

F.55-20



ONTARIO
DEPARTMENT OF HIGHWAYS

Memo to.....Mr. F. C. Browaridge..... Date.....September 1, 1955.....
.....Materials and Research Engineer..... Subject Re: Foundation of the Culvert.....
From.....G. N. Farantatos..... at Station 339+70 on Highway #16.....

The subsurface exploration for the soil condition on the site of the existing culvert at the intersection of Highway #16 and Rideau River was completed and the soil testing done.

This letter is a preliminary report with final recommendations drawn from the soil testing of the underlying soil.

The present beam and slab culvert is found on a layer of soft marine clay. The beams have sagged badly and the reinforcements have been exposed to deterioration and corrosion. It is therefore desirable to replace the present culvert with a flexible type.

The corrugated pipe culvert is thought to be the best to meet this kind of soil condition. A 14 ft. diameter pipe culvert is believed to be able to provide the necessary cross-sectional area for the flow of the river.

If the same location is used, the proposed grade is safe regarding slope stability.

If another location close to the present one is desirable, for construction purposes, the same type of pipe culvert could also be used, but the fill should not exceed the safe height of 30 ft. at any point.

The backfill of the culvert should be done according to recommendations from the manufacturers of the pipes.

The final report will be ready within the next two weeks.

(G. N. Farantatos)
Foundation Engineer

GNF:GGP

Copies: J. B. Wilkes
File

Mr. F. C. Brownridge

September 1, 1955

Materials and Research Engineer

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G. N. Farantatos

at Station 339+70 on Highway #16

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GWF:GCP


(G. N. Farantatos)
Foundation Engineer

Copies: J. B. Wilkes
File

A Report on the Subsurface Conditions
for the Culvert at

Sta. 339/76

Highway 16, near Ottawa.

Copies to:

Mr. A. Tye
Bridge Engineer (2)

Mr. J. Walter
Design Engineer (1)

Mr. H. Tregaskes
Construction Engineer (1)

Project 55-F-20

Mr. J. Wilkes
Divisional Engineer, Ottawa (1)

Mr. G. Farantatos (1)

File (1)

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INTRODUCTION:

The following report is concerned with an investigation into the soil conditions at Sta. 319+00, Hwy. 16 where it is proposed to raise the grade by eleven feet at the site of a beam and slab culvert.

This structure is in a poor condition; the beams are sagging badly and some of the reinforcement is exposed. It is preferred that the culvert be removed, and the soil conditions have been explored in order to decide upon the most suitable type of replacement and analyze the stability of the proposed increased height of fill.

PROZONING:

Three borholes were cut down at the positions shown on the attached drawing No. P-55-20A. All the relevant information concerning the soils encountered locations and levels etc. is shown in Appendix I.

SOIL CONDITIONS:

The conditions were not identical in each hole but a generalized description is as follows:-

Excluding fill, a stratum of soft clay gray to light brown, not more than fifteen feet thick overlies soft blue marine clay. The existing culvert was found to lie on this material. The greatest depth of marine clay encountered was twenty-six feet, and was found to lie on sand and gravel, which in turn rested on bedrock.

WATER CONDITIONS:

Ground water was found in borholes two and three; in borhole two an artesian head produced a free surface one foot above ground level. In borhole three, the free surface was twenty-two feet below ground level.

TESTS & CALCULATIONS:

The undisturbed samples of clay have been tested in compression both in the sampled state, and consolidated to the same overburden pressure from where they were recovered. By testing the clay in the test states, the gain of shear strength due to the consolidation of the existing fill has been examined, and it has been calculated that the proposed grade is safe regarding known stability.

If during construction it is intended to provide an alternative route close to the present one the height of fill on ground that is not consolidated should not exceed thirty feet.

When the existing culvert is removed it is probable that the clay will recover some of its original void ratio e ; that when the pressure is re-applied by the fill, some settlement will result. This contingency has been examined and it has been found that up to two feet of settlements may occur, the greater part within the first three years.

RECOMMENDATION:

In order to accommodate any differential settlement the culvert replacement should be flexible. A corrugated pipe is recommended which should be backfilled according to the manufacturers instructions; a fourteen foot diameter pipe should provide sufficient area of flow for the creek.

The proposed increased height of fill will be stable but any fill on adjacent ground that is not consolidated should not exceed thirty feet in height.

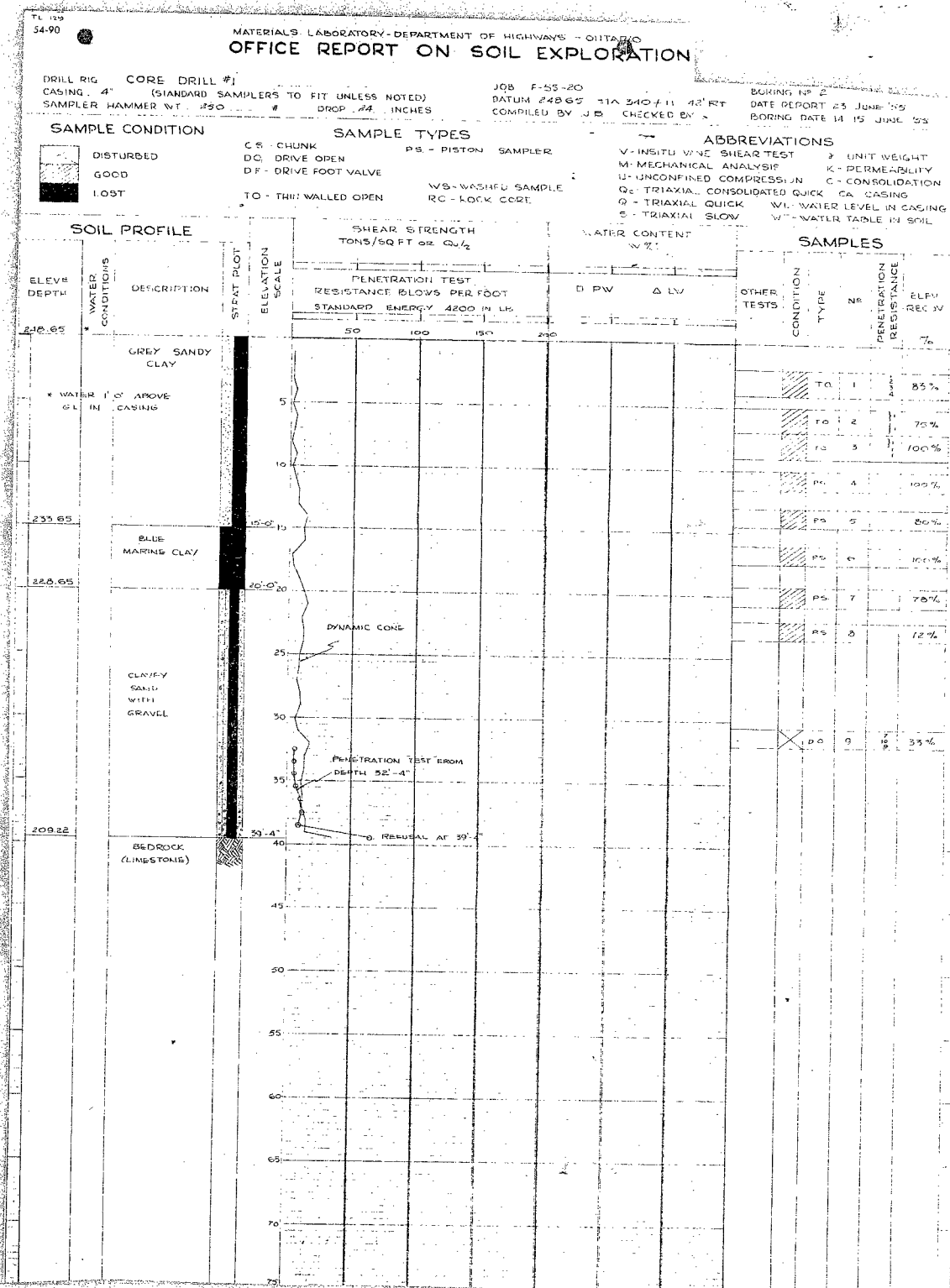
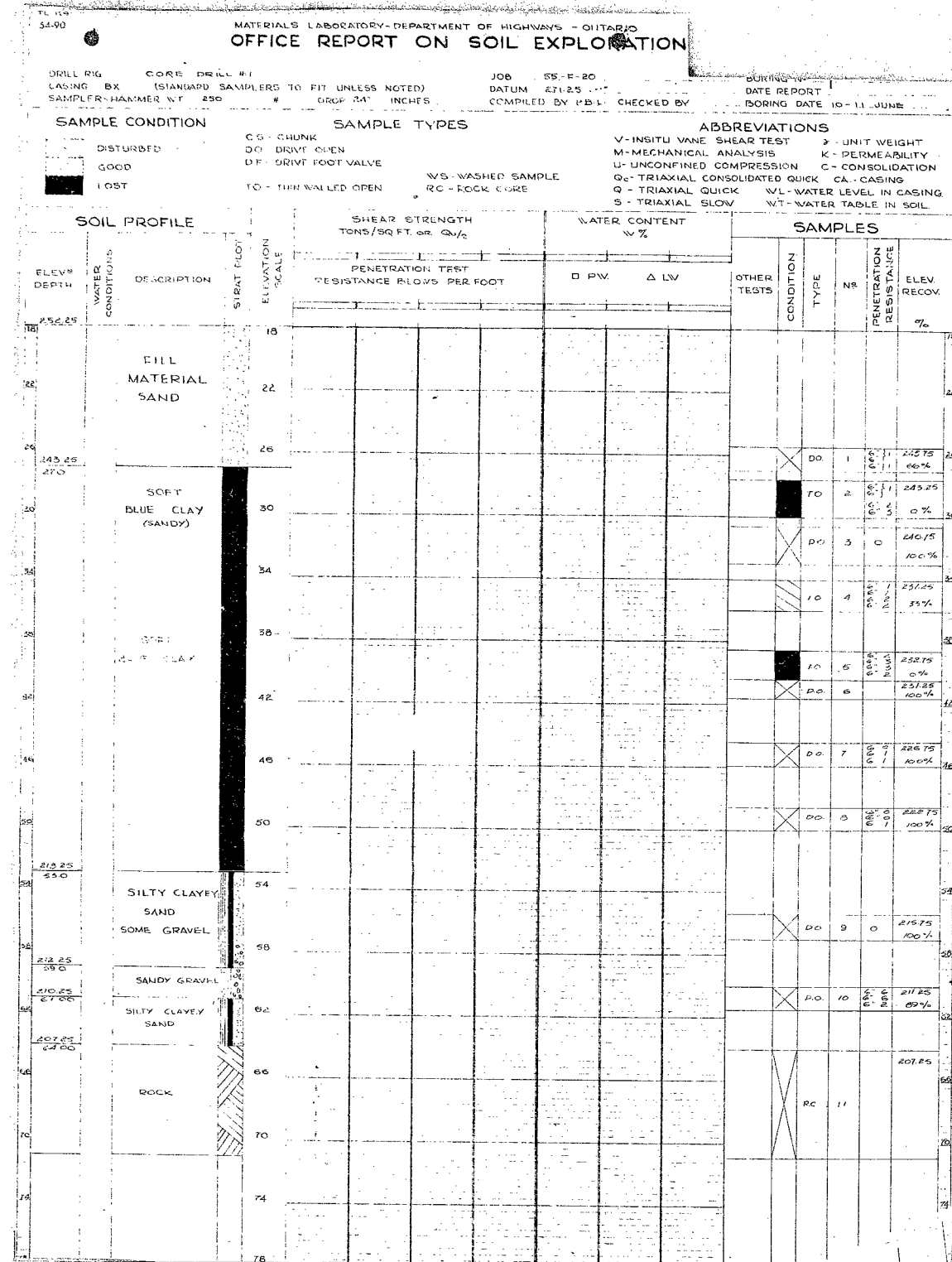
GUP:hr


(G. S. Fernandez)
Foundation Engineer.

APPENDIX I

55-F-20
Hwy. # 16
CULVERT NEAR
OTTAWA

EDITED
FOR MICROFILMING
BY *H.T.* DATE *2/10*



54-70

MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG CORE DRILL #1
CASING 4" (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT 250 # DROP 24" INCHES
JOB F-35-20
DATUM 473.24 STA 55B+55 17 RT
COMPILED BY CHECKED BY
BORING NO 5
DATE REPORT 20 JUNE '55
BORING DATE 18-20 JUNE '55

SAMPLE CONDITION

DISTURBED
GOOD
LOST

SAMPLE TYPES

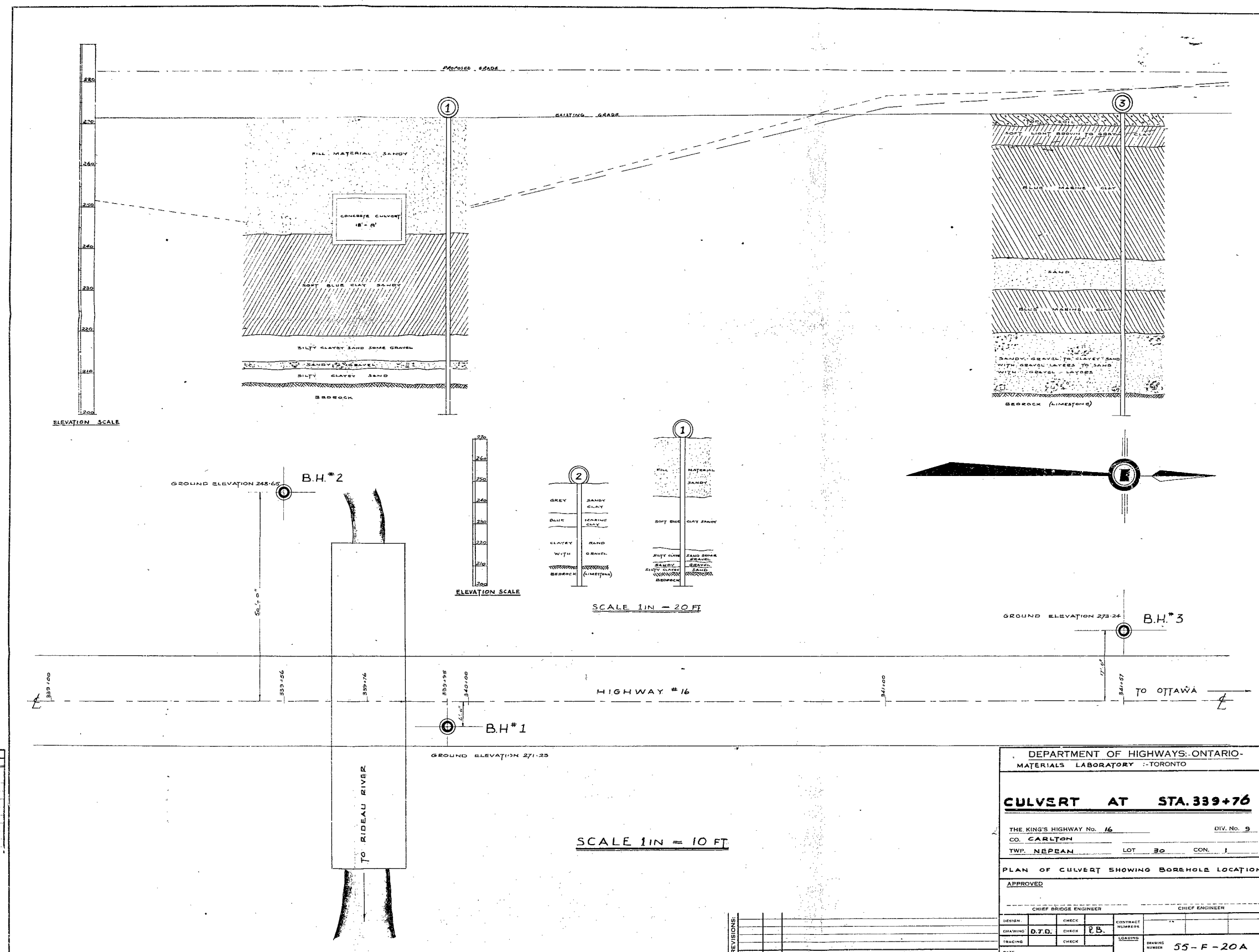
CS - CHUCK
DO - DRIVE OPEN
DF - DRIVE FOOT VALVE
VS - WASHED SAMPLE
TO - THIN WALLED OPEN
RC - ROCK CORE

ABBREVIATIONS

V - INSITU VANE SHEAR TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Qc - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION
CA - CASING
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

SOIL PROFILE				SHEAR STRENGTH TONS/SQ FT OR $Q_{u/2}$		WATER CONTENT W %		SAMPLES				
CLEV DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	PENETRATION TEST RESISTANCE BLOWS PER FOOT STANDARD ENERGY 4200 IN-LBS	Δ PW	Δ LV	OTHER TESTS	CONDITION TYPE	№	PENETRATION RESISTANCE	ELEV RECOV
273.24		TOP SOIL		4'-0"								
269.24		SOFT LIGHT-BROWN TO GREY CLAY		5						1	85	
264.24				9'-0"						2	100	
		BLUE MARINE CLAY		10						3	100	
				15						4	100	
				20						5	100	
261.24	WL 23'-0"			25						6	100	
				30						7	100	
				35						8	100	
				40						9	100	
256.01				45'-0"						10	100	
		SAND		50						11	50	
229.74				55'-0"						12	100	
		BLUE MARINE CLAY		60						13	65	
210.24				64'-0"						14	11	
		SANDY GRAVEL TO CLAYEY SAND WITH GRAVEL LAYERS TO SAND WITH GRAVEL LAYERS		65						15	100	
205.58				67'-0"						16	66	
		BEDROCK (LIMESTONE)		70	REFUSAL AT 67'-0"							
				75								

REFUSAL AT 67'-8"



PRINT RECORD		
NO.	FOR	DATE

DEPARTMENT OF HIGHWAYS-ONTARIO-			
MATERIALS LABORATORY -TORONTO			
CULVERT AT STA. 339+76			
THE KING'S HIGHWAY No. 16		DIV. No. 9	
CO. CARLTON			
TWP. NEPEAN		LOT 30	CON. 1
PLAN OF CULVERT SHOWING BOREHOLE LOCATIONS			
APPROVED			
CHIEF BRIDGE ENGINEER		CHIEF ENGINEER	
DESIGN	CHECK	CONTRACT	NUMBER
DRAWING	D.T.D.	CHECK	P.B.
TRACING	CHECK	LOADING	
DATE	BY	DESCRIPTION	DRAWING NUMBER
			55-F-20A