

CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

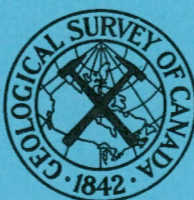
GEOLOGICAL SURVEY OF CANADA
TOPICAL REPORT NO. 115

YUKON RIVER DRAINAGE BASIN
DAM SITE INVESTIGATION

SITE No. 38

LOWER LAPIE CANYON DAM SITE
(MAP AND NOTES)

E. B. OWEN



OTTAWA
1967

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Lower Lapie Canyon Dam Site

General Description

The examination of Lower Lapie Canyon dam site was part of an investigation by the Water Resources Branch, Department of Energy, Mines and Resources of the hydroelectric power potential in the Yukon River drainage basin. Lower Lapie Canyon dam site is situated on Lapie River in Yukon Territory about 4 miles upstream from the junction of Lapie and Pelly Rivers. An alternate site (Upper Lapie Canyon) is situated about 4 and a half miles upstream. Lower Lapie Canyon dam site is included on National Topographic Series sheet No. 105F (Quiet Lake), scale 1:250,000 and on aerial photograph A12371-395. The geology is described on Geological Survey of Canada map No. 7-1960.¹

The purpose of constructing a dam on Lapie River would be to provide storage for larger dams on Pelly River. There is neither sufficient head (about 6 feet) nor water at the site for the development of hydroelectric power. A road presently under construction between the communities of Ross River and Carmacks passes through the site. The determination of bedrock conditions in the abutments of the proposed dam site was made easier by the examination of rock cores obtained by the Department of Public Works during a drilling program to determine the suitability of bedrock as foundation material for a permanent bridge across Lapie River. The location of the bridge is indicated on the accompanying geological map of the proposed dam site area and the locations of the test holes are shown on a plan prepared by the Department of Public Works which is included in this report. The following is a summary of the test hole data:

¹ Wheeler, J.O., Green, L.H. and Roddick, J.A.: Geology, Quiet Lake, Yukon Territory; Geol. Surv., Can, Map 7-1960, 1960.

Test Hole Number	Elevations (feet)		
	Ground Surface	Bedrock Surface	Bottom of Hole
1	2454	2445.5	2426.5
2	2452	2450	2427
3	2452	2449.5	2429
4	2454	2454	2433
5	2455	2453.5	2427.5

One result of the drilling indicates bedrock near surface is highly weathered and incompetent. Numerous hair-thin fractures in the rock made it difficult to obtain lengths of NX core greater than 3 inches. At least 30 feet of rock will have to be removed from the canyon walls before rock suitable as abutment material for the proposed dam will be exposed. Also, about 10 feet of rock should be removed from the surface of bedrock exposed above the canyon. Descriptions of potential construction materials which are readily accessible from the site are included in this report. The following reports describing other proposed dam sites in the Yukon River drainage basin also contain descriptions of potential construction materials which may be useful at the Lower Lapie Canyon project. These sites are all within 20 air miles of Lower Lapie Canyon.

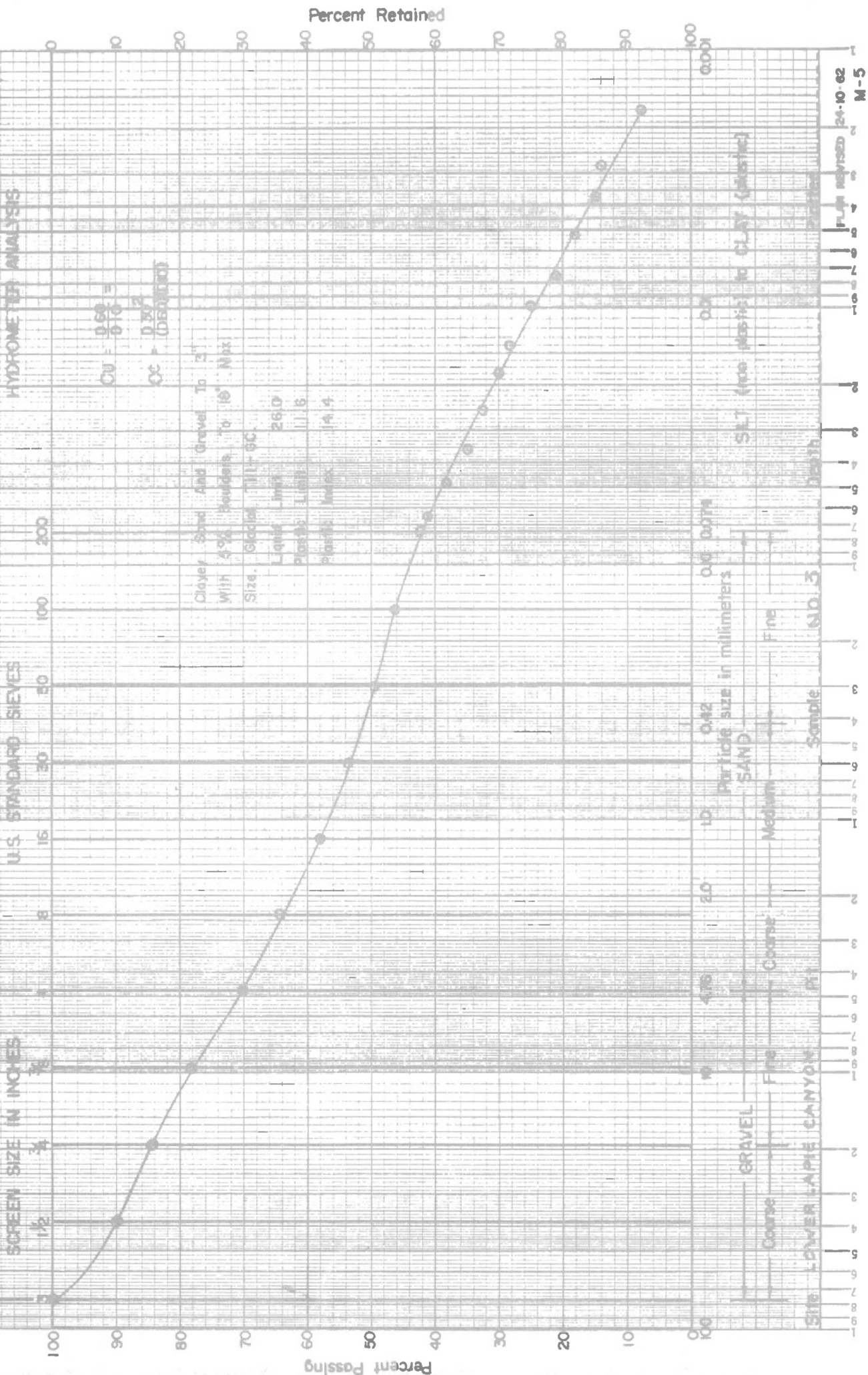
Dam Site	Topical Report Number	Site Number
Ross Canyon	39	28
Hoole Canyon	105	27
Upper Lapie Canyon	122	33

Description of Potential Impervious Material for the following Grain Size Analyses Curves

Sample Number	Location	Field Description of Material	Group* Symbol	Field Description of Overburden	Thickness of Deposit	Aerial Extent (Estimated)	Remarks
3	40-foot cut on north side of Ross River - Carmacks Road; 2.7 miles west of Canol Road; 5 feet above road; 12 inches beneath ground surface	Till: Clayey, sandy, dense, brown-grey, dry; angular granitic and quartzitic boulders to 18 inches, most less than 6 inches.	GC	None	40 + feet	Unlimited	L.L. - 26.0 P.L. - 11.6 P.I. - 14.4 Cut is on the side of a large, elongated till ridge; frozen material liquifies when thawed.
8	30-foot cut on north side of Ross River - Carmacks Road; .7 miles west of Canol Road; 10 feet above road; 18 inches beneath ground surface	Till: silty, sandy, dense, brown-grey, dry; largest rock fragment is 2 inches	ML	None	30 + feet	Unlimited	Cut is along the toe of a large, elongated till ridge; excellent material on which to build a road.
9	10 - foot cut on north side of Ross River - Carmacks Road; one mile west of Canol Road; 6 feet above road; 12 inches beneath ground surface	Till: clayey, silty, sandy, dense, grey-brown, dry; angular boulders of black chert, schist and quartzite to 10 inches.	ML - CL	None	10 + feet	Unlimited	L.L. - 22.1 P.I. - 16.7 Cut is along the toe of a large, elongated till ridge.

* Unified Soil Classification System

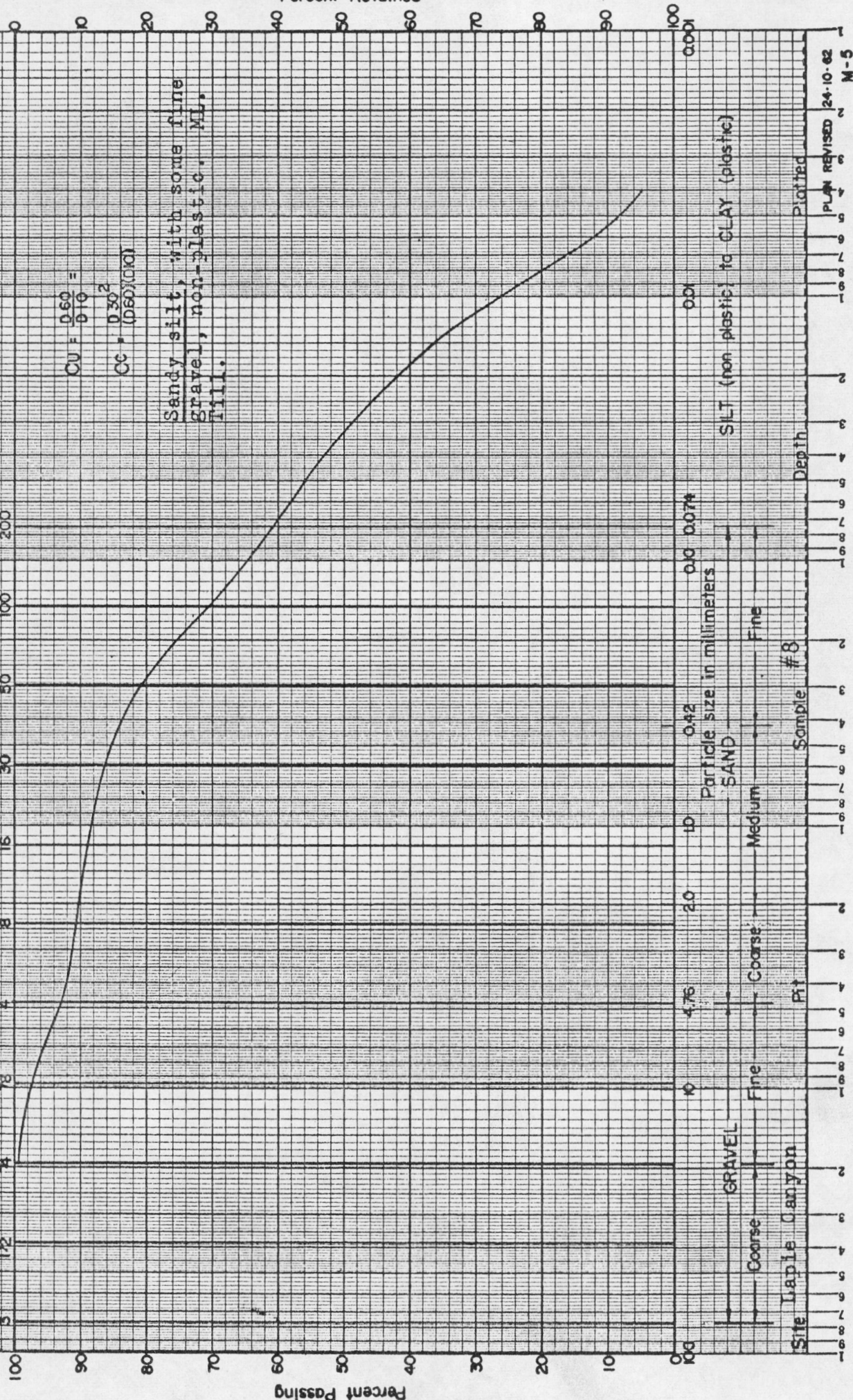
WATER RESOURCES BRANCH
GRAIN SIZE ANALYSIS



WATER RESOURCES BRANCH

GRAIN SIZE ANALYSIS

HYDROMETER ANALYSIS



$CU = \frac{D_{60}}{D_{10}} =$
 $CC = \frac{D_{30}^2}{(D_{60} \times D_{10})}$

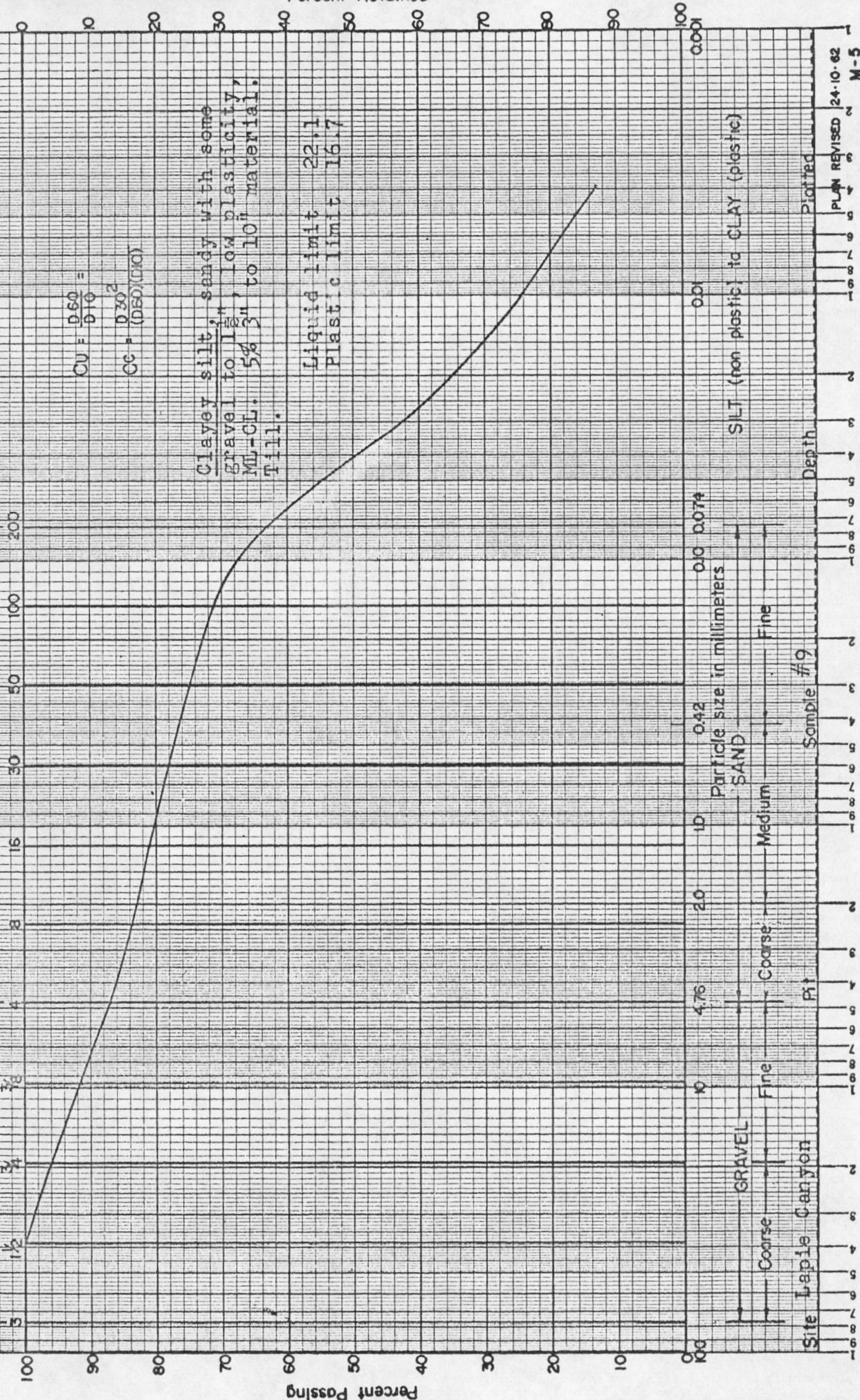
Sandy silt, with some fine gravel, non-plastic, MU, fill.

WATER RESOURCES BRANCH

GRAIN SIZE ANALYSIS

U.S. STANDARD SIEVES

HYDROMETER ANALYSIS



$CU = \frac{D_{60}}{D_{10}} =$
 $CC = \frac{D_{30}^2}{(D_{60} \times D_{10})}$

Clayey silt, sandy with some gravel to 1/2", low plasticity, MU-CL. 5% 3" to 10" material. Till.

Liquid limit 22.1
Plastic limit 16.7

SILT (non plastic) to CLAY (plastic)

PLANNED 24-10-62
M-5

Description of Potential Impervious Material for the following Grain Size Analysis Curve

Sample Number	Location	Field Description of Material	Group* Symbol	Field Description of Overburden	Thickness of Deposit	Aerial Extent (Estimated)	Remarks
10	Large cut on north side of Ross River - Carmacks Road; 9.2 miles west of Canol Road; 2 feet above road; 18 inches beneath ground surface	Till: sandy, silty, clayey, dense, dark grey; numerous black chert pebbles, weathered granitic boulders to 10 inches.	GM-GC	None	30 + feet	Unlimited	L.L. - 22.6 P.I. - 15.8

* Unified Soil Classification System.

GRAIN SIZE ANALYSIS

HYDROMETER ANALYSIS

Percent Passing

Percent Retained

SCREEN SIZE IN INCHES

U.S. STANDARD SIEVES

200

100

50

30

16

8

4

2

1 1/2

3

100 90 80 70 60 50 40 30 20 10 0

CU = $\frac{0.60}{0.10} =$

CC = $\frac{0.30^2}{(0.60)(0.10)}$

Gravel-sand mixture with silt-clay binder, fines are slightly plastic, max. size 1 1/2" with 5% 3/8" to 10# oversize material, GM-GC. Till.

Liquid limit 22.6
Plastic limit 15.8

100 90 80 70 60 50 40 30 20 10 0

Particle size in millimeters

0.075

0.15

0.3

0.6

1.18

2.0

4.75

100

SAND

Fine

Medium

Coarse

GRAVEL

Fine

Coarse

SILT (non plastic) to CLAY (plastic)

Site

Trapie Canyon

Sample #10

Depth

Plotted

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

PLAN REVISED 24-10-62

M-5

Chemical Analyses of Lapie River Water at Lower Lapie Canyon dam site
(parts per million)

Location	Date	River Discharge	PH	SiO ₂	Ca	Mg	Na	K	Fe	CO ₃	HCO ₃	SO ₄	Cl	F	NO ₃	Turbidity	Hardness as CaCO ₃
Upstream end of dam site; right side; 12 inches beneath water surface	Aug. 18, 1964 — Temp. 47°F.	low	8.1	5.6	52.6	22.2	1.4	0.7	0.29	0	191	59	0.2	0.16	0.2	0.5	223
"	June 29, 1966 — Temp. 47°F.	med.	7.7	4.4	32.3	12.7	0.9	0.5	1.0	0	129	28.2	0.5	0.06	0.05	5.0	133

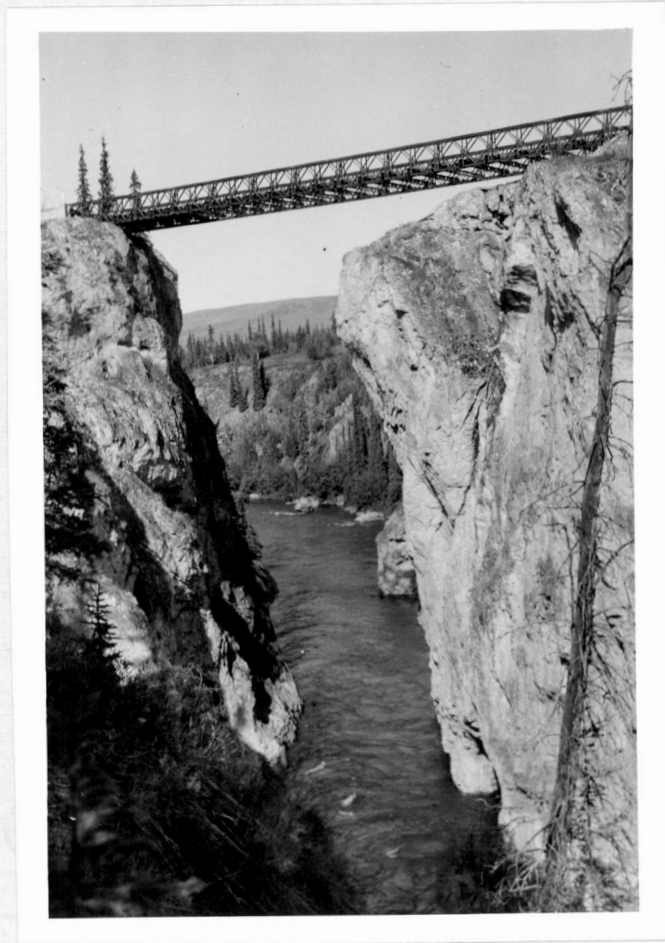


Plate 1

View looking downstream through Lower Lapie Canyon; floor
of temporary bailey bridge is 107 feet above water surface.

G.S.C. 16-4-64

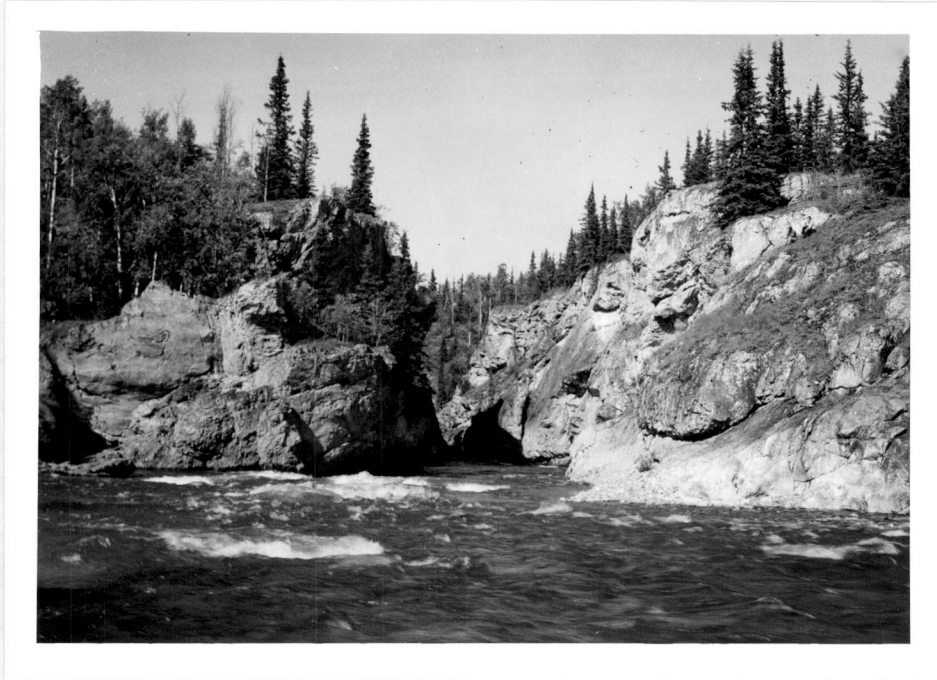


Plate 2

View looking downstream toward Upper end of Lower Lapie Canyon; photograph was taken about 1,800 feet upstream from the bridge shown in plate 1.

G.S.C. 16-8-64

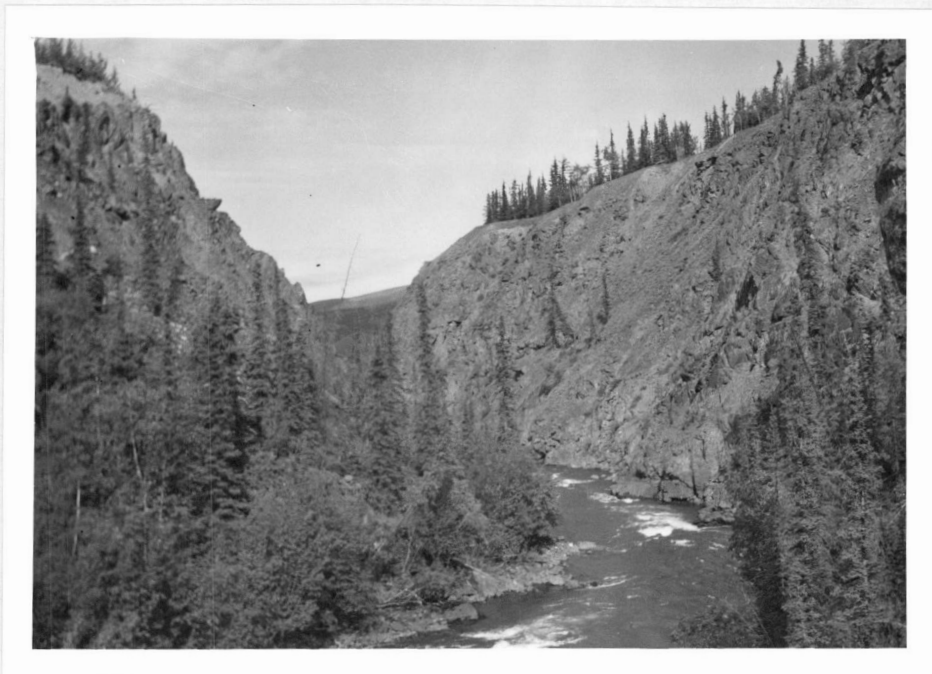


Plate 3

View looking downstream toward the lower end of Lower
Lapie Canyon.

G.S.C. 15-7-64



Plate 4

Fracture in bedrock in right abutment area; fracture is about 100 feet long and varies in width from 2 to 6 inches; it is about 30 feet from the wall of the canyon and is parallel to it.

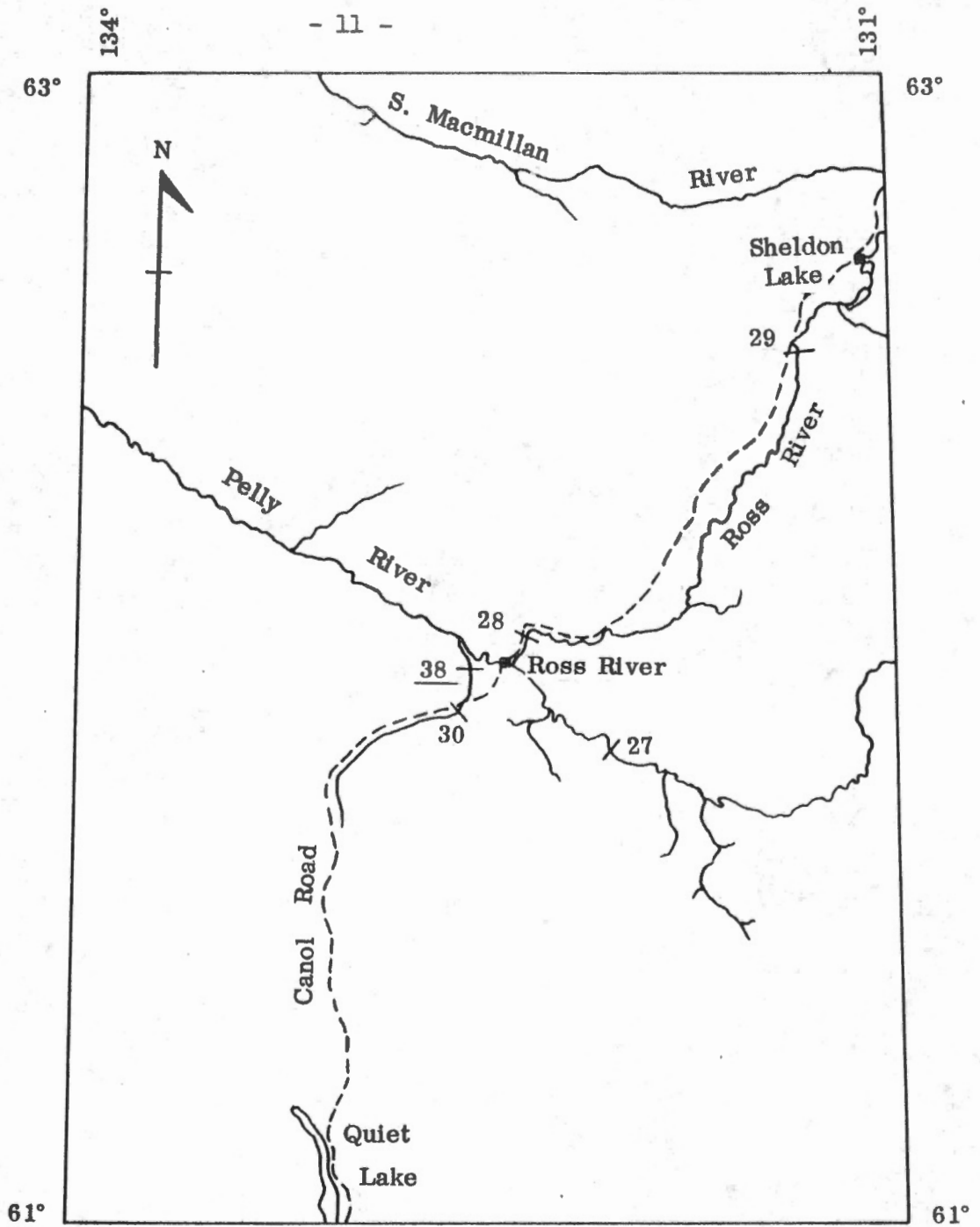
G.S.C. 1-2-66



Plate 5

Till exposed in a 40-foot cut along the north side of the
Ross River - Carmacks Road; 2.7 miles west of the Canol
Road; soil sample No. 3 taken here.

G.S.C. 1-1-66



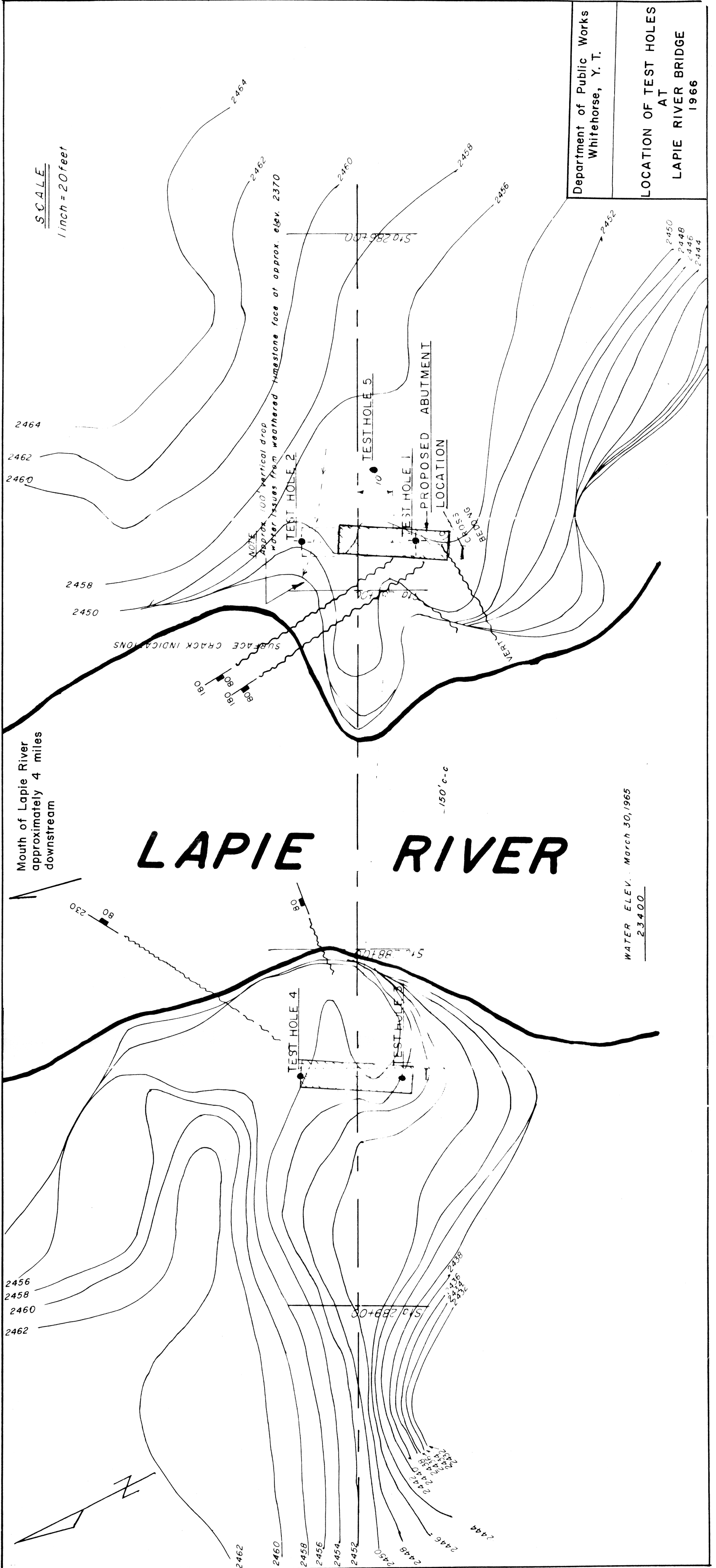
**LOCATION OF PROPOSED DAM SITES
YUKON RIVER DRAINAGE BASIN**
Scale: 1 inch = 20 miles

<u>Site No.</u>	<u>Name</u>	<u>River</u>
27	Hoole Canyon	Pelly
28	Ross Canyon	Ross
29	Prevost Canyon	Ross
30	Upper Lapie Canyon	Lapie
38	<u>Lower Lapie Canyon</u>	Lapie

SCALE
1 inch = 20 feet

Department of Public Works
Whitehorse, Y. T.

LOCATION OF TEST HOLES
AT
LAPIE RIVER BRIDGE
1966



Mouth of Lapie River
approximately 4 miles
downstream

LAPIE RIVER

WATER ELEV. March 30, 1965
23400