2

EXPOSURE: hand excavated test pit

MATERIAL TYPE: sand and gravel

GENESIS (LANDFORM): AFP

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

SOURCE: 600

LANDFORM AND LOCATION: ACTIVE FLOODPLAIN, QUILL CREEK (EAST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	0
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	0
TERRESTRIAL FAUNA:	NO INVOLVEMENT	0
AQUATIC FAUNA:	GRAYLING IN LOWER REACHES	1
SURFACE WATER:	POTENTIAL FOR SILTATION AND ALTERATION OF EXISTING DRAINAGE PATTERNS	4
LAND STATUS AND USE:	HUNTING OUTFITTER/GUIDING AREA TRAPPING AREA RECREATION POTENTIAL	1
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	EXTENSIVE BOULDERY STREAM BED	1

SOURCE: 600

LANDFORM AND LOCATION: ACTIVE FLOODPLAIN, QUILL CREEK (WEST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	0
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	0
TERRESTRIAL FAUNA:	NO INVOLVEMENT	0
AQUATIC FAUNA:	GRAYLING IN LOWER REACHES	1
SURFACE WATER:	POTENTIAL FOR SILTATION, ALTERATION OF EXISTING DRAINAGE PATTERNS	4
LAND STATUS AND USE:	NATIONAL PARK RECREATION POTENTIAL	5
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	EXTENSIVE BOULDERY STREAM BED	1

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	610
SAMPLE NOS.	610-1 610-8 610-10
LANDFORM AND LOCATION	UD extending from kilometre post HR243 to the Dezadeash River
MATERIAL	sand and gravel, trace of silt
ESTIMATED VOLUME	not estimated
AIRPHOTO NOS.	HIGH LEVEL A23793 LOW LEVEL A24052-131, -159 and -169

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 610 is an area between Quill Creek and the Dezadeash River that has been designated as undifferentiated drift. Inactive flood plains and beach deposits segment the source. The Haines Road, abandoned pipeline right-of-way and telephone line all traverse the source. Several large borrow pits have been developed along the road.

Biotic

Vegetation composed of mature spruce stands to 15 m with dbh to 0.3 m, interspersed with mature aspen. The ground cover is kinnikinnick in the more open areas and empetrum where the canopy is closed.

Browse sign was observed within the site. There are no fisheries concerns.

Recreation

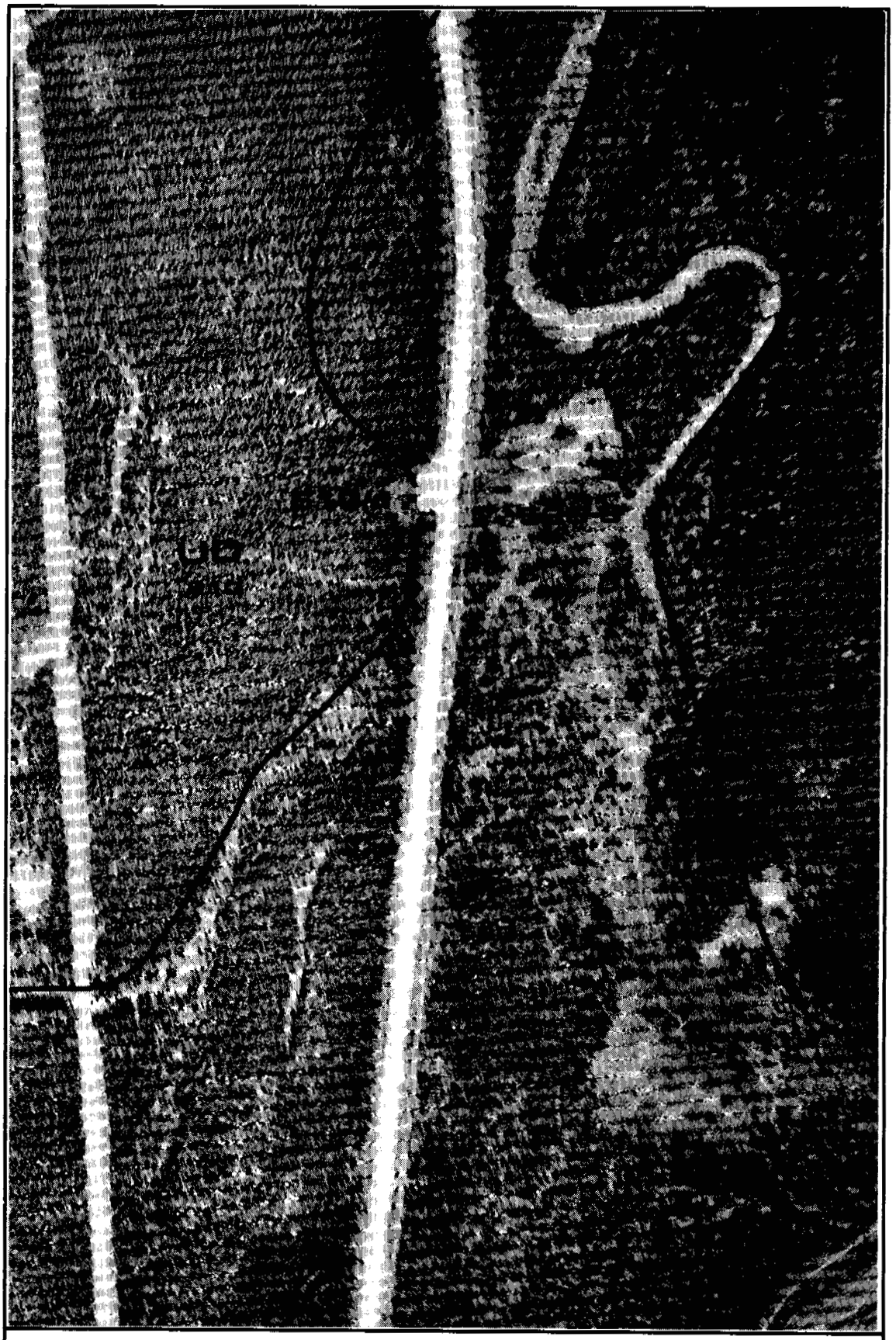
Portions of this site west of the highway are within Kluane National Park.

GRANULAR RESOURCES

Granular materials within Source No. 610 consist mainly of sand and gravel with traces of silt. Quartzite is the major rock type with sandstone and slate the main accessories. The locations sampled were mainly abandoned borrow areas, and hence may not necessarily be representative of the entire source. Many areas are expected to have a higher silt and fine sand content than that revealed in the sieve analyses.

DEVELOPMENT

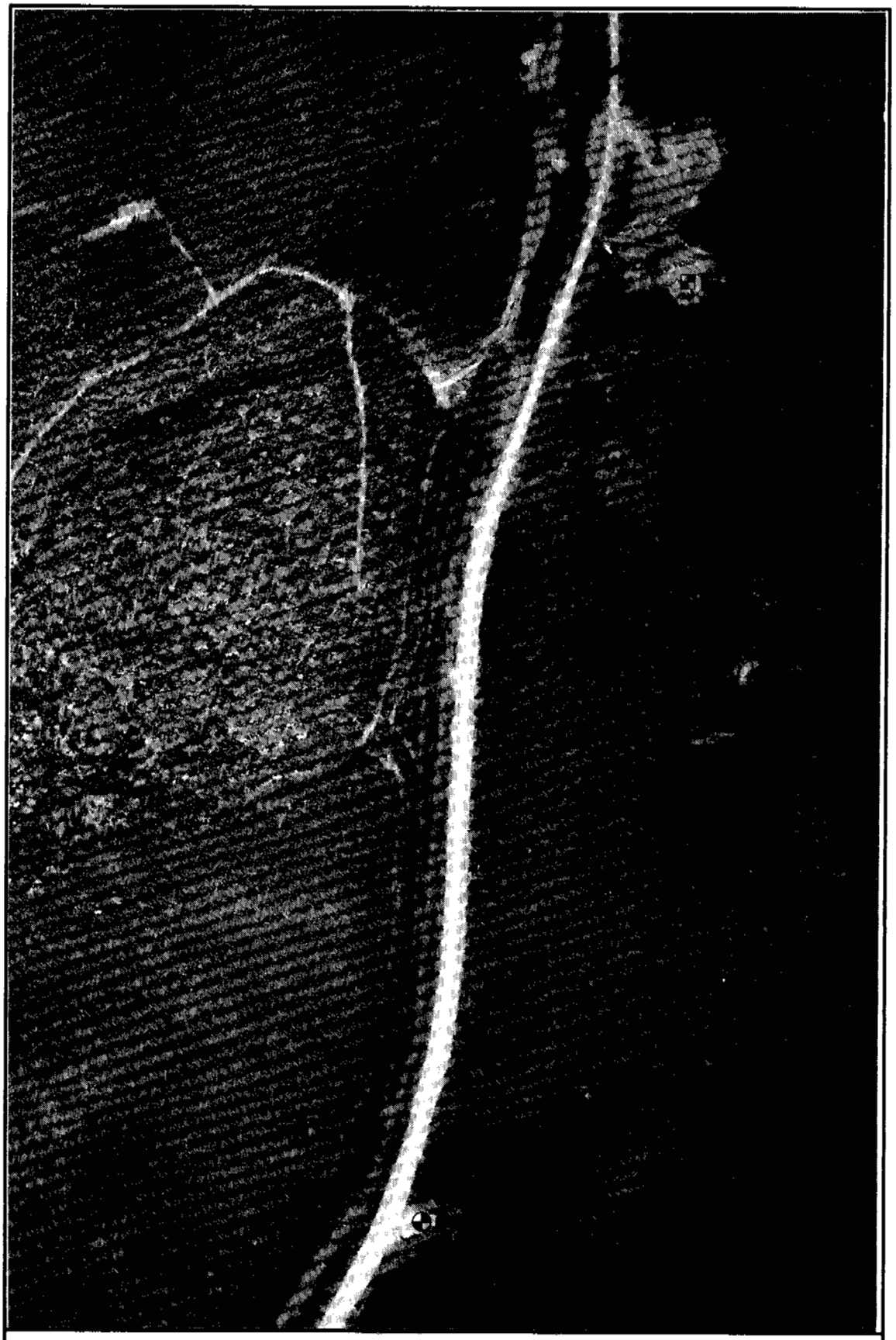
Base and sub-base course material can be produced from the abandoned pits at 610-1 and 610-8. The existing pit at 610-10, like most of the deposit, appears to be only acceptable as a source of general fill.



Source Nos. 580 and 610 Airphoto No. A24052-168

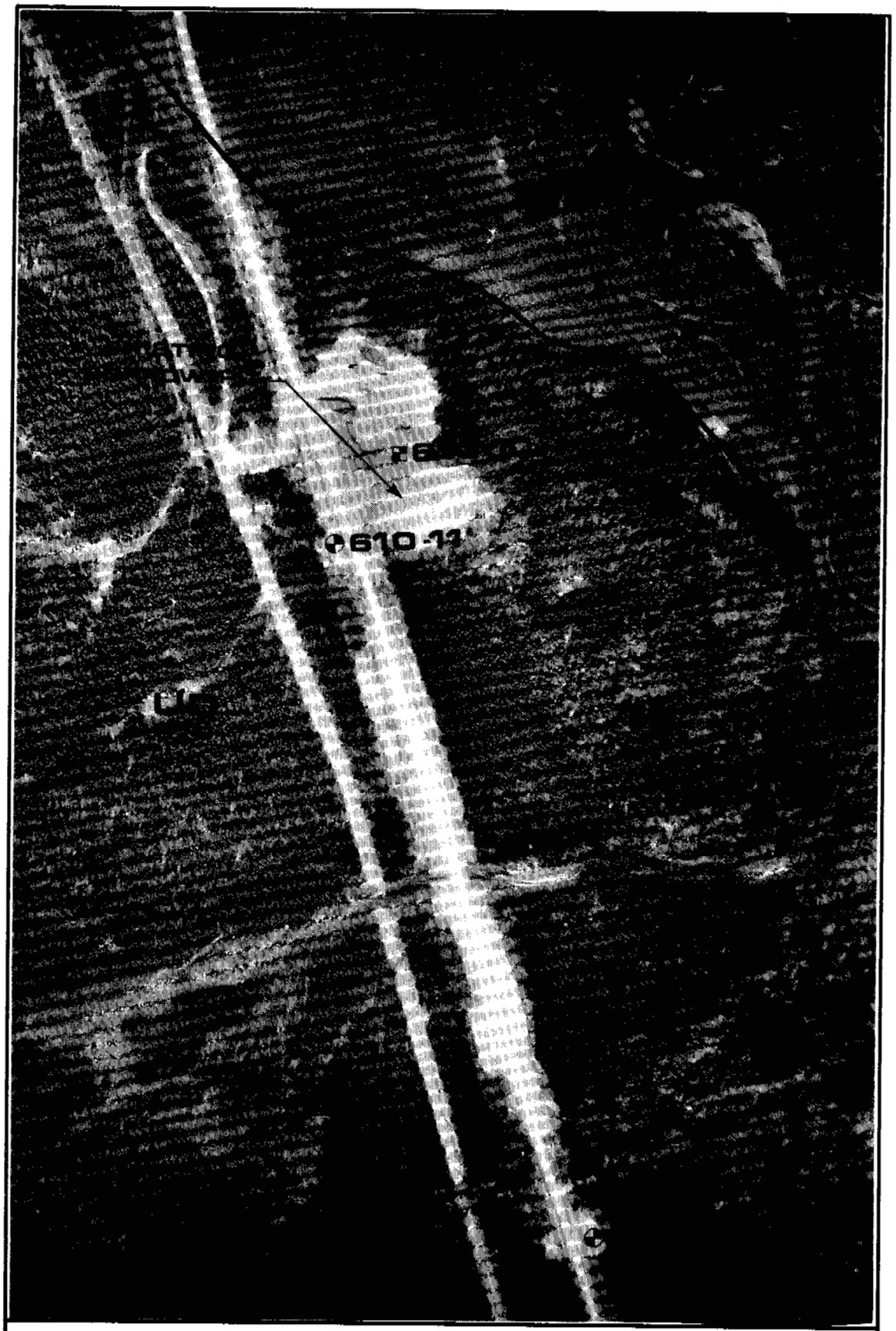
Source Nos. 610 and 620

Airphoto No. A24052-162



Source No. 610

Airphoto No. A24052-159



Source No. 610

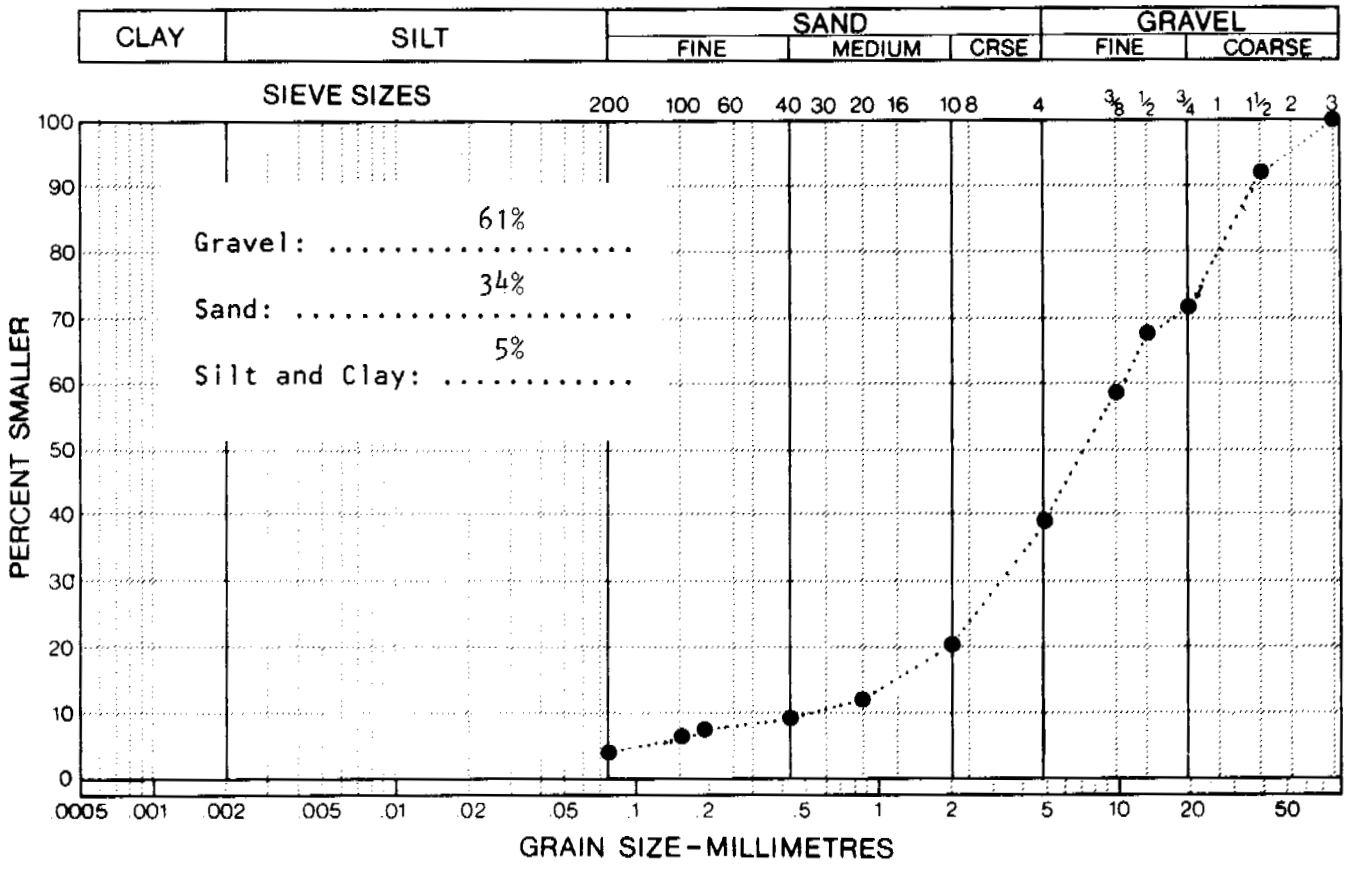
Airphoto No. A24052-131

LABORATORY ANALYSIS

SOURCE NO. 610

PIT NO. 610-1

EXPOSURE: abandoned borrow area



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS: quartzite 81%
slate 10%
sandstone 9%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular to subrounded

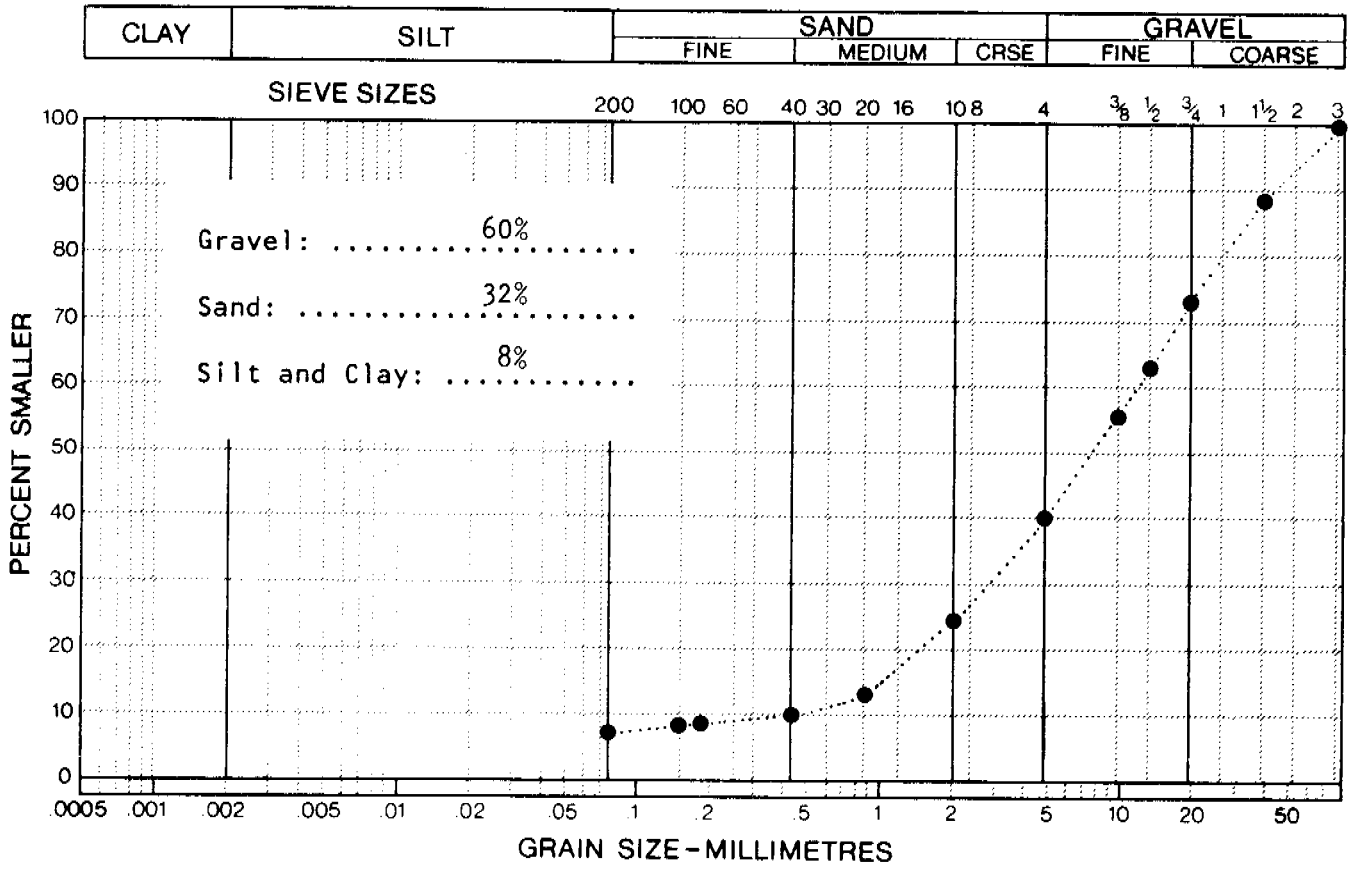
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 610

PIT NO. 610-8

EXPOSURE: abandoned borrow area



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS:

quartzite 70%
sandstone 16%
diorite 6%
schist 4%
slate 3%
rhyolite 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, angular

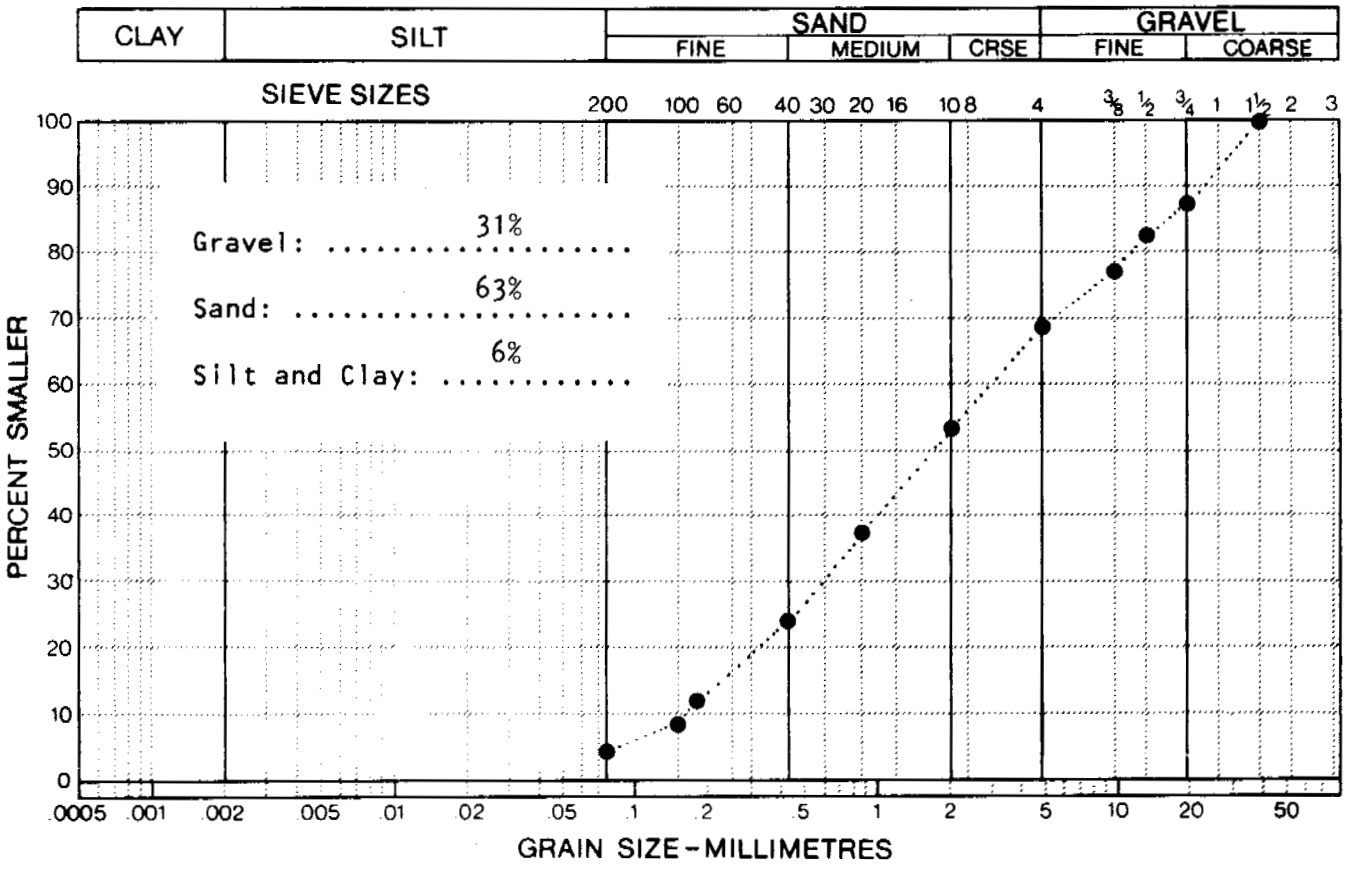
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 610

PIT NO. 610-10

EXPOSURE: borrow area



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS:
quartzite 66%
sandstone 24%
calcite 6%
slate 4%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS:

SOURCE NO. 610

PIT NO. 610-2

EXPOSURE: road cut

MATERIAL TYPE: gravelly silt

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 610

PIT NO. 610-3

EXPOSURE: hand excavated test pit

MATERIAL TYPE: gravelly silt

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 610

PIT NO. 610-4

EXPOSURE: hand excavated test pit

MATERIAL TYPE: gravelly silt

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 610

PIT NO. 610-5

EXPOSURE: abandoned borrow area

MATERIAL TYPE: gravelly silt

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 610

PIT NO. 610-6

EXPOSURE: abandoned borrow area

MATERIAL TYPE: silty sandy gravel

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 610

PIT NO. 610-7

EXPOSURE: abandoned borrow area

MATERIAL TYPE: gravelly silt, trace of sand

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 610

PIT NO. 610-9

EXPOSURE: road cut

MATERIAL TYPE: clayey silt

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 610

PIT NO. 610-11

EXPOSURE: road cut

MATERIAL TYPE: gravelly silt, trace of sand

GENESIS (LANDFORM): UD

REMARKS:

SOURCE: 610

LANDFORM AND LOCATION: UNDIFFERENTIATED KNOB

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	2
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	2
TERRESTRIAL FAUNA:	GENERAL HABITAT	1
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	HUNTING AREA OUTFITTER/GUIDING AREA TRAPPING AREA	1
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	620
SAMPLE NOS.	none taken
LANDFORM AND LOCATION	BD on the southern slope of the Dezadeash River valley crossing the Haines Road in the vicinity of kilometre post HR250
MATERIAL	sand, trace of gravel
ESTIMATED VOLUME	not estimated
AIRPHOTO NOS.	HIGH LEVEL A23793-74 LOW LEVEL A24052-162

COMMENTS

Source No. 620 consists of a number of short, segmented, low relief beach deposits which once marked the shoreline of Glacial Lake Champagne. Where examined, these deposits contain fine to medium sand with a trace of gravel. Although limited in extent, these beaches may warrant further investigation as a possible source of mortar sand for use by the community of Haines Junction.

Source Nos. 610 and 620 Airphoto No. A24052-162

SOURCE NO. 620

PIT NO. 620-1

EXPOSURE: abandoned borrow area

MATERIAL TYPE: fine to medium sand, trace of gravel

GENESIS (LANDFORM): BD

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	630
SAMPLE NOS.	not sampled
LANDFORM AND LOCATION	AC along Dezadeash River near Haines Junction
MATERIAL	gravel and sand, trace of silt
ESTIMATED VOLUME	not calculated
AIRPHOTO NOS.	HIGH LEVEL A23793-94
	LOW LEVEL none available

COMMENTS

This small alluvial cone originates as a gully within Source No. 610. Material is expected to be a sand, with a trace of silt, similar to that sampled in the undifferentiated drift deposit. No development of this source is anticipated.

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO. 640

SAMPLE NOS. 640-2

LANDFORM AND LOCATION active flood plain of Dezadeash River near Haines Junction

MATERIAL gravel and sand, trace of silt

ESTIMATED VOLUME 1 000 000 m^3

AIRPHOTO NOS. HIGH LEVEL A23893-5

LOW LEVEL A24052-133

DETAILED ASSESSMENT

ENVORONMENT

Physical

The active flood plain of the Dezadeash River near Haines Junction, Y.T. has been designated as Source No. 640. Braided stream channels dissect this low-lying swampy area, which is approximately 600 m wide near the Haines Road, and has an average elevation 1.0 m above the autumn river level. A telephone line parallels the Haines Road, crossing the flood plain southwest of Haines Junction.

Biotic

Vegetation along the braided stream channel consists of alders to 6 m and some large willows, interspersed with sedge meadows. Browse sign, moose tracks and beaver cut were observed.

The Dezadeash River supports trout, grayling and whitefish. No salmon are present. The system formerly supported sockeye runs, but these were eliminated by the surging of Lowell Glacier across the Alsek River.

The western portion of the meander plain lies within Kluane National Park. The Haines Junction Local Improvement District borders the north side of Dezadeash River. Residential and industrial sites occupy raised terraces above the river. Hunting and trapping areas surround the Haines Junction LID and sports fishing is active along the river.

GRANULAR RESOURCES

Sand and gravel are present at the surface along inactive river braids, and beneath 0.2 to 1.0 m of organic, clayey silt in the swampy areas. Petrographic examination indicates that the sample is primarily quartzite (87%) with granite (4%), greenstone (2%) and siltstone (1%). Some soft sandstone (6%) is also present.

Volume calculations, both total and recoverable, are very difficult to make for this source, since no investigation of the depth of the sand and gravel was carried out. On the assumption that 25% of the total AFP within the study area could be effectively mined to yield 1.0 m^3 of gravel per 1.0 m^3 of area, then more than 1 000 000 m^3 of material would be available.

DEVELOPMENT

According to the grain size distribution curve obtained from sample 640-2, this material could be used without processing for both base and sub-base courses, but some crushing or screening would be necessary for asphalt and concrete aggregate

36-0260

Stripping and restoration procedures would be difficult, since much of the site is probably under water or ice for a significant period of the year.

Since all of the deposit west of the road lies within Kluane National Park and the section east of the Haines Road borders residential and industrial developments borrow operations cannot be recommended at this time.

Source No. 640

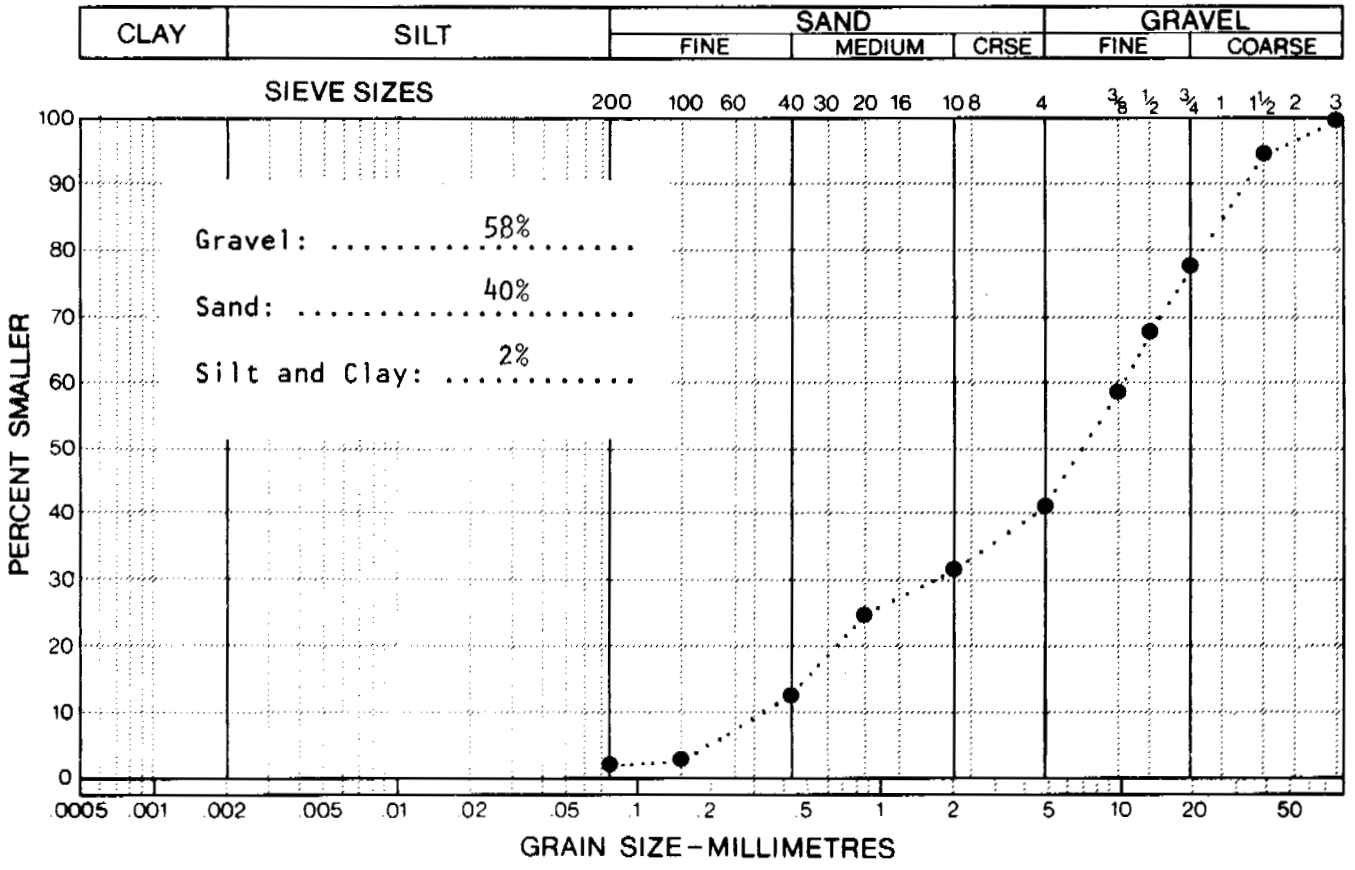
Airphoto No. A24052-133

LABORATORY ANALYSIS

SOURCE NO. 640

PIT NO. 640-2

EXPOSURE: hand excavated test pit



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): active flood plain

PETROGRAPHIC ANALYSIS:
quartzite 87%
soft sandstone 6%
granite 4%
greenstone 2%
siltstone 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS:

SOURCE NO. 640

PIT NO. 640-1

EXPOSURE: hand excavated test pit

MATERIAL TYPE: clayey silt

GENESIS (LANDFORM): AFP

REMARKS:

SOURCE NO. 640

PIT NO. 640-3

EXPOSURE: hand excavated test pit

MATERIAL TYPE: sand and gravel

GENESIS (LANDFORM): AFP

REMARKS:

SOURCE: 640

LANDFORM AND LOCATION: ACTIVE MEANDER PLAIN, DEZADEASH RIVER (EAST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	3
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	GENERAL HABITAT	1
AQUATIC FAUNA:	TROUT, GRAYLING AND CHAR IN DEZADEASH RIVER	3
SURFACE WATER:	POTENTIAL FOR SLUMPING, EROSION, SILTATION OR ALTERATION OF EXISTING DRAINAGE PATTERNS	3
LAND STATUS AND USE:	BORDERS HAINES JUNCTION LOCAL IMPROVEMENT DISTRICT RESIDENTIAL USE INDUSTRIAL USE HUNTING/TRAPPING AREA OUTFITTER/GUIDING AREA	4
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

SOURCE: 640

LANDFORM AND LOCATION: ACTIVE MEANDER PLAIN, DEZADEASH RIVER (WEST OF HAINES ROAD)

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	3
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL VALUE:	GENERAL HABITAT	1
AQUATIC FAUNA:	TROUT, GRAYLING AND CHAR IN DEZADEASH RIVER	3
SURFACE WATER:	POTENTIAL FOR SLUMPING, EROSION, SILTATION OR ALTERATION OF EXISTING DRAINAGE PATTERNS	3
LAND STATUS AND USE:	NATIONAL PARK BORDERS HAINES JUNCTION LOCAL IMPROVEMENT DISTRICT RESIDENTIAL USE INDUSTRIAL USE	5
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO. 650

SAMPLE NOS. none taken

LANDFORM AND LOCATION IFP adjacent to AFP of Dezadeash River near Haines Junction

MATERIAL possible sand and gravel

ESTIMATED VOLUME 400 000 m^3 east of Haines Road

AIRPHOTO NOS. HIGH LEVEL A23893-5

LOW LEVEL A24052-133

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 650 represents inactive flood plains adjacent to the Dezadeash River near Haines Junction. Although no ground check of these areas during the field study, airphoto analysis indicates that they are low, narrow alluvial terraces in close proximity to the townsite, on which some residential development has already taken place.

Biotic

No field examination of this site was completed.

36-0260

GRANULAR RESOURCES

It is expected that both petrology and grain size will be similar to that recorded for 640-2. The thickness of overburden is unknown at the present time. It is estimated that at least 1 m of gravel and sand will be recoverable above the river level in this area. Thus the estimated volume of recoverable granular material is at least 400 000 m^3 for the IFP east of the Haines Road. Another 200 000 m^3 would be available west of the highway, but this deposit is entirely within the National Park, and is not presently exploitable.

DEVELOPMENT

It is recommended that specific studies be undertaken to assess the environmental impact of developing a borrow source in such close proximity to the present townsite, and to evaluate the quality of any resources which may be available. If suitable material exists in this area, the deposit may provide a potential borrow source for exclusive use by the Haines Junction community.

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	660	
SAMPLE NOS.	660-3 660-4	
LANDFORM AND LOCATION	UD along Alaska Highway northwest of Haines Junction	
MATERIAL	mostly gravelly, sandy silt; some sand and gravel	
ESTIMATED VOLUME	unknown	
AIRPHOTO NOS.	HIGH LEVEL	see mosaic
	LOW LEVEL	A24051-7 A24051-51

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Much of the area within the Shakwak valley northwest of Haines Junction is blanketed by a deposit of loess and ablation till, which has been dropped on to, and is presently obscuring all but the most prominent preglacial and/or interglacial landforms. For the purposes of this report, this material has been termed undifferentiated drift, and has been designated as Source No. 660.

GRANULAR RESOURCES

In general this deposit has a very high silt content (see 660-4) and would not be termed suitable as a construction material. It appears, however, that such material has been used extensively in the construction of some portions of the Alaska Highway (660-4 was obtained from a large, active borrow pit) and except when extremely wet, appears to perform adequately.

Some areas within Source No. 660 contain superior granular material. Sample 660-3, for instance, was obtained near kilometre post AH1651 (Plate 660-1). The scarp edge at this location has exposed a triangular section more than 15 m high containing well stratified gravel and sand, and only a trace of silt. Most of the grains analyzed were quartzites (45%) or diorites (41%). Only 8% of the grains counted were deleterious slates and schists, but minor calcite coatings were observed. Gravelly silt overlies the gravel, being thin to absent at the top of the deposit and 3-4 m thick near the base. Other exposures along the bluff show the same general features, but the extent of granular material is difficult to assess on the airphotos, hence it is not clear at the present time whether this coarse material is actually a part of the undifferentiated drift, of whether it represents some earlier deposit which has subsequently been buried.

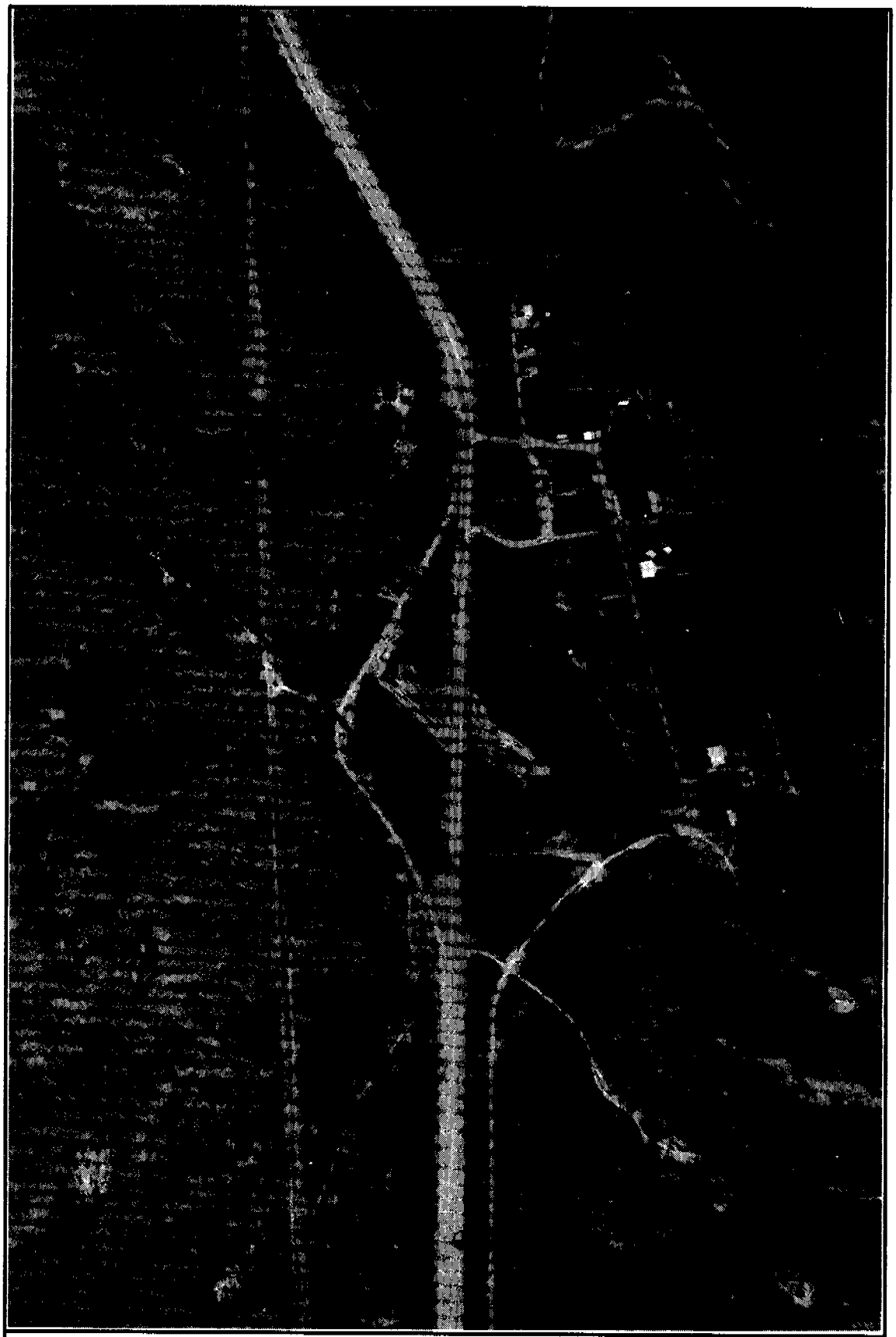
DEVELOPMENT

Any of the active pits currently which are currently mining the undifferentiated drift deposits may be continued as a source of general fill, providing the limitations of this silty material are recognized.

It is probable that at least 10 000 m^3 of good, coarse granular material might be exploited from the UD near location 660-3, and perhaps much more may be available, depending on the extent of the deposit. Regardless of the extent, access to the site from the Alaska Highway would be excellent, and environmental concerns would not be serious.

According to the grain size analysis, this material would probably be suitable, without processing, for production of both base and sub-base courses. Small amounts of screening or crushing could also be used to produce asphalt and concrete aggregates with little difficulty.

Further field investigations should be undertaken to assess the extent and uniformity of the gravel and sand sampled at 660-3. A complete laboratory analysis is also necessary to evaluate the effect of the deleterious materials on possible construction performance.

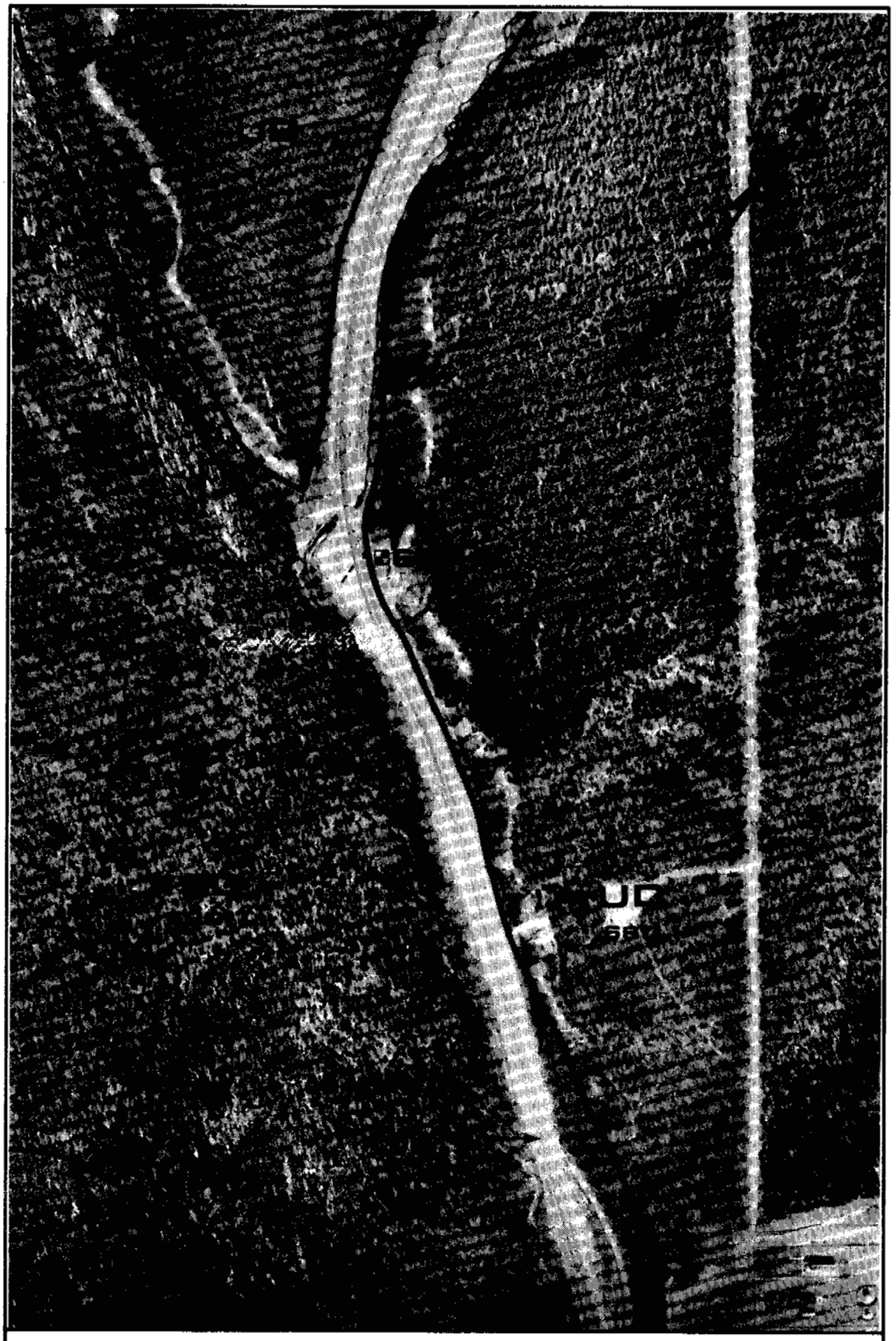


Source No. 660,670,680

Airphoto No. A24052-139

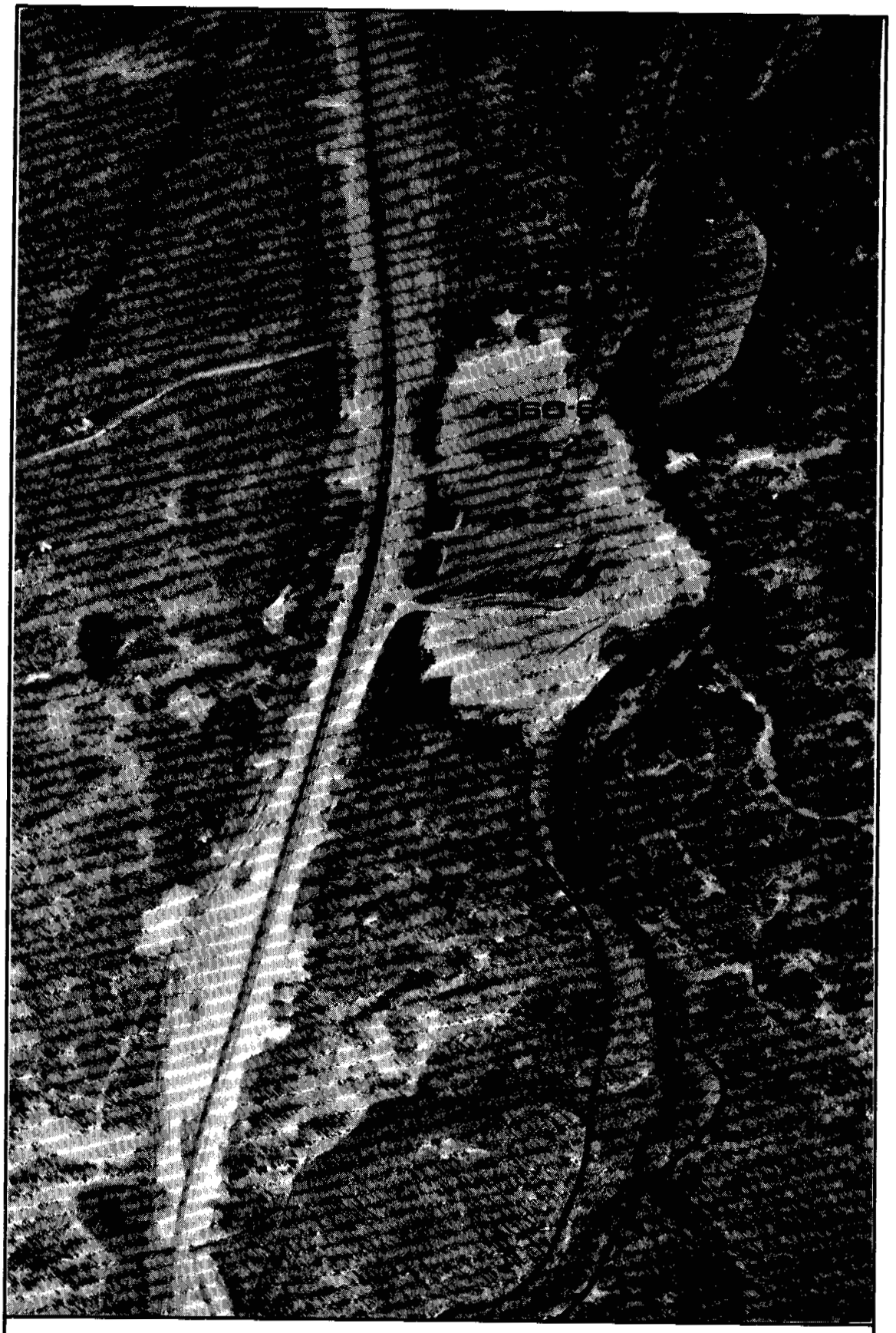
Source Nos. 660 and 680

Airphoto No. A24052-146



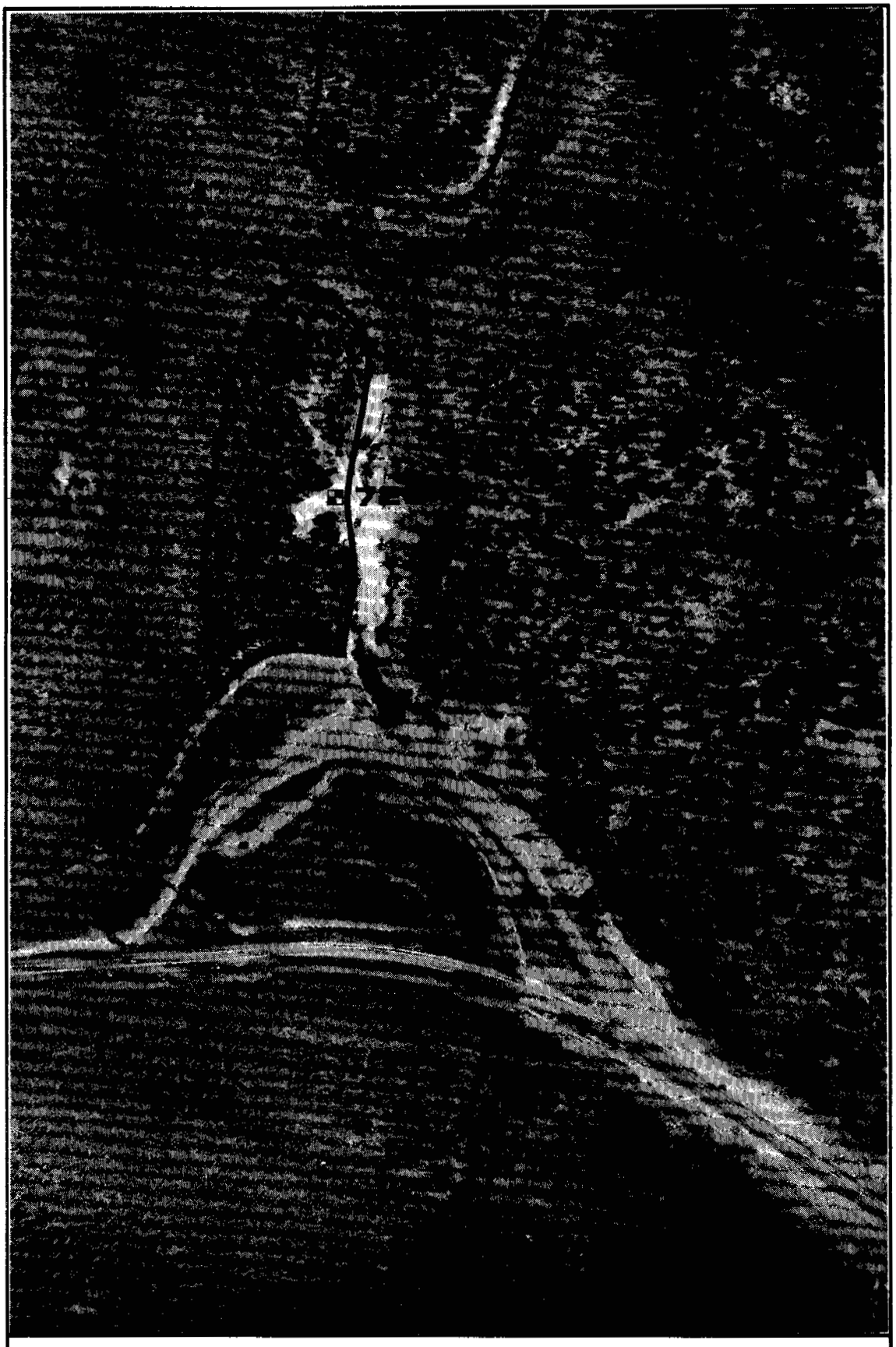
Source No. 660

Airphoto No. A24051-7

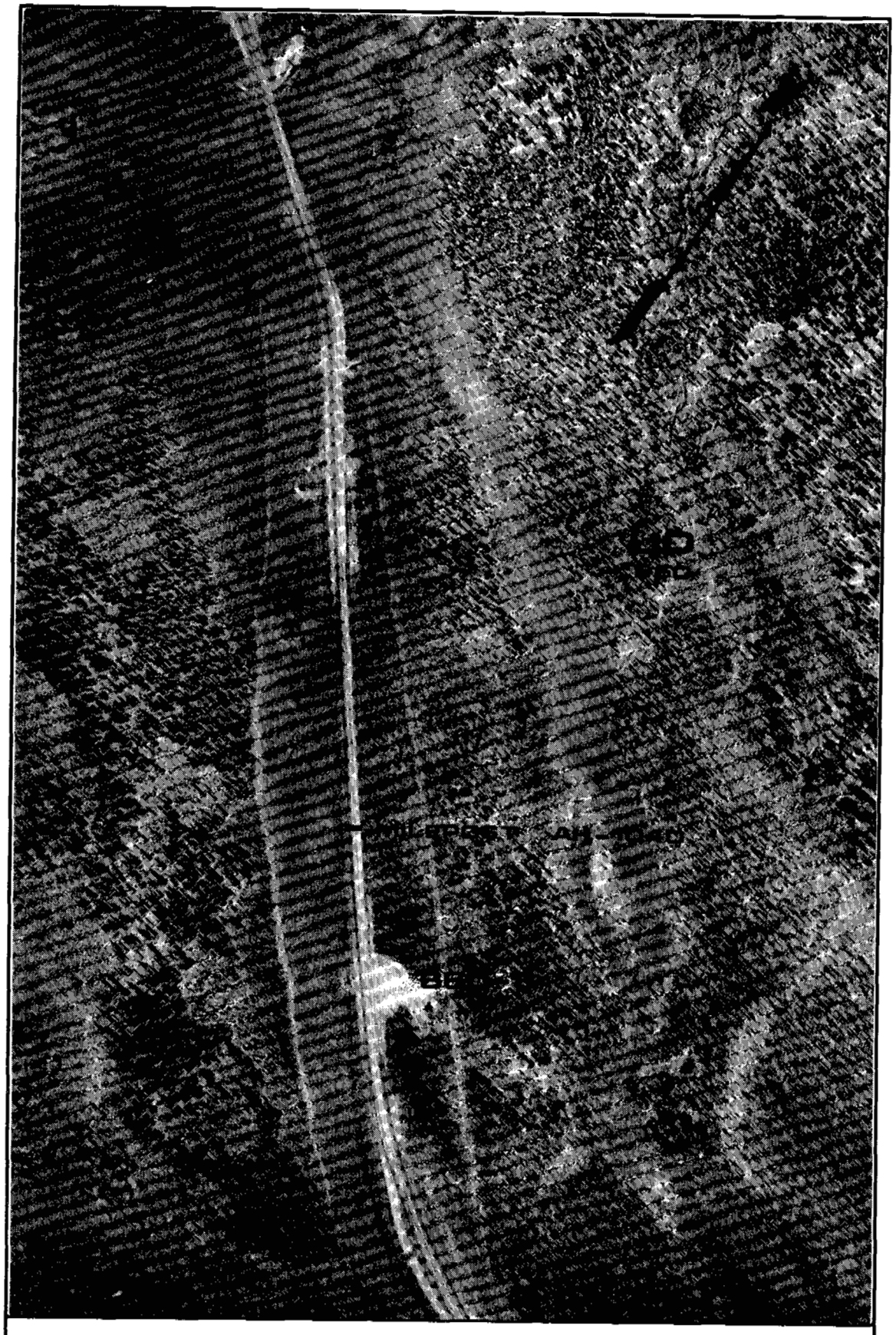


Source No. 660

Airphoto No. A24051-51



Source Nos. 660 and 720 Airphoto No. A24051-53



Source No. 660

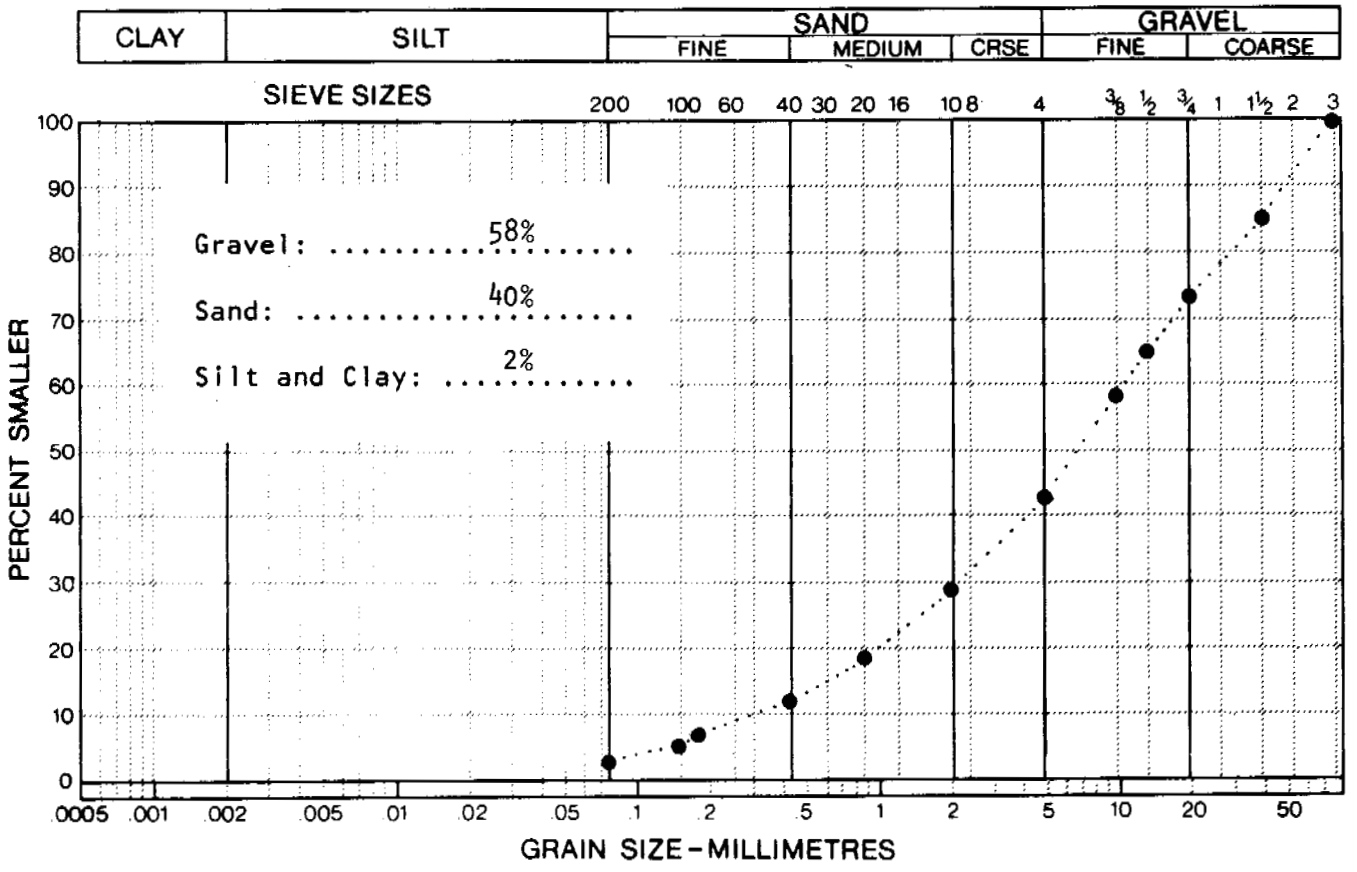
Airphoto No. A24051-54

LABORATORY ANALYSIS

SOURCE NO. 660

PIT NO. 660-3

EXPOSURE: road cut



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): undifferentiated drift

PETROGRAPHIC ANALYSIS:

quartzite 45%
diorite 41%
syenite 7%
slate 6%
schist 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

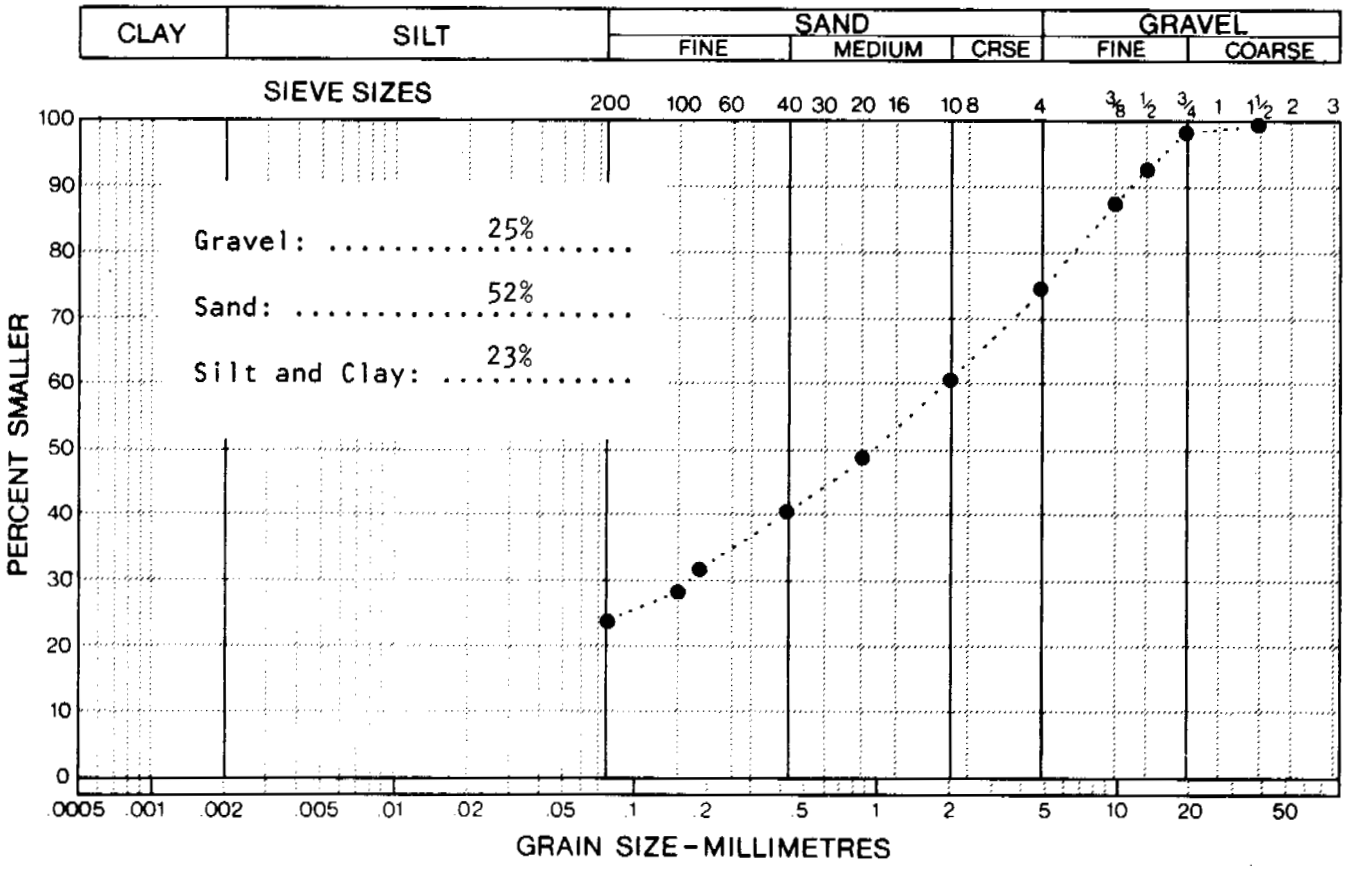
REMARKS: minor calcareous coatings

LABORATORY ANALYSIS

SOURCE NO. 660

PIT NO. 660-4

EXPOSURE: stockpile



MATERIAL TYPE: gravelly, silty sand

GENISIS (LANDFORM): processed material from undifferentiated drift

PETROGRAPHIC ANALYSIS: sample not analysed

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS:

REMARKS:

SOURCE NO. 660

PIT NO. 660-1

EXPOSURE: hand excavated test pit

MATERIAL TYPE: fine silty sand

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 660

PIT NO. 660-2

EXPOSURE: hand excavated test pit

MATERIAL TYPE: silt, some fine sand, trace of gravel

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 660

PIT NO. 660-5

EXPOSURE: hand excavated test pit

MATERIAL TYPE: gravelly silt, trace of cobbles and boulders

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 660

PIT NO. 660-6

EXPOSURE: existing borrow area

MATERIAL TYPE: gravelly silt, trace of cobbles and boulders

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 660

PIT NO. 660-7

EXPOSURE: hand excavated test pit

MATERIAL TYPE: silt, trace of gravel

GENESIS (LANDFORM): UD

REMARKS:

SOURCE NO. 660

PIT NO. 660-8

EXPOSURE: abandoned borrow area

MATERIAL TYPE: silt, some clay, trace of gravel

GENESIS (LANDFORM): UD

REMARKS:

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	670
SAMPLE NOS.	none taken
LANDFORM AND LOCATION	AMP Pine Creek
MATERIAL	sand and gravel
ESTIMATED VOLUME	not estimated
AIRPHOTO NOS.	HIGH LEVEL A23893-142
	LOW LEVEL A24052-139

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 670 consists of the active meander plain of Pine Creek, approximate kilometre post AH1639. The creek is bounded along its northeast margin by beach deposits, and along the southwest margin by undifferentiated silty drift. Sand and gravel within the AMP are overlain by 0 to 1 m of silt, and covered with thick vegetation.

Biotic and Recreation

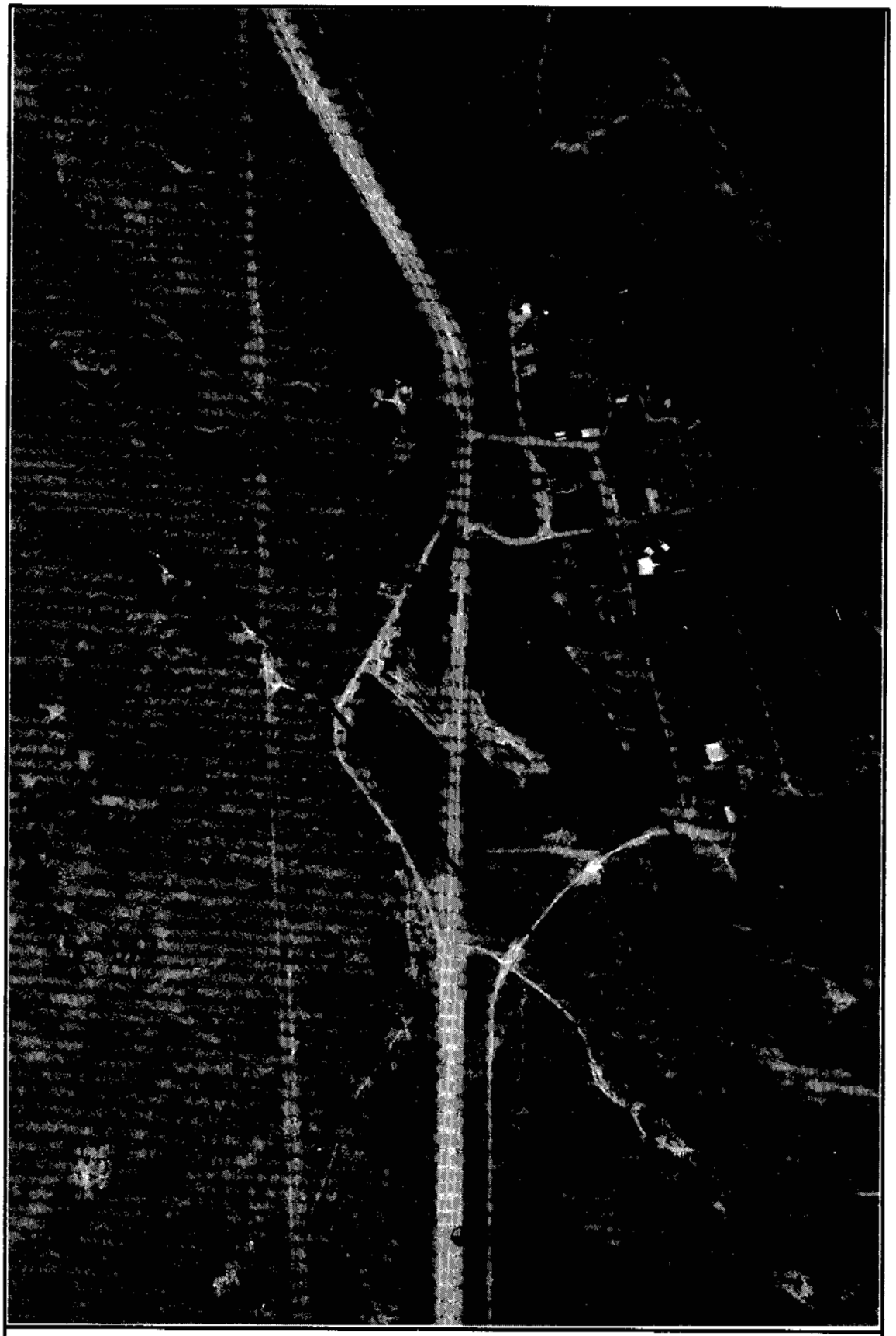
No biotic assessment of this site was carried out. West of the highway the AMP is entirely within Kluane National Park and the Pine Creek Experimental Station lies adjacent to the meander plain to the northeast
.

GRANULAR RESOURCES

Sand and gravel were observed at pit 670-1, but no petrographic or grain size analyses were undertaken.

DEVELOPMENT

The limited size and location of part of the deposit in Kluane Park reduces the desirability of developing this site.



Source No. 660,670,680

Airphoto No. A24052-139

SOURCE NO. 670

PIT NO. 670-1

EXPOSURE: hand excavated test pit

MATERIAL TYPE: silt overlying sand and gravel

GENESIS (LANDFORM): AMP

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO. 680

SAMPLE NOS. 680-3, 680-6

LANDFORM AND LOCATION beach deposits northeast of Pine Creek, approximate kilometre post AH-1641

MATERIAL gravel, sand and silt

ESTIMATED VOLUME 1 000 000 to 1 500 000 m^3

AIRPHOTO NOS.

HIGH LEVEL	A23893-150
LOW LEVEL	A24051-145
	A24051-18

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 680 is a pair of beach terraces which are adjacent to the Alaska Highway northwest of the Pine Creek Experimental Station. They extend up to 1.5 km west of the highway and approximately 0.5 km east of the highway at a relatively constant elevation, terminating at the western edge in a terrace which stands approximately 15 m above the active flood plain of the Dezadeash River system.

Biotic

Vegetation on these terraces is primarily composed of sparse, stunted balsam poplar with scattered grasses and xeric herb species. In low-lying areas surrounding the ridges, vegetation is mature spruce with a dry understory of grasses and herbs.

The area is heavily grazed by cattle and horses, and grizzlies are known to inhabit the same area, but there is no involvement of aquatic systems.

The beach terraces are entirely within Kluane National Park. They have considerable recreational potential and interest as unusual land forms.

GRANULAR RESOURCES

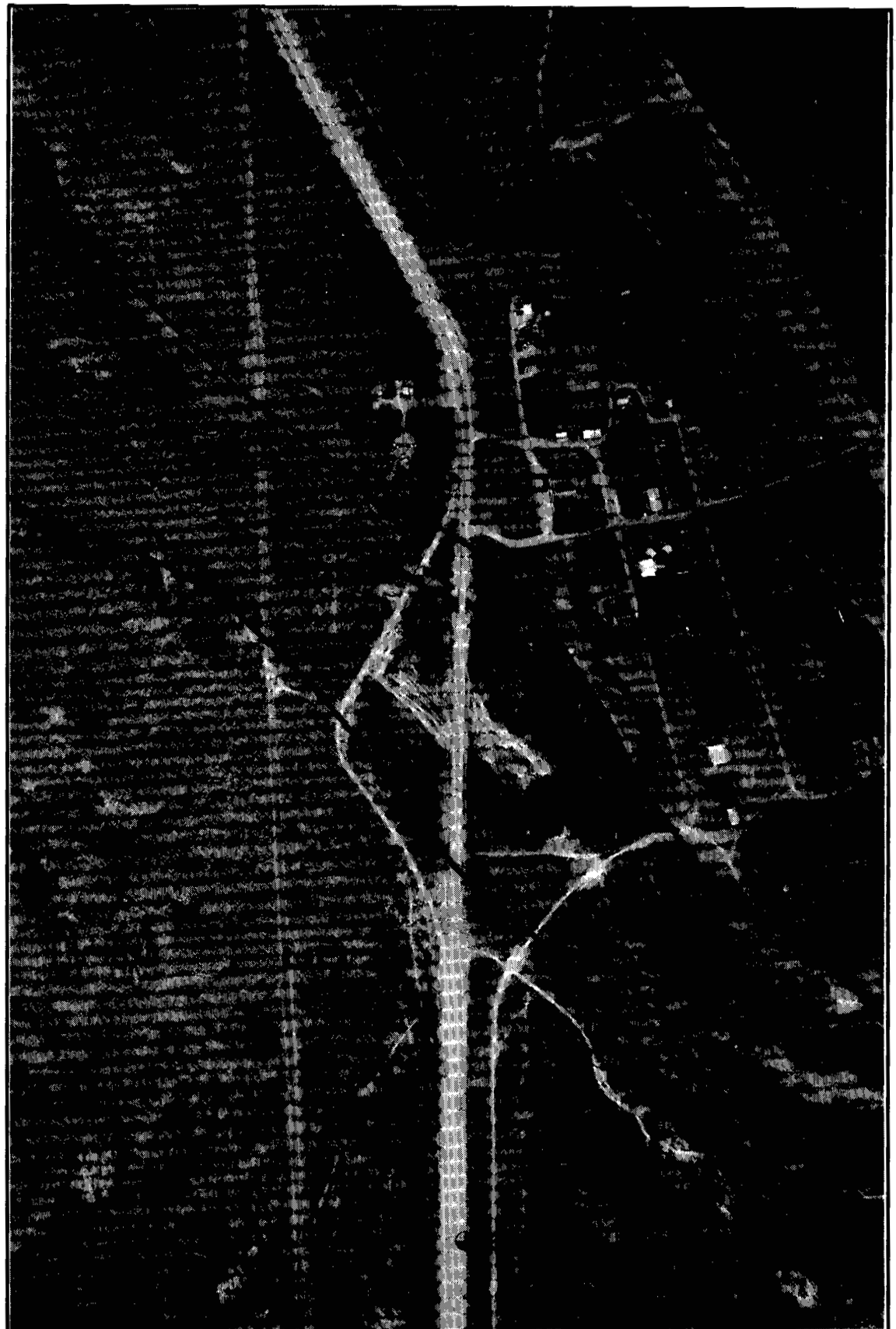
Most of the beach deposit is composed of clayey to sandy silts, with a trace of gravel (sample 680-3). At the extreme western edge of both terraces, however, thick deposits of sand and gravel, including large surface boulders up to 1.5 m in diameter, were encountered (Plate 680.1). Petrographic analysis of 680-6 revealed that 77% of the sample is composed of subangular, bladed quartzite, and the remainder includes soft sandstone (8%), fissile slate (6%) diorite (5%), granite and schist (2% each). Both overburden and vegetation are absent over most of the gravelly sections, although a thin silt covering is apparent near the tree-covered areas.

The volume of useable material is this source, including both of the terraces seen on the high level photos, is estimated to be between 1 000 000 m^3 and 1 500 000 m^3. This figure was calculated using topographic information obtained during the field study, and the limits of coarse granular material from field observations and airphoto analysis. Thick exposures of the section along the margin of the terrace indicate that the deposit is probably very uniform, but similar in age and origin to that presently being mined near Bear Creek (Source No. 700).

DEVELOPMENT

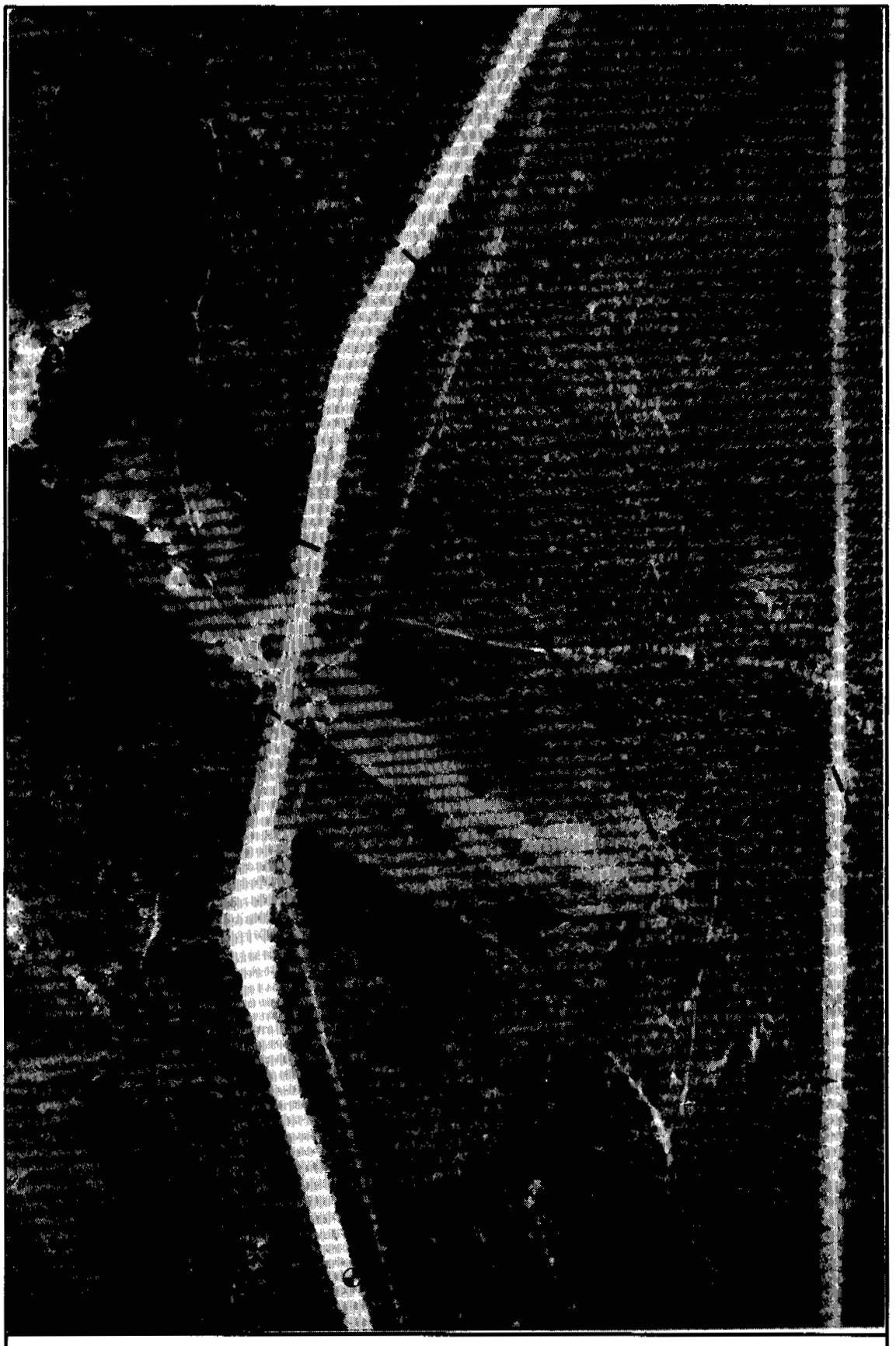
According to the grain size distribution curves, this material may be suitable for concrete, aggregate base, coarse, and sub-base are with only minor amounts of crushing and screening. Crushing and blending would be necessary for asphalt

use. Significant amounts of delterious materials such as shale and soft sandstone create concern for the overall value of the deposit, and the presence of calcuim carbonate coatings on 60% of the grains further affects its importance. Further laboratory tests would be necessary to establish guidelines for utilization of his resource. Finally, the granular terraces on both beach deposits are entirely within Kluane National Park, and as a result no development is recommended.



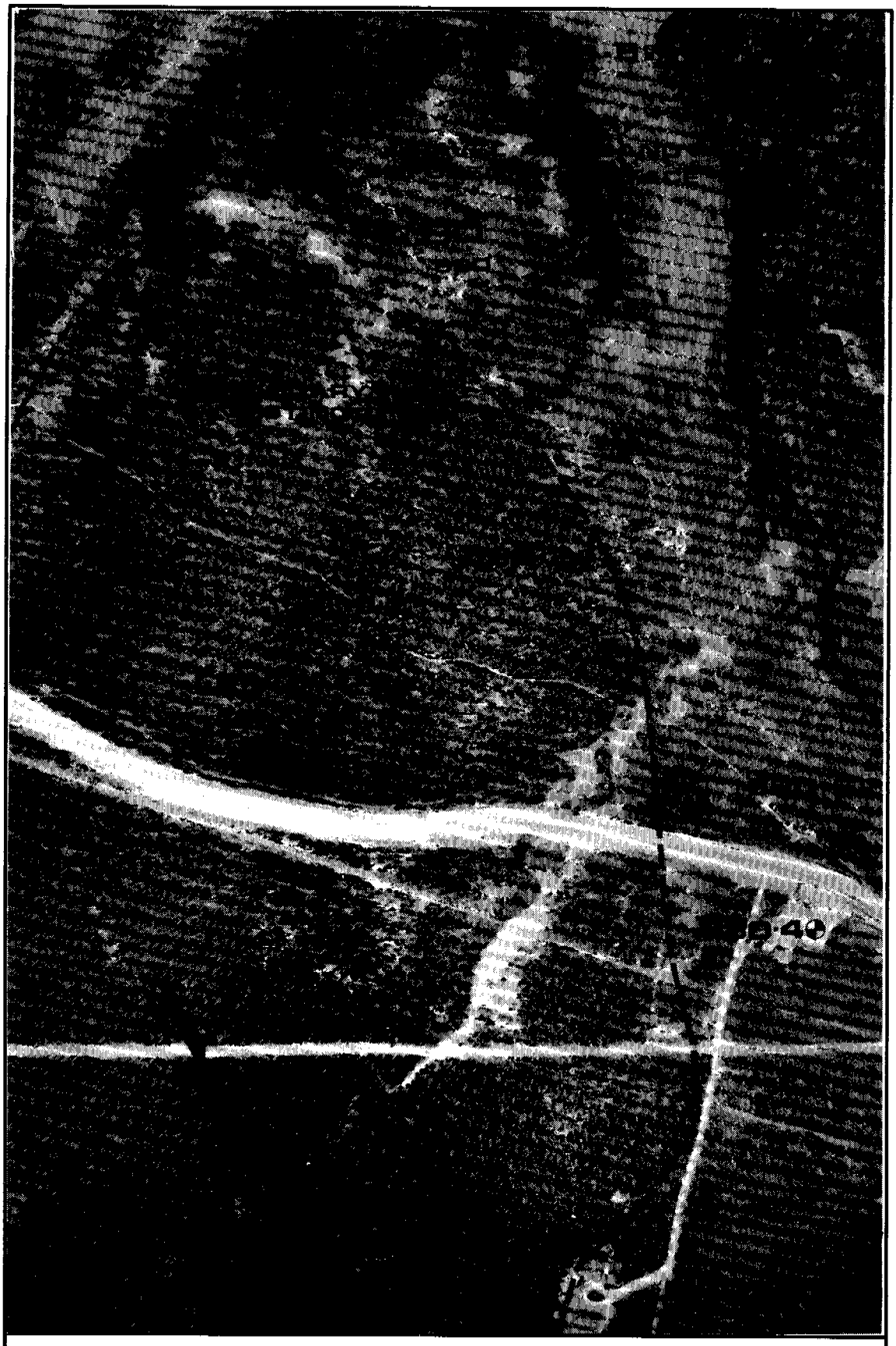
Source No. 660,670,680

Airphoto No. A24052-139



Source No. 680

Airphoto No. A24052-144



Source Nos. 660 and 680 Airphoto No. A24052-146

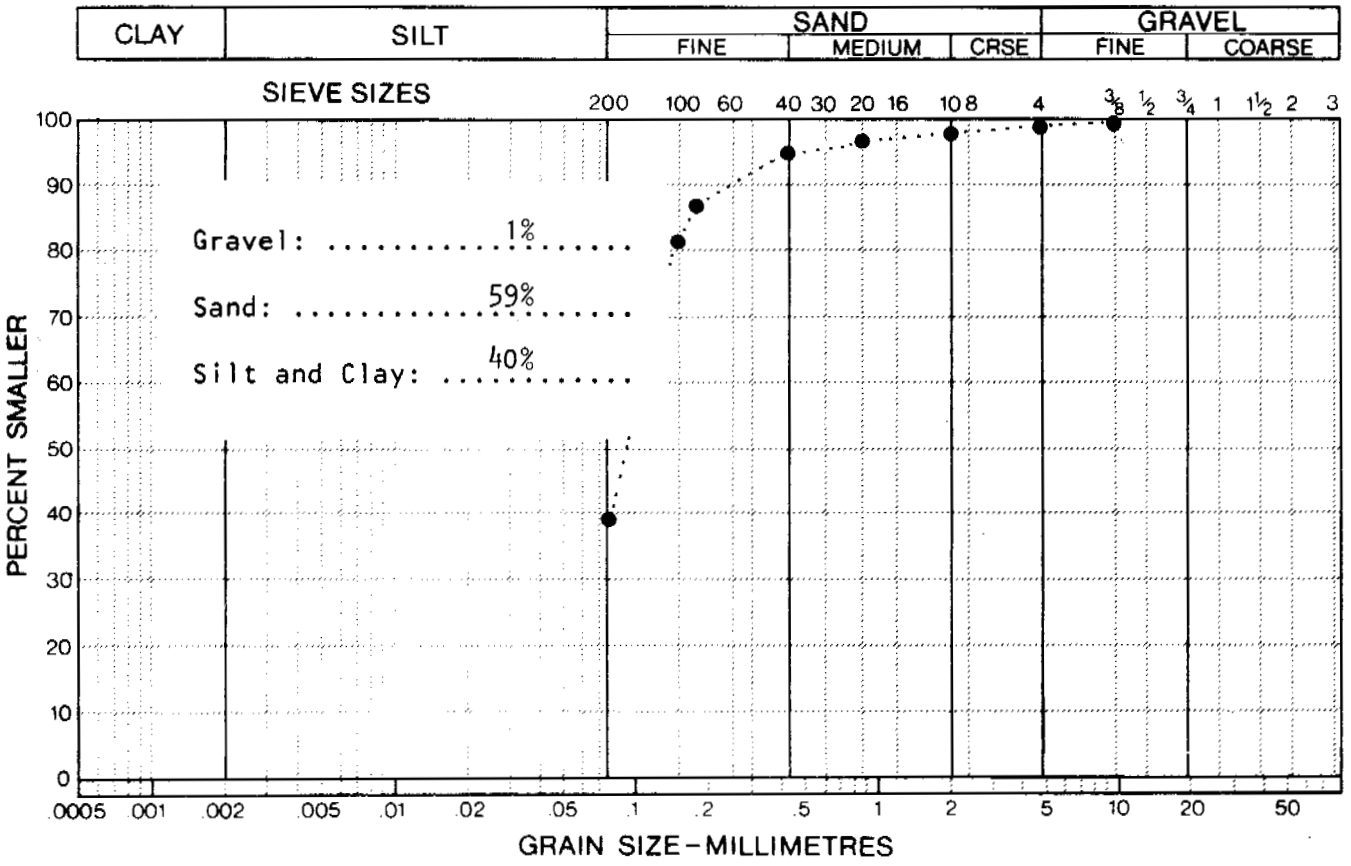
Source Nos. 660 and 680 Airphoto No. A24051-18

LABORATORY ANALYSIS

SOURCE NO. 680

PIT NO. 680-3

EXPOSURE: hand excavated test pit



MATERIAL TYPE: silt and sand, trace of gravel

GENISIS (LANDFORM): beach deposit

PETROGRAPHIC ANALYSIS: sample not analysed

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS:

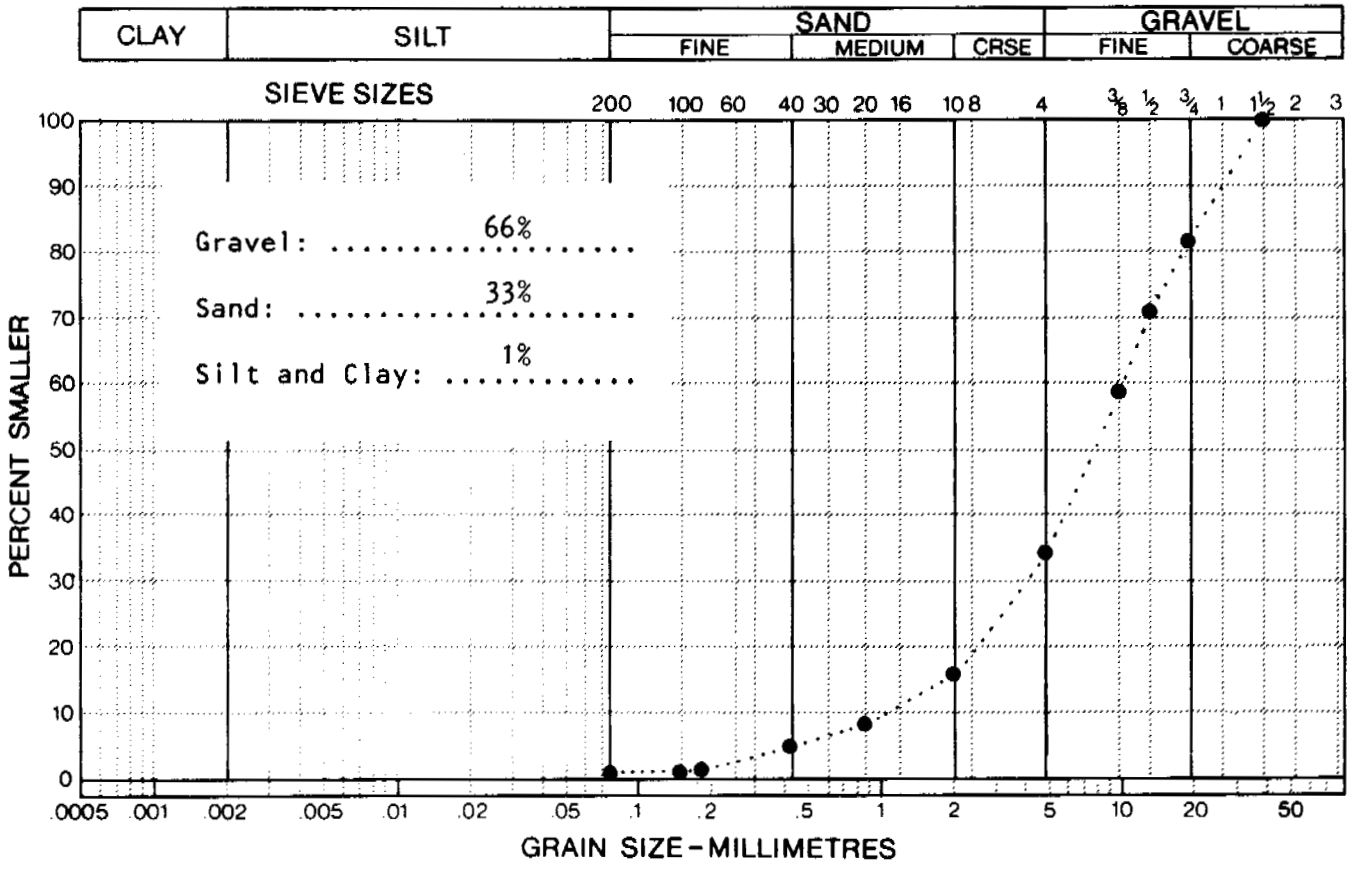
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 680

PIT NO. 680-6

EXPOSURE: natural cut slope



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): beach deposit

PETROGRAPHIC ANALYSIS:

quartzite 77%
sandstone 8%
slate 6%
diorite 5%
granite 2%
schist 2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS: abundant calcareous coatings

SOURCE NO. 680

PIT NO. 680-1

EXPOSURE: hand excavated test pit

MATERIAL TYPE: fine sandy silt

GENESIS (LANDFORM): BD

REMARKS:

SOURCE NO. 680

PIT NO. 680-2

EXPOSURE: hand excavated test pit

MATERIAL TYPE: sandy silt, some gravel

GENESIS (LANDFORM): BD

REMARKS:

SOURCE NO. 680

PIT NO. 680-4

EXPOSURE: abandoned borrow area

MATERIAL TYPE: silt, trace of sand

GENESIS (LANDFORM): BD

REMARKS:

SOURCE NO. 680

PIT NO. 680-5

EXPOSURE: gopher hole

MATERIAL TYPE: clayey silt

GENESIS (LANDFORM): BD

REMARKS:

SOURCE: 680

LANDFORM AND LOCATION: BEACH TERRACES

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	0
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	2
TERRESTRIAL FAUNA:	GENERAL HABITAT	1
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	NATIONAL PARK RECREATION POTENTIAL	5
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	UNUSUAL LANDFORM POTENTIAL GEOLOGIC INTERPRETIVE SITE	4

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO. 690

SAMPLE NOS. 690-1
690-5
690-7

LANDFORM AND LOCATION large FPD

MATERIAL gravel and sand

ESTIMATED VOLUME large - see detailed assessment

AIRPHOTO NOS. HIGH LEVEL A11539-60 and A11478-38

LOW LEVEL A24051-3
A24051-9
A24052-147

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 690 is a large flood plain deposit formed by coalescing alluvial fans, active flood plains and active meander plains in an area of the Shakwak Valley northwest of Pine Creek. Most of the material appears to originate within the Kluane Ranges, and crosses the Alaska Highway between kilometre post AH1644 and AH1655. Although bedrock outliers protrude through the alluvial sands and gravels in some areas west of the highway, the northwest and northeast margins generally abut directly against undifferential drift deposits.

Biotic

This site is characterized by two typical vegetation types, depending on local drainage conditions and previous fire history. The vegetation

in unburned areas consists of semi-open stands of spruce intermixed with large shrub willows, including mosses and kinnikinnick as ground cover. Drier, previously burned areas are covered with thickets of stunted balsam shrub willow and shepherdia with kinnikinnick as ground cover.

The area has some potential for moose and grouse use but no sign was observed.

The cobbled, dry stream bed of torrential Summit Creek crosses the site, but is has no known fish populations, and therefore no aquatic concerns.

West of the Alaska Highway the site is within the Kluane Game Sancturary and an IBP site. East of the highway, two abandoned industrial sites (a pumping station and an oil storage site) are within the area. Both industrial sites have potential for future development. The dry mountain streams have interest as potential access routes to alpine areas.

GRANULAR RESOURCES

Like the beach terraces at Source No. 680, most of the flood plain deposits consist of sand and gravel with minor traces of silt size particles. More than 80% of the rock types usually fall into the quartzite or meta-greywacke classes, and approximately 10 - 15% may be termed slates, phyllites or soft sandstones. Minor calcite coatings were noticed on sample 690-1, but none were observed in either 690-5 or 690-7, which were obtained from areas farther north.

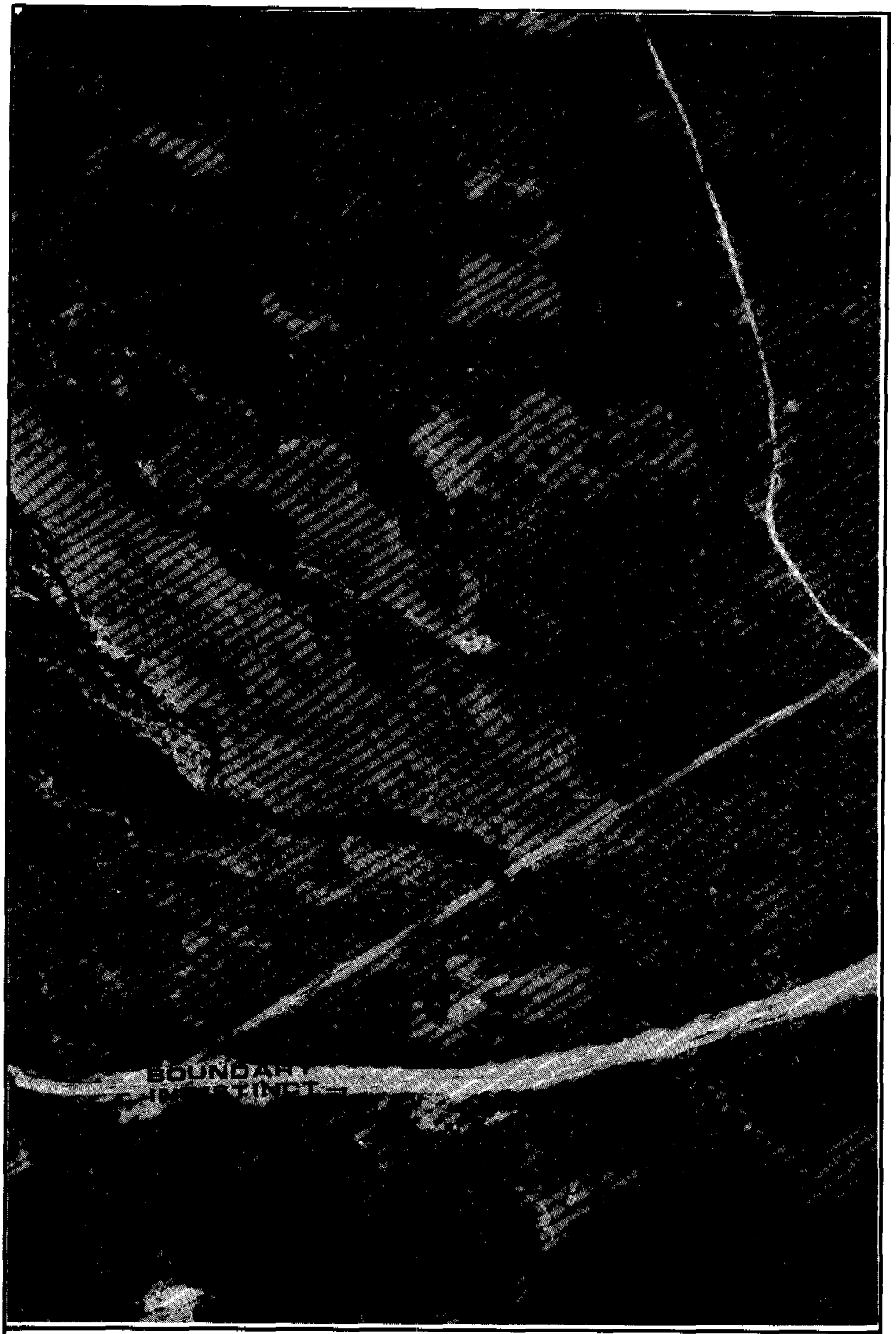
Overburden on the FPD is generally thin and absent near AFP's associated with Bear Creek and Summit Creek, although silt deposits up to 2 m may be found associated with low-lying areas in presently inactive areas. Both grain size curves and petrographic analysis at each location sampled appear to be remarkably similar, and it is expected that this reflects the general uniformity of the entire deposit and the common geologic setting in which it originates.

It is estimated that more than 5 000 000 m^3 of granular material may be available inside the study corridor within 2 m of the present ground surface from the flood plain deposits of Source No. 690.

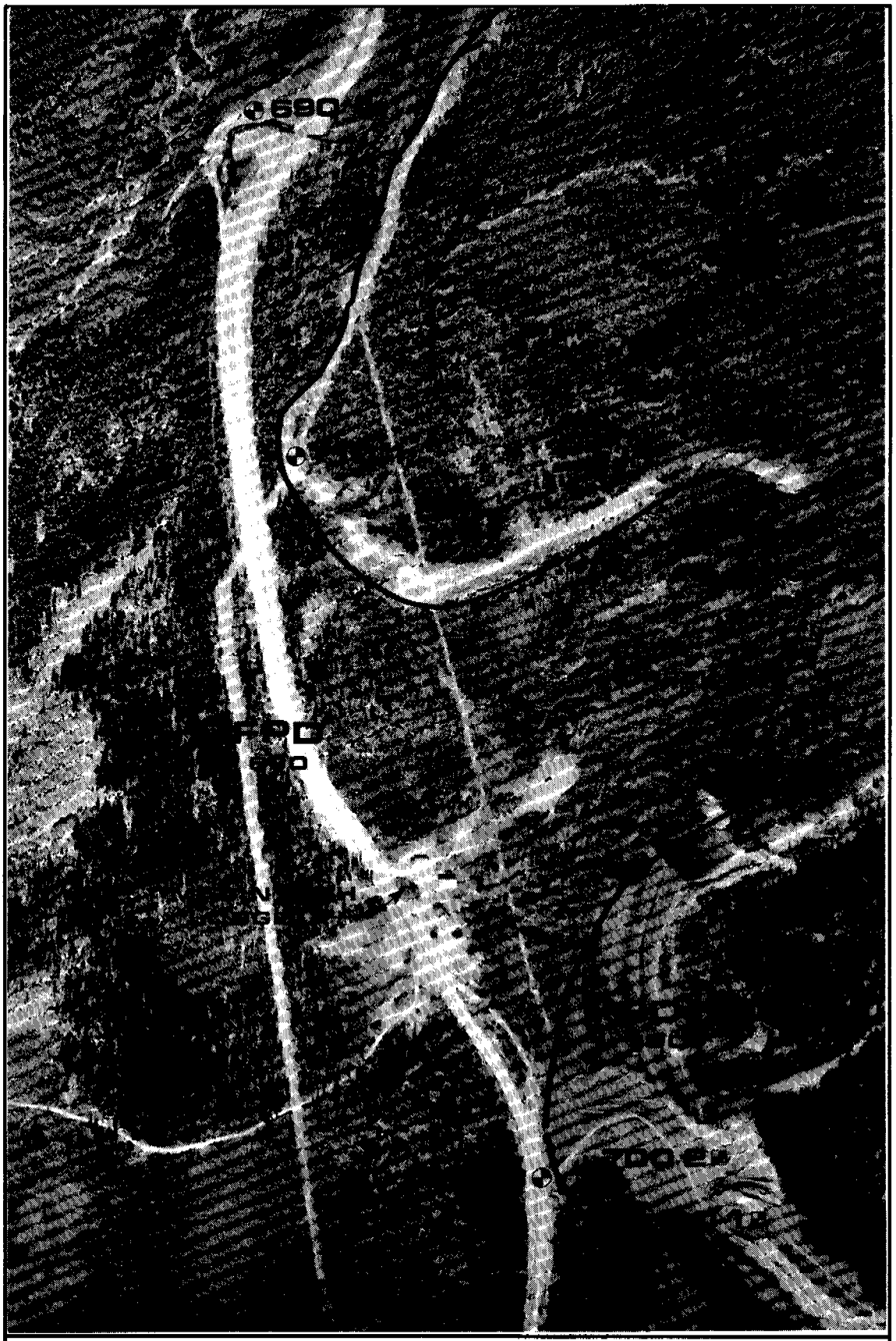
DEVELOPMENT

Grain size curves indicate that very little processing would be necessary in order to use this material for base or sub-base courses. Some screening, blending and washing would be required to produce concrete aggregate. Care would be required when selecting aggregate for asphalt, so that areas with high silt contents are not included. The presence of some deleterious materials (slates, phyllites and soft sandstones) and minor calcium carbonate coatings requires further assessment to determine their ultimate effect on material properties.

Although access to most areas within the FPD could be provided on a year-round basis without difficulty, torrential spring runoff could affect those portions of the source within, or adjacent to, active flood plains. Low-lying areas near Summit Creek and Bear Creek would require special consideration. Environmental constraints are not limiting at this site.

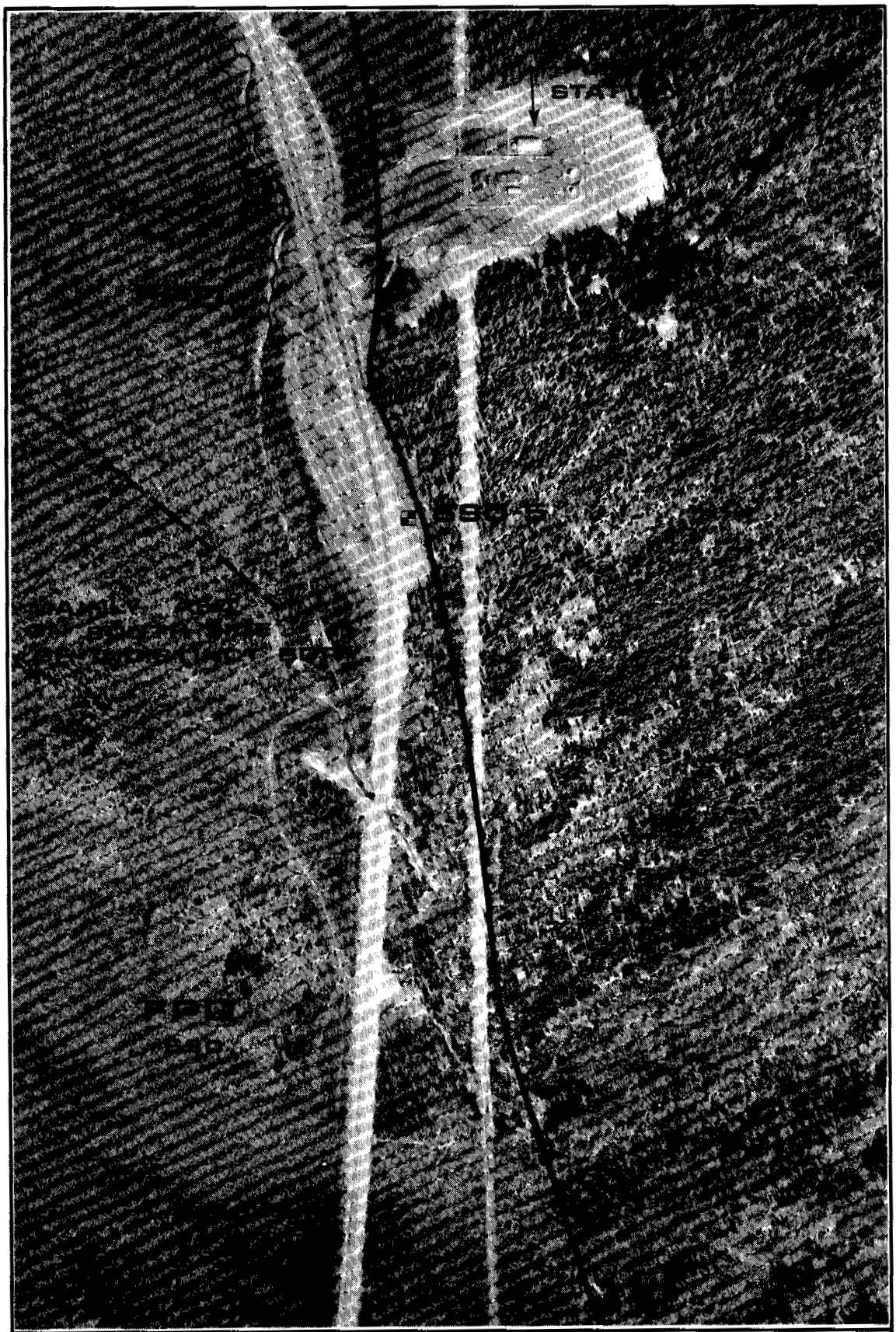


Source No. 690 Airphoto No. A24052-147



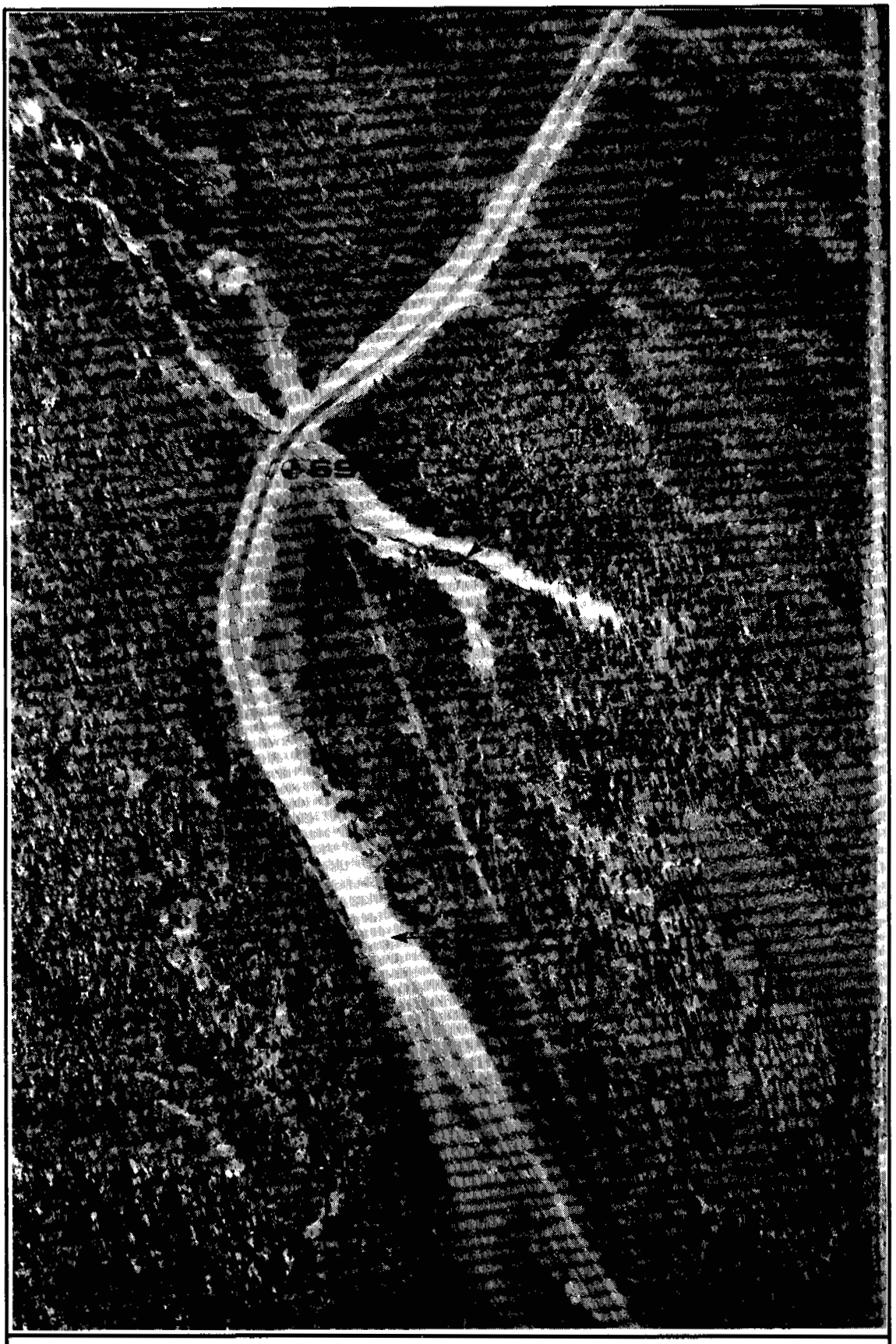
Source Nos. 690, 710

Airphoto No. A24051-15



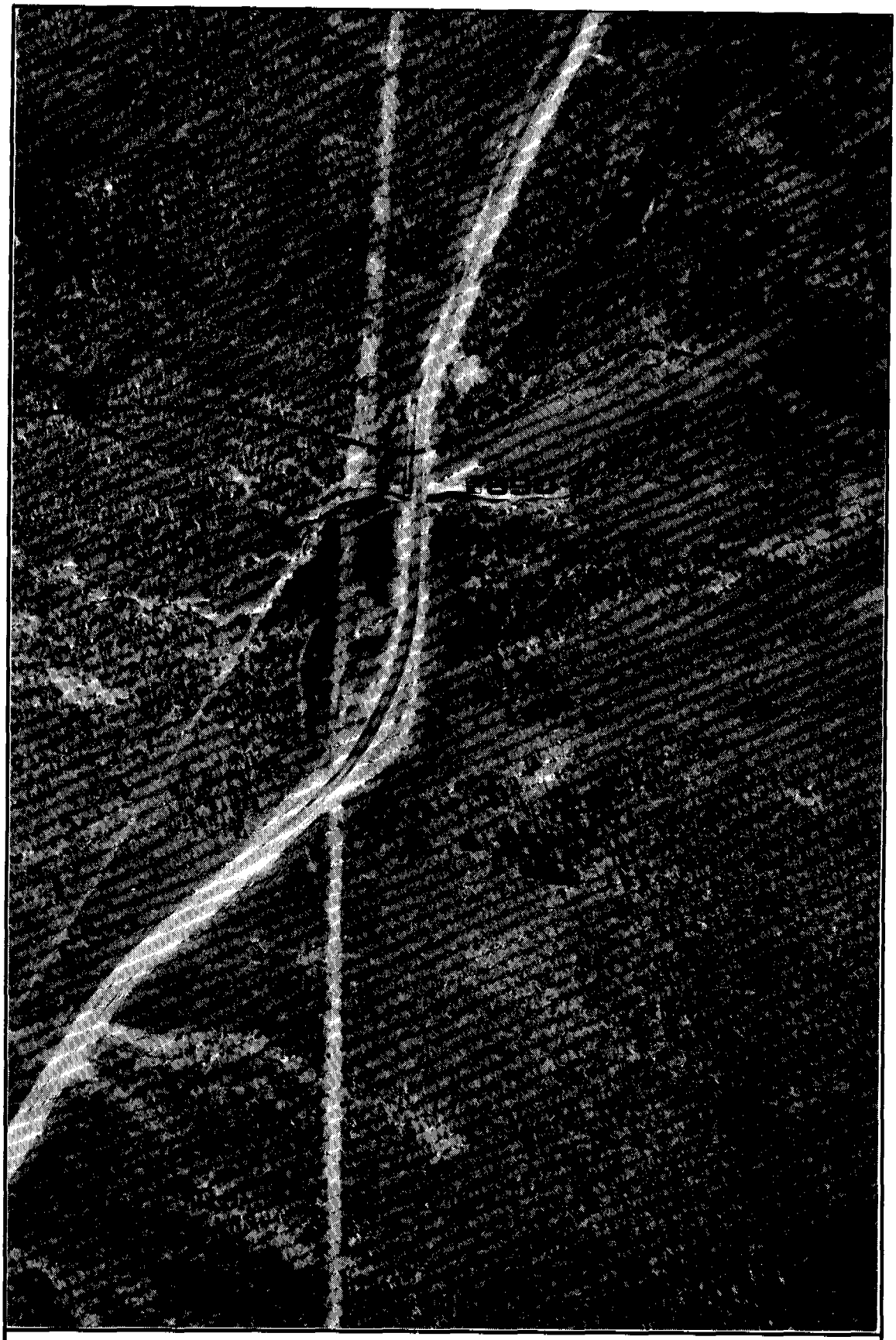
Source No. 690

Airphoto No. A24051-9



Source No. 690

Airphoto No. A24051-5



Source No. 690

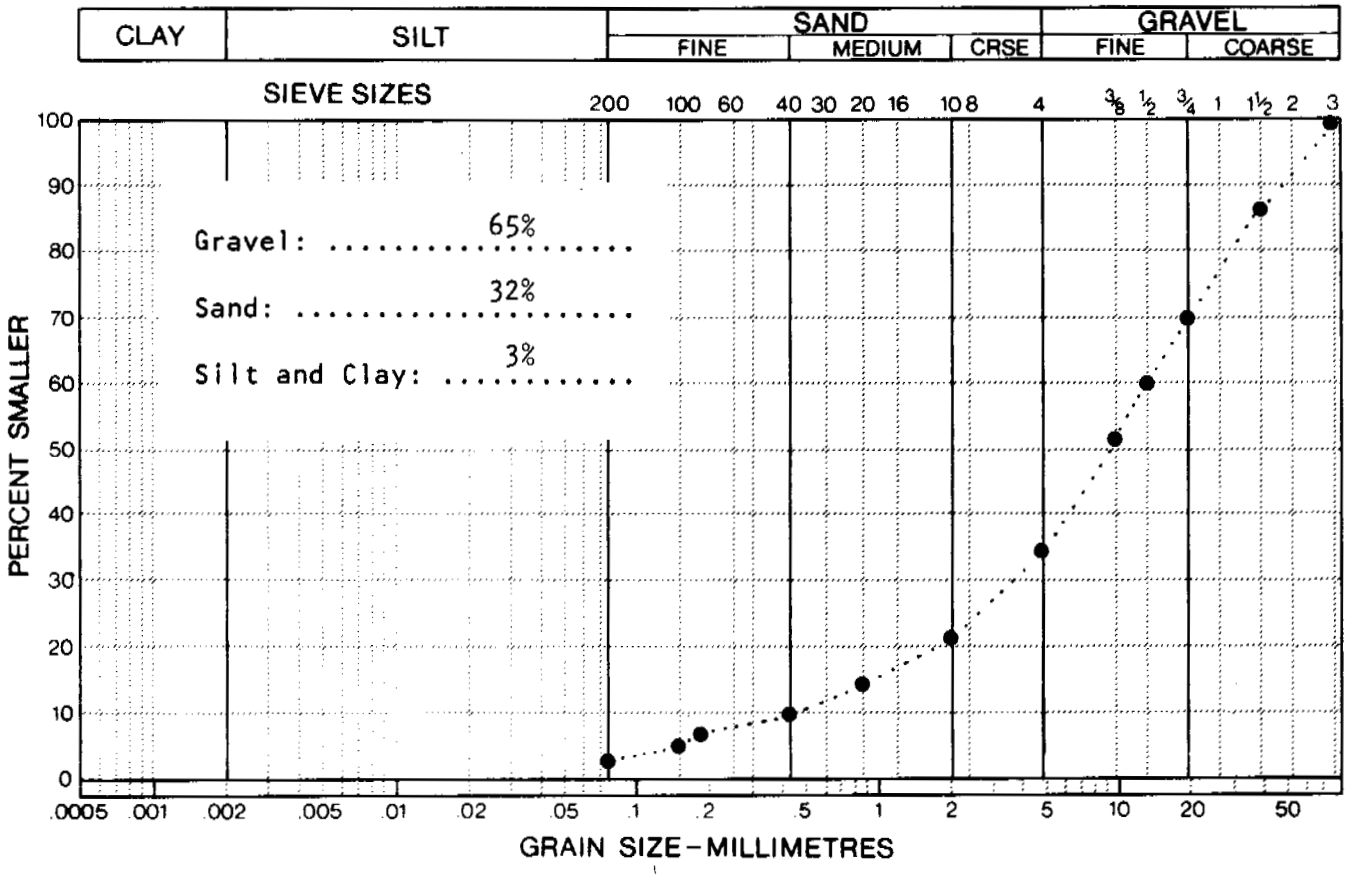
Airphoto No. A24051-3

LABORATORY ANALYSIS

SOURCE NO. 690

PIT NO. 690-1

EXPOSURE: abandoned borrow pit



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): flood plain deposit

PETROGRAPHIC ANALYSIS:
quartzite 61%
diorite 27%
slate 10%
syenite 2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subrounded to subangular

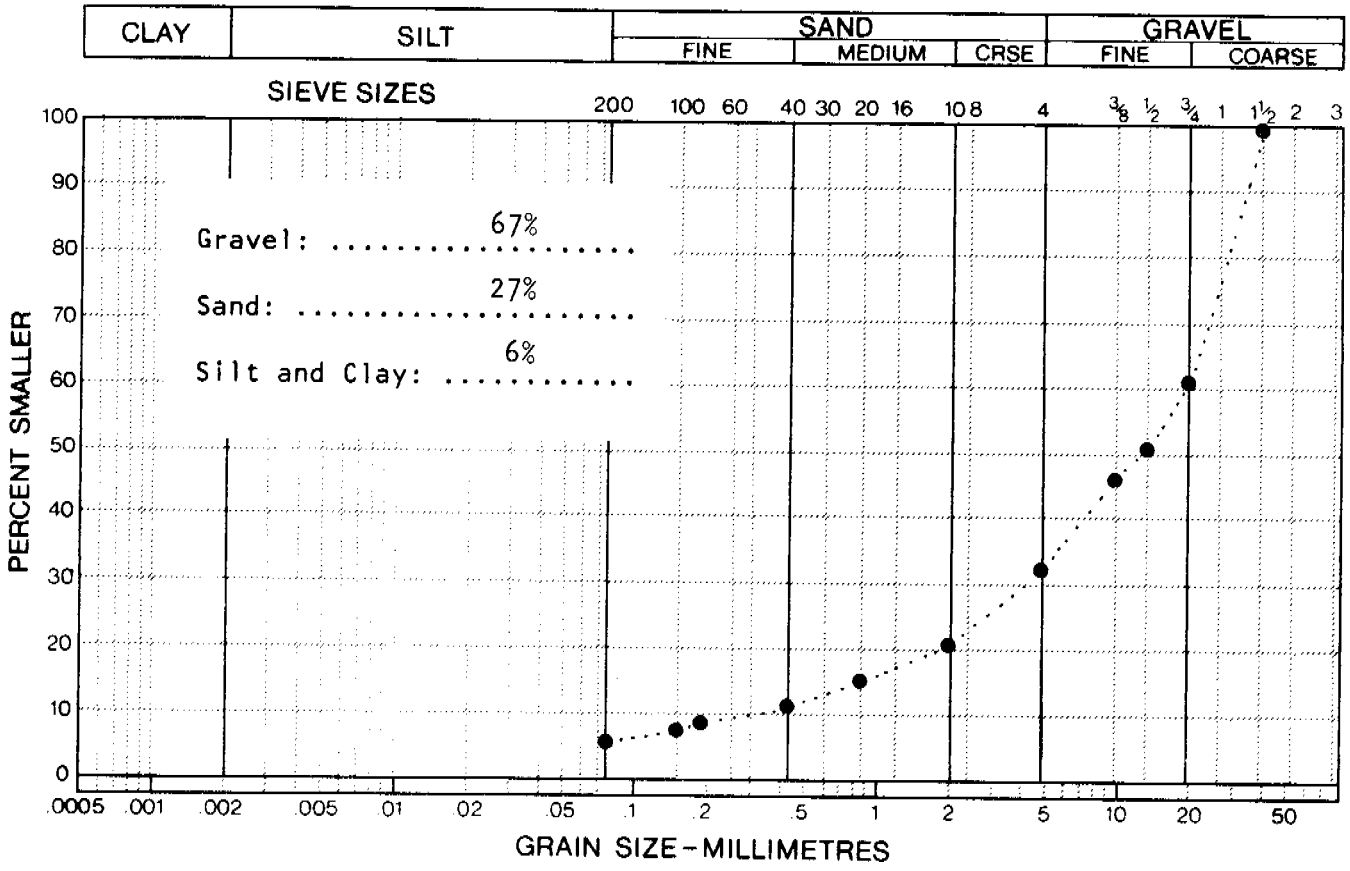
REMARKS: minor calcareous coatings

LABORATORY ANALYSIS

SOURCE NO. 690

PIT NO. 690-5

EXPOSURE: hand excavated test pit



MATERIAL TYPE: gravel, some sand, trace of silt

GENISIS (LANDFORM): flood plain deposit

PETROGRAPHIC ANALYSIS:

quartzite 82%
slate 8%
gneiss 5%
schist 4%
sandstone 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

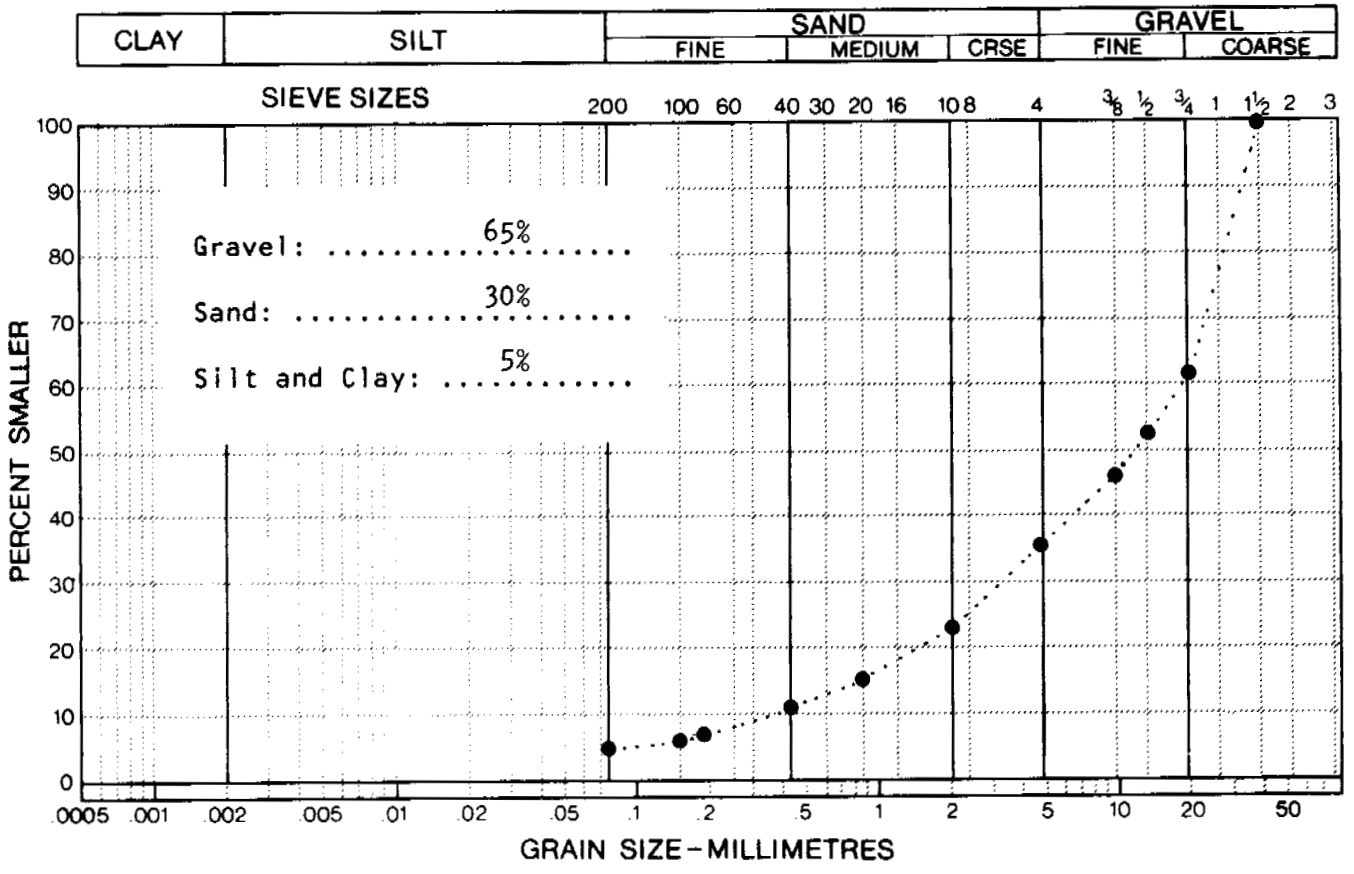
REMARKS:

LABORATORY ANALYSIS

SOURCE NO. 690

PIT NO. 690-7

EXPOSURE: stream bed



MATERIAL TYPE: sandy gravel, trace of silt

GENISIS (LANDFORM): active flood plain deposit

PETROGRAPHIC ANALYSIS:

quartzite 80%
slate 8%
sandstone 3%
diorite 3%
gneiss 3%
schist 3%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

REMARKS:

SOURCE NO. 690

PIT NO. 690-2

EXPOSURE: abandoned borrow area

MATERIAL TYPE: organics over gravel

GENESIS (LANDFORM): FPD

REMARKS:

SOURCE NO. 690

PIT NO. 690-3

EXPOSURE: hand excavated test pit

MATERIAL TYPE: gravelly sandy silt

GENESIS (LANDFORM): FPD

REMARKS:

SOURCE NO. 690

PIT NO. 690-4

EXPOSURE: hand excavated test pit

MATERIAL TYPE: gravelly silt

GENESIS (LANDFORM): FPD

REMARKS:

SOURCE NO. 690

PIT NO. 690-6

EXPOSURE: hand excavated test pit

MATERIAL TYPE: gravel and sand, trace of cobbles and boulders

GENESIS (LANDFORM): FPD

REMARKS:

SOURCE: 690

LANDFORM AND LOCATION: ACTIVE FLOODPLAIN - SUMMIT CREEK

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	0
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	GENERAL HABITAT	1
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	POTENTIAL FOR EROSION, SILTATION AND ALTERATION OF EXISTING DRAINAGE PATTERNS	3
LAND STATUS AND USE:	GAME SANCTUARY IBP SITE 16 RECREATION POTENTIAL	3
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

SOURCE: 690

LANDFORM AND LOCATION: ALLUVIAL FLOODPLAIN

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	0
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	GENERAL HABITAT	1
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	POTENTIAL FOR SLUMPING AND EROSION	2
LAND STATUS AND USE:	INDUSTRIAL (ABANDONED PIPELINE, PUMPING STATION AND OIL STORAGE TANKS) GAME SANCTUARY (WEST OF ALASKA HWY.) IBP SITE 16 (WEST OF ALASKA HWY.) HUNTING/TRAPPING AREA OUTFITTER/GUIDING AREA	3
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	700
SAMPLE NOS.	700-1, 700-2
LANDFORM AND LOCATION	BD east of Bear Creek near MacIntosh Lodge
MATERIAL	gravel and sand
ESTIMATED VOLUME	1 000 000 m^3 to 1 500 000 m^3
AIRPHOTO NOS.	HIGH LEVEL A23793-215
	LOW LEVEL A24052-148

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 700 is a large beach terrace east of Bear Creek, approximate kilometre post AH1646, which is currently being developed as an active borrow source. About 700 m of the deposit are exposed in a series of slopes and level benches rising to approximately 40 m above the highway. At the base of the deposit and on the opposite side of Bear Creek is located the small settlement known locally as MacIntosh Lodge.

Biotic

Adjacent to the existing pit the slopes and level benches are grass-covered, but have been heavily-grazed by cattle and horses. Spruce and poplar stands are present behind the gravel terraces.

Use by wildlife is unlikely since horses and cattle are present. Bank Swallows use the slopes for nesting.

The terrace is one of the more dominant landforms of the area and existing excavations in lower slopes are very visible from the highway, marring its natural beauty.

GRANULAR RESOURCES

Sample 700-1, taken from the upper wall of the borrow pit, was composed of gravel and sand, with a trace of silt. More than 75% of the material is quartzite, with greenstone (12%) and soft sandstones (8%) making up most of the remainder. The overburden at this location is limited to approximately 0.5 m of silt, which lies directly on the gravel. Access, of course, has already been developed into the existing pit.

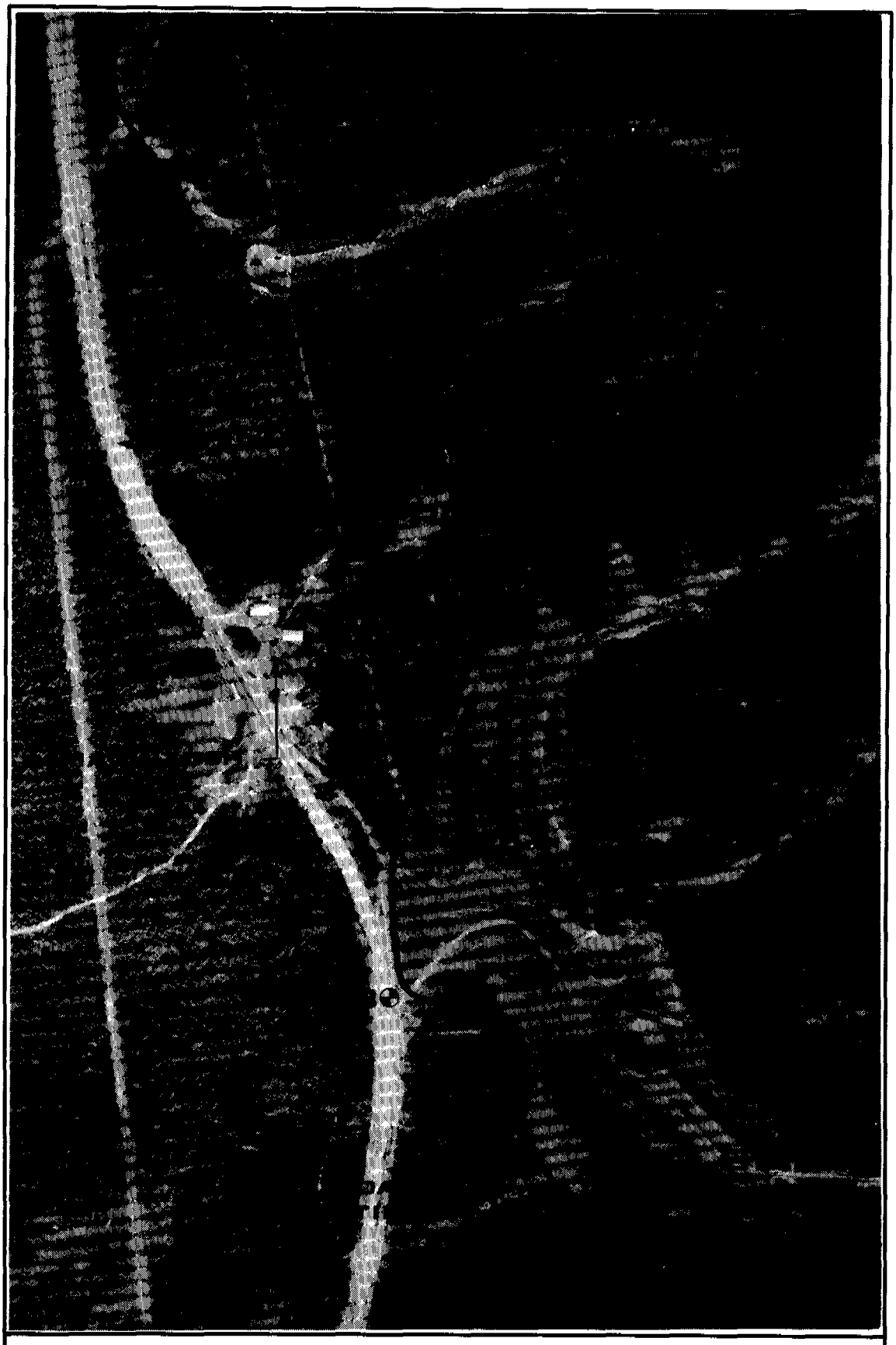
Although distinct stratification is evident in exposures along the walls of the existing pit, the deposit appears to be remarkably uniform. The northeast limit of granular material within the terrace is not known at the present time. On the basis of the position of the boundary shown on the accompanying airphoto, between 1 000 000 m3 and 1 500 000 m^3 of material may remain at the present time and more may exist along the flanks of the deposit.

DEVELOPMENT

Continued development of this source is highly recommended, in spite of its potential as a geologic interpretive site tourist view point. Grain size analyses of both the natural sediments (700-1) and stockpile (700-2) indicate that this site could provide material for concrete, base courses and sub-bases with minimal processing and blending, screening and crushing could also be employed to produce asphalt.

Five cycle sulphate soundness tests on Sample 700-1 resulted in a loss of 4.4% in the fine fraction and 3.4% in the coarse fraction. These figures are well within the acceptable limits proposed for the Shakwak Project.

The terraces are positioned such that borrow operations cannot be hidden from view along the highway, however, the natural terraces could be reclaimed after the pit is abandoned. The proximity of this source to Haines Junction makes it suitable for use by the community, as well as Public Works and Foothills Pipeline.



Source Nos. 700

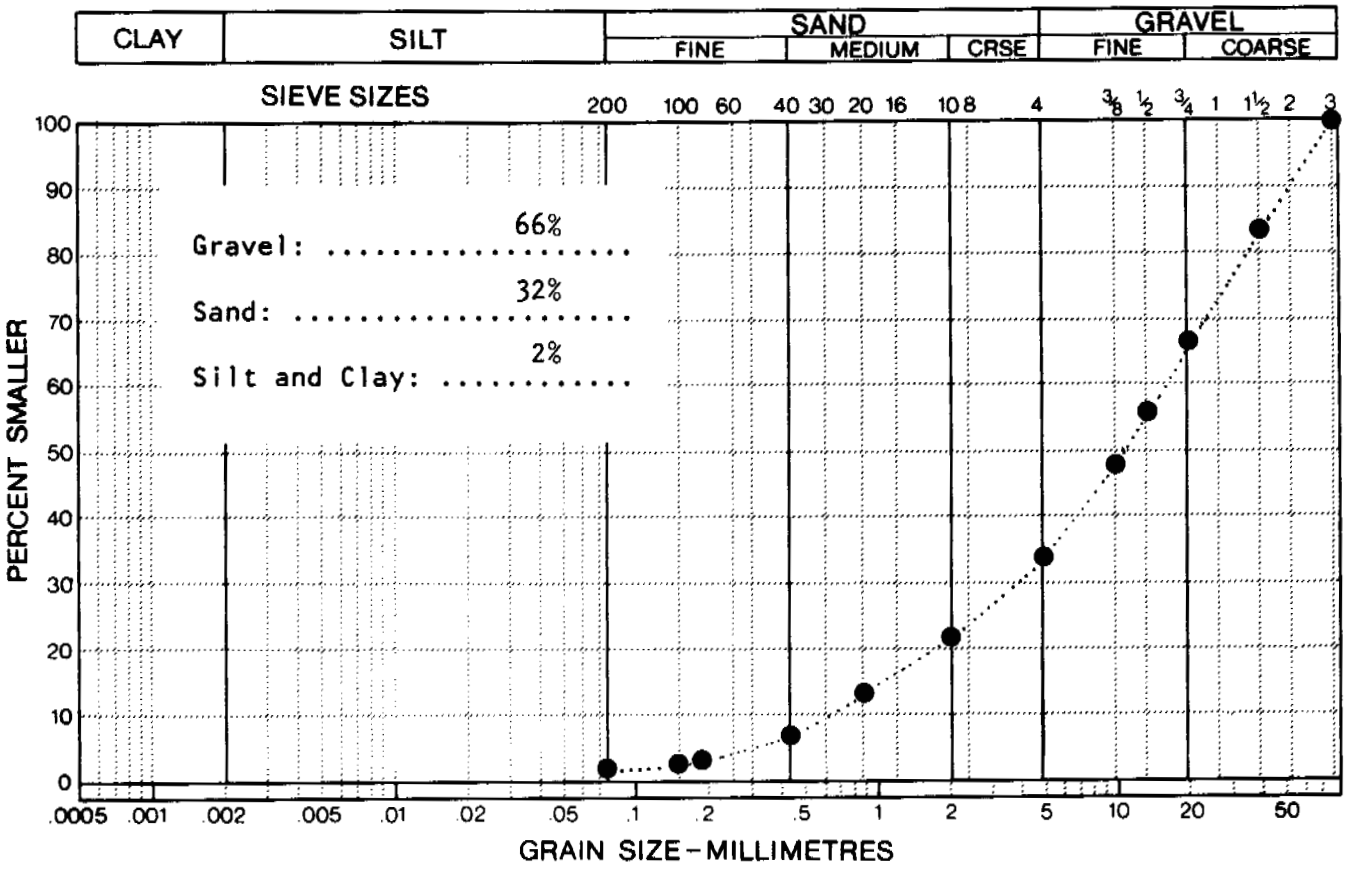
Airphoto No. A24052-148

LABORATORY ANALYSIS

SOURCE NO. 700

PIT NO. 700-1

EXPOSURE: active borrow area



MATERIAL TYPE: gravel and sand, trace of silt

GENISIS (LANDFORM): beach deposit

PETROGRAPHIC ANALYSIS:
quartzite 77%
diorite 12%
granite 7%
slate 4%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades, subangular

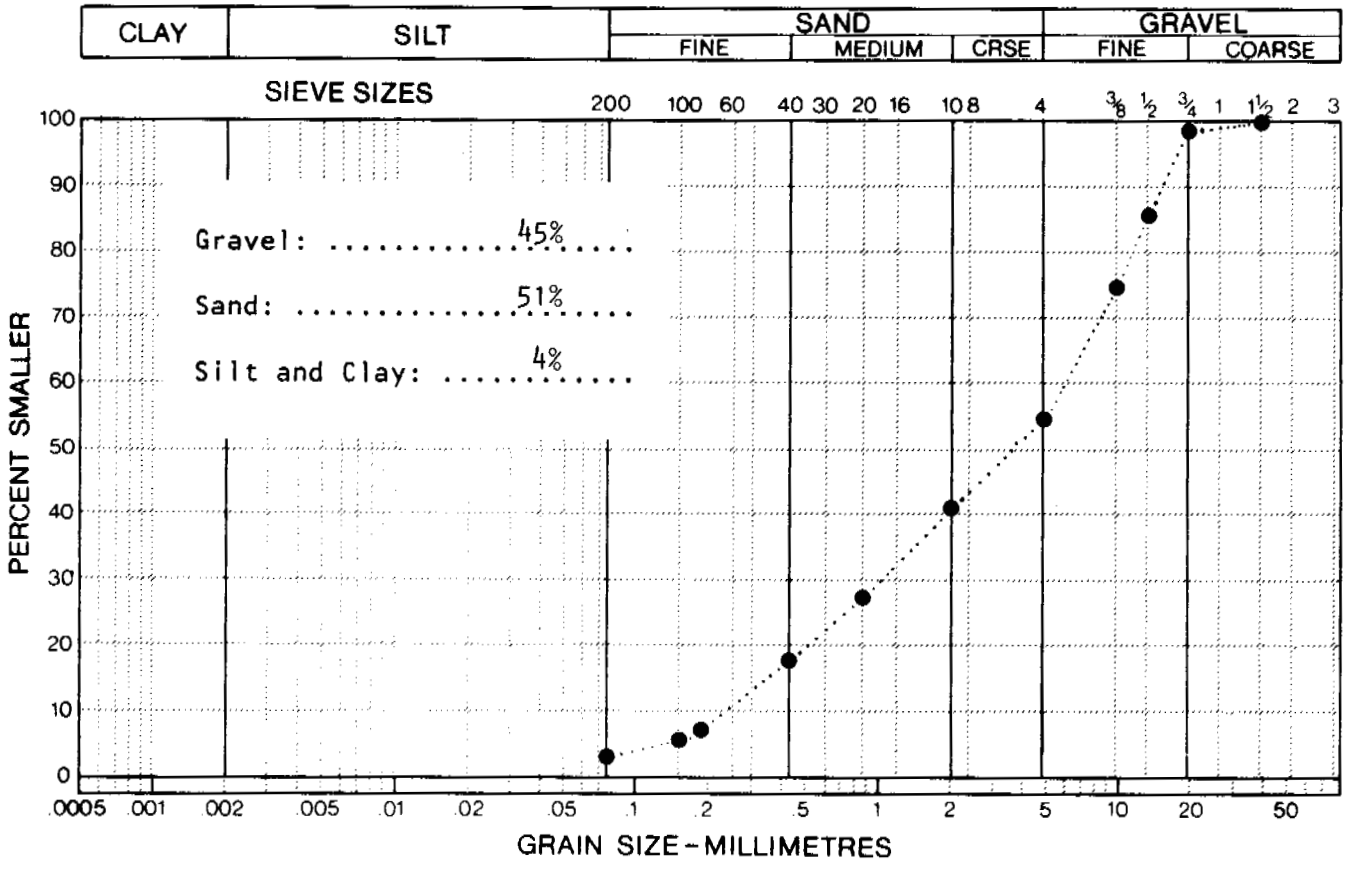
REMARKS: abundant calcareous coatings
loss after 5 cycles sulphate soundness test: coarse 3.4%, fine 4.4%

LABORATORY ANALYSIS

SOURCE NO. 700

PIT NO. 700-2

EXPOSURE: stockpile



MATERIAL TYPE: sand and gravel, trace of silt

GENISIS (LANDFORM): crushed sample from beach deposit

PETROGRAPHIC ANALYSIS:

quartzite 81%
granite 8%
slate 7%
diorite 2%
schist 2%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades and spheroids, subangular

REMARKS: abundant calcareous coatings

SOURCE NO. 700

PIT NO. 700-2

EXPOSURE: stockpile

MATERIAL TYPE: sandy gravel, some silt

GENESIS (LANDFORM): BD

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

SOURCE: 700

LANDFORM AND LOCATION: BEACH TERRACE

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	0
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	2
TERRESTRIAL FAUNA:	NO INVOLVEMENT	0
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	TOURIST LODGE AGRICULTURE/GRAZING RECREATION POTENTIAL EXISTING BORROW SITE	3
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	UNUSUAL LANDFORM POTENTIAL VIEWPOINT AND GEOLOGIC INTERPRETIVE SITE	3

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	710
SAMPLE NOS.	none taken
LANDFORM AND LOCATION	BD northwest of Bear Creek
MATERIAL	sand and gravel
ESTIMATED VOLUME	probable minimum of 300 000 m^3, may exceed 1 200 000 m^3
AIRPHOTO NOS.	HIGH LEVEL A23793-217
	LOW LEVEL A24051-15 A24052-148

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 710 is a beach terrace southwest of Bear Creek, adjacent to and the same age as Source No. 700, which is under development. Elevation, orientation and drainage are also similar to that encountered at Source No. 700. This terrace, however, has not been developed. The abandoned pipeline traverses the northwest flank of the terrace.

Biotic

This portion of the beach deposit is grass-covered on the crest with thick stands of spruce and willow. On lower slopes the grass ground cover is replaced by kinnikinnick and aspen and balsam poplar form the tree cover.

The site offers some suitable grouse habitat but none were observed. There is no direct involvement of aquatic systems, although Bear Creek is in close proximity.

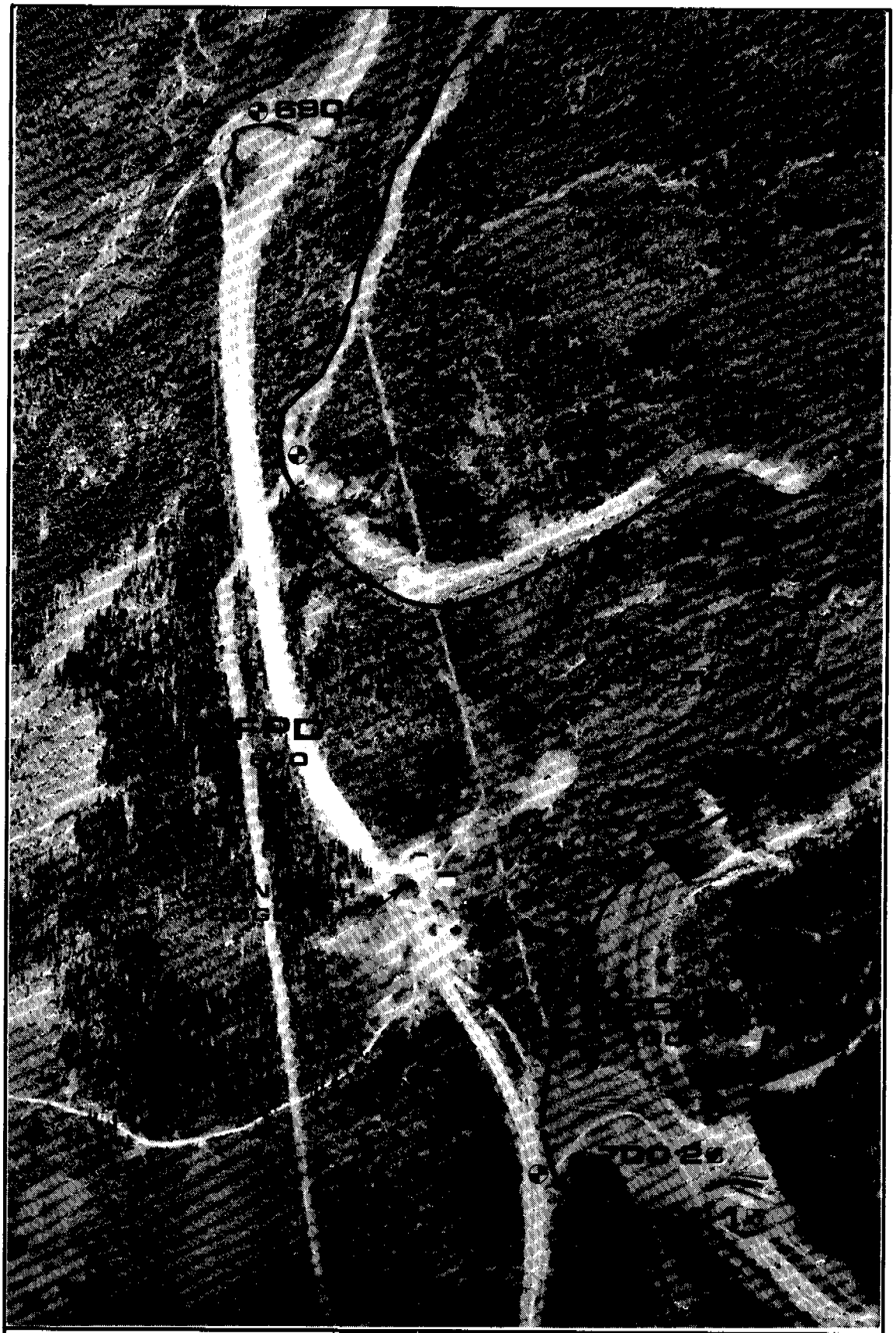
The beach ridge at this location is adjacent to the highway but partially screened by trees. The abandoned pipeline right-of-way makes an obvious vertical ascent of the hillside. The area has some interest and tourist potential but is not as predominant a landform as Source No. 700.

GRANULAR RESOURCE

Gradation, petrology and uniformity of this deposit are expected to be similar to that observed at Source No. 700, although no samples were taken for laboratory analysis. The distribution of vegetation on the upper part of the terrace suggests that only a narrow margin along the western flank of the deposit is composed of coarse granular material. Volume calculations based on this criterion are presented as a probable minimum of 350 000 m^3. Up to 1 200 000 m^3 or more may be available if the width of the gravel deposit along the flank proves to be larger.

DEVELOPMENT

Excellent access and the presence of another active pit in the same area makes this source ideal for development. Further exploration would be necessary to define the size and quality of the granular resources available.



Source Nos. 690, 710

Airphoto No. A24051-15

SOURCE NO. 710

PIT NO. 710-1

EXPOSURE: pipeline cut

MATERIAL TYPE: sand and gravel

GENESIS (LANDFORM): BD

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

SOURCE: 710

LANDFORM AND LOCATION: BEACH TERRACE

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	0
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	GENERAL HABITAT	1
AQUATIC FAUNA:	NO INVOLVEMENT	0
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	INDUSTRIAL USE (ABANDONED PIPELINE) AGRICULTURE/GRAZING	2
HISTORIC RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	UNUSUAL LANDFORM	1

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	720
SAMPLE NOS.	720-1
LANDFORM AND LOCATION	BD southeast of Kloo Lake
MATERIAL	gravelly sand, trace of silt
ESTIMATED VOLUME	560 000 m^3
AIRPHOTO NOS.	HIGH LEVEL A11452-217
	LOW LEVEL A24051-53

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 720 is a beach deposit forming a low, northeast trending ridge which intersects an abandoned section of the highway near kilometre post AH1661. North of the road the source extends for approximately 2.5 km with an average width of 150 m to 180 m, but south of the road the width diminishes to approximately 40 m and the length to 1 km. The site has previously been used for borrow but is well-screened from the existing highway alignment.

Biotic

The vegetation is composed of thick immature spruce with occasional aspen. Shepherdia and a few shrub willows form the understory with a sparse ground cover of kinnikinnick and grasses. Some old excavations are bare of vegetation.

The area has some potential for moose, and a creek through the area shows beaver activity. There are also minor concerns for small tributaries of the Jarvis River which are potential grayling habitat.

Access to borrow would be via an abandoned highway section. Other land uses are hunting and trapping. Lands bordering the site to the north are potential Indian land claims.

GRANULAR RESOURCES

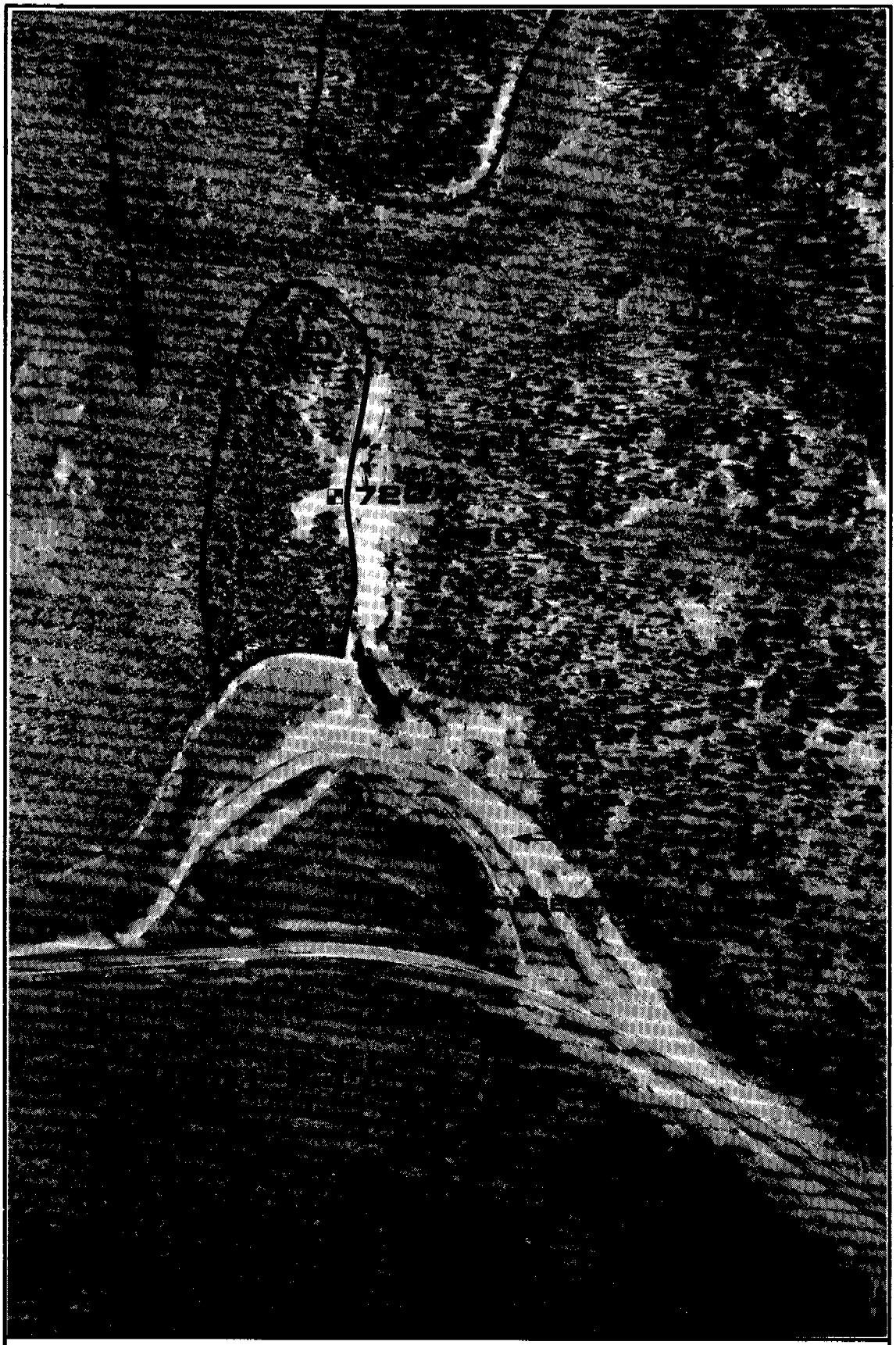
The source is primarily composed of subrounded, gravelly sand, with some cobbles and boulders and a trace of silt. A petrographic analysis of sample 720-1 shows the main constituent to be quartzite (47.9%). Other rocks identified included granite (24%), diorite (20%), and less than 10% of syenite, slate, and shist. Since only one ridge is present, it is believed that the grain size distribution and petrology of the material will not be highly variable along the length of the deposit. Some segregation may exist across the deposit, but this was not tested during the study. Less than 0.3 m of overburden was apparent at the sample location, and the morphology of the site makes it unlikely that this will be exceeded in many places.

Access to borrow via the abandoned highway section and existing borrow site is excellent.

The estimated volume of 560 000 m^3 has been calculated using a triangular cross section with width equal to 150 m and an average height of 3 m for the material north of the road. No allowance was made for the thinner deposits to the south, since these may be unsuitable for economic development. This volume may be further reduced if future studies show that the deposit is not homogeneous across the entire width of the ridge.

DEVELOPMENT

The material in this source is expected to be suitable for asphalt aggregate with some selective screening. Future information on the heterogeneity of the deposit should be acquired to assess potential methods of development.



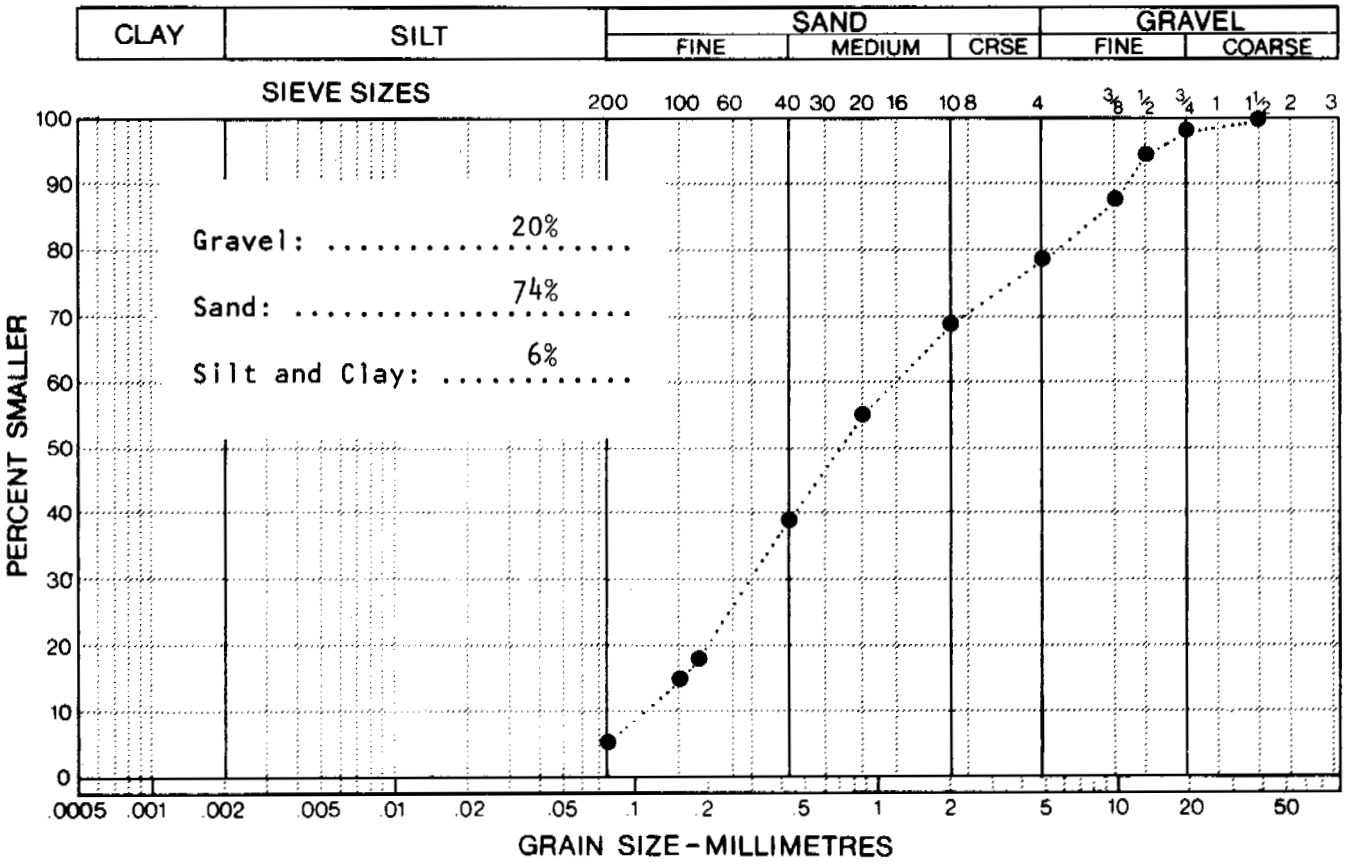
Source Nos. 660 and 720 Airphoto No. A24051-53

LABORATORY ANALYSIS

SOURCE NO. 720

PIT NO. 720-1

EXPOSURE: abandoned borrow pit



MATERIAL TYPE: gravelly sand, trace of silt

GENISIS (LANDFORM): beach deposit

PETROGRAPHIC ANALYSIS:

quartzite 47%
granite 24%
diorite 20%
syenite 6%
slate 2%
schist 1%

MAIN FRACTION PARTICLE SHAPE & ROUNDNESS: blades and rollers, subrounded

REMARKS: minor calcareous coatings

SOURCE: 720

LANDFORM AND LOCATION: BEACH DEPOSIT

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	1
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	BEAVER HABITAT	2
AQUATIC FAUNA:	POSSIBLE GRAYLING HABITAT IN TRIBUTARY OF JARVIS RIVER	1
SURFACE WATER:	NO IMPACT	0
LAND STATUS AND USE:	BORDERS POTENTIAL INDIAN LAND CLAIM HUNTING AREA OUTFITTER/GUIDING AREA TRAPPING AREA EXISTING BORROW SITE	1
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	730
SAMPLE NOS.	not sampled
LANDFORM AND LOCATION	AMP of Jarvis River, near Kloo Lake, approximate kilometre post AH1663
MATERIAL	sand and gravel
ESTIMATED VOLUME	120 000 m^3
AIRPHOTO NOS.	HIGH LEVEL A11452-217
	LOW LEVEL A24051-138

DETAILED ASSESSMENT

ENVIRONMENT

Physical

The active meander plain of the Jarvis River has been designated Source No. 730. Sand and gravel, typical of AMP deposits, were observed at site 730-1, located near a highway rest stop immediately adjacent to the highway bridge crossing. The Jarvis River at this location is approximately 10 m wide in a shallow riffle, and the AMP near the highway varies between 120 and 200 m in width. Unlike some of the alluvial sources to the south, the lateral extent of the AMP, and hence the granular material, is difficult to assess.

Biotic

Vegetation consists of low-growing shrub willows and birches with some scattered spruce and a ground cover of moss. Extensive browse sign was observed, chiefly on shrub birch. Waterfowl were present on pools within the Jarvis River meander plain, and may use Kloo Lake for staging.

Within the river the water was clear over cobbles and fine gravel, with a well-developed algae cover on the bottom. The Jarvis River is a tributary of the Alsek system and supports grayling. Kloo Lake, drained by the Jarvis River, supports grayling, lake trout and pike.

West of the Alaska Highway the meander plain is within the Kluane Game Sancturary. Sports fishing is active. A YTG highway rest stop provides ready access to the river west of the highway bridge. Grazing leases and potential Indian lands border the deposit on the east side.

GRANULAR RESOURCES

No samples of sand and gravel were recovered at this site for laboratory testing, but the petrology and grain size distribution of the coarse material are expected to be similar to that determined for Source No. 690. The organic overburden on the AMP is very thin, generally less than 0.3 m in depth, and virtually absent in some places. Oxbows and cutoffs within the AMP suggest that the deposit may be nonuniform and difficult to mine economically.

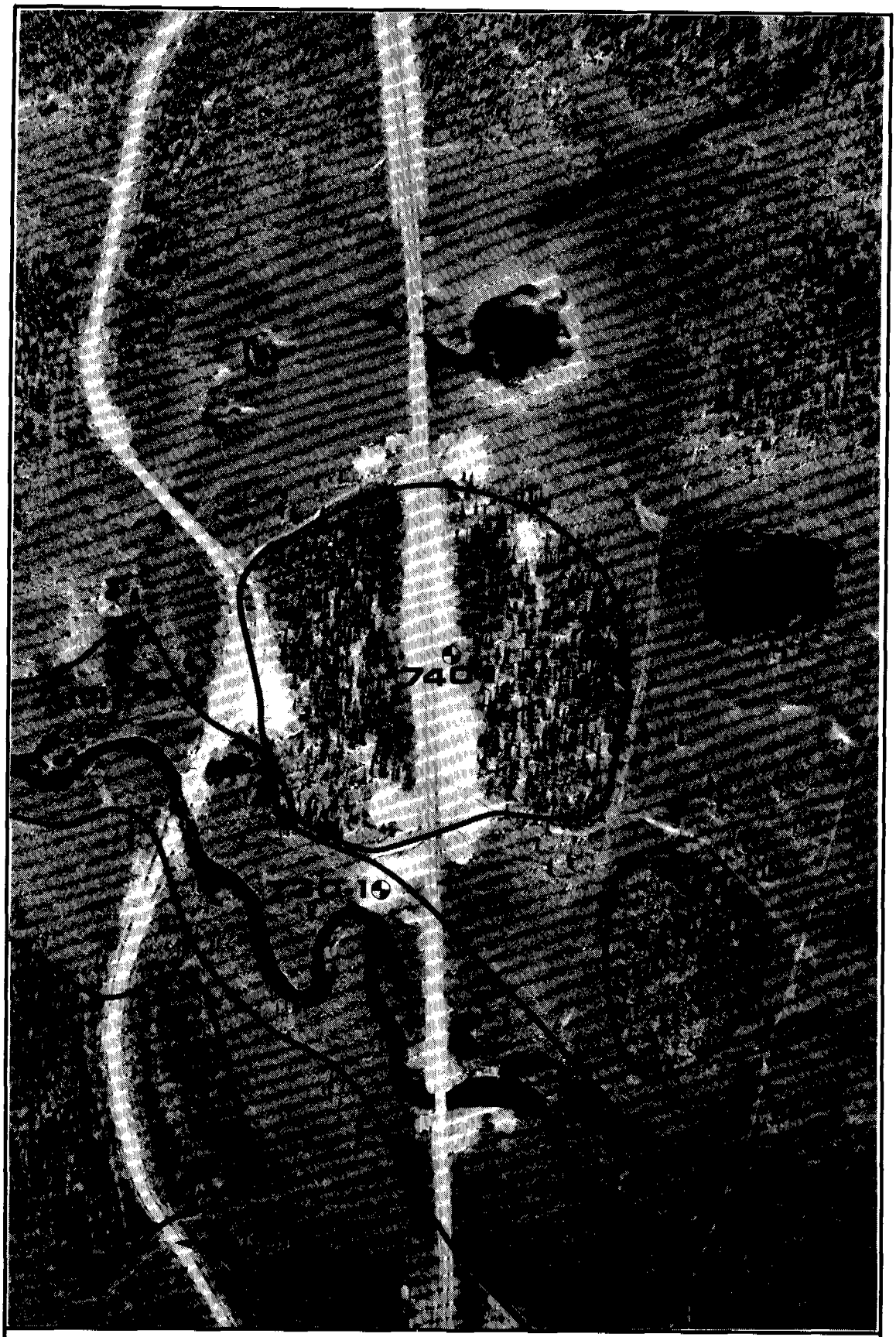
Poor airphoto coverage in this area hampered the estimate of granular resource volumes. Using an average recoverable depth of 1.5 m and an average AMP width of 80 m, approximately 120 000 m^3 could be recovered within 500 m of the highway. More may be available in low-lying adjacent areas of UD, which may represent abandoned AMP's of the same system.

DEVELOPMENT

No specific guidelines are available for potential use of material for this site, since no laboratory information is available. On the basis of the results from other AMP's in the same locality, it is expected that suitable blending and crushing methods could be used to produce asphalt, concrete, as well as base and sub-base courses.

36-0260

In view of the difficulties of extracting large amounts of material within acceptable environmental guidelines, no development of this source is currently recommended.



SOURCE NO. 730, 740 AIRPHOTOGRAPH NO. A24051-138

SOURCE NO. 730

PIT NO. 730-1

EXPOSURE: hand excavated test pit

MATERIAL TYPE: sand and gravel

GENESIS (LANDFORM): AMP

REMARKS:

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS:

SOURCE: 730

LANDFORM AND LOCATION: JARVIS RIVER ACTIVE MEANDER PLAIN

PARAMETER	ENVIRONMENTAL CONCERN	EVALUATION
GEOTERRAIN:	POTENTIAL FOR EROSION	2
VEGETATION:	COMMERCIAL AND/OR AESTHETIC VALUE	1
TERRESTRIAL FAUNA:	WATERFOWL HABITAT	2
AQUATIC FAUNA:	GRAYLING IN JARVIS RIVER GRAYLING, LAKE TROUT, PIKE AND WHITEFISH IN KLOO LAKE	1
SURFACE WATER:	POTENTIAL FOR SLUMPING, EROSION, SILTATION AND ALTERATION OF EXISTING DRAINAGE PATTERNS	1
LAND STATUS AND USE:	GAME SANCTUARY IBP SITE 16 HIGHWAY REST STOP SPORT FISHING AGRICULTURE/GRAZING BORDERS POTENTIAL INDIAN LAND CLAIMS	3
HERITAGE RESOURCES:	NO INVOLVEMENT	0
SPECIAL INTEREST:	NONE	0

36-0260

DETAILED SOURCE ASSESSMENT SHEET

SOURCE NO.	740
SAMPLE NOS.	not sampled
LANDFORM AND LOCATION	possible kames adjacent to Alaska Highway near Kloo Lake and Sulphur Lake
MATERIAL	gravel, sand and silt
ESTIMATED VOLUME	possible 2 000 000 m^3
AIRPHOTO NOS.	HIGH LEVEL A11452-217
	LOW LEVEL A24051-138

DETAILED ASSESSMENT

ENVIRONMENT

Physical

Source No. 740 is a series of low, roughly circular knobs adjacent to the Alaska Highway south of Kloo Lake and again near Sulphur Lake. The deposits, which vary in size, may be moulin kames which have been partially buried by undifferentiated drift (Source No. 660). Pit 740-1, which was dug in a road cut near the Jarvis River, encountered a well stratified sequence of gravel, gravelly silt, and silt with some thin sand lenses. Some cobbles and boulders were also evident. Surface drainage on the deposit appears to be excellent, and the sediments examined were relatively dry. Overburden at this site consisted of approximately 0.2 m of organic topsoil and 0.2 to 0.5 m of silt, probably of loessal origin.

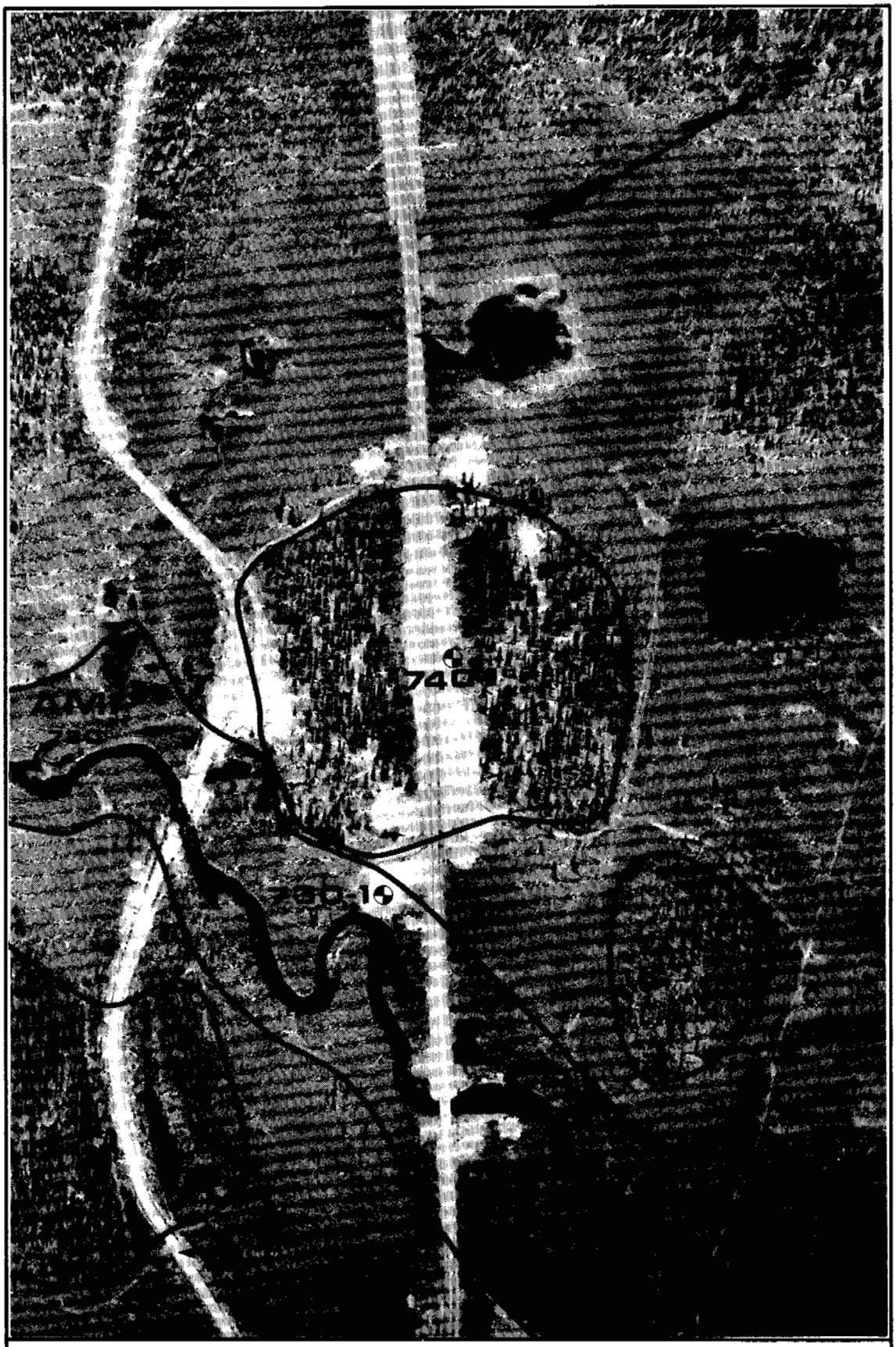
The suspected ice contact origin of this source suggests that any potential granular resources may be distributed nonuniformly, both within and between deposits, and therefore would be difficult to accurately access without further subsurface information.

A single kame, 6 m high, with an average diameter of 300 m, may contain as much as 400 000 m^3 of material.

DEVELOPMENT

Most of this would probably make excellent general fill, and selected areas which containlless silt may be suitable for engineering purposes, especially base and sub-base courses.

Access roads to all sites adjacent to the highway could be constructed at little expense.



SOURCE NO. 730, 740 AIRPHOTOGRAPH NO. A24051-138

SOURCE NO. 740

PIT NO. 740-1

EXPOSURE: road cut

MATERIAL TYPE: sand, some gravel, trace of cobbles and boulders

GENESIS (LANDFORM): K

REMARKS: stratified with silt

SOURCE NO.

PIT NO.

EXPOSURE:

MATERIAL TYPE:

GENESIS (LANDFORM):

REMARKS: