54-F-23

HWY. # 81

MUD CREEK

54-90

MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS ONTARIO

OFFICE REPORT ON SOIL EXPLORAT

DRILL RIG Core Drill #2 — JOB 54-F-23 — BORING No 2
CASING BX (STANDARD SAMPLERS TO FIT UNLESS NOTED) — DATUM 707.60 — DATE REPORT
SAMPLER HAMMER WT 250 lbs — DROP — INCHES — COMPILED BY P.B.L. CHECKED BY S.T.B. — BORING DATE Dec 7/54

SAMPLE CONDITION
DISTURBED
GOOD
LOST

SAMPLE TYPES Location Sta 24+27 26'Rt
C.S - CHUNK
D.O - DRIVE OPEN
D.F - DRIVE FOOT VALVE
T.O - THIN WALLED OPEN
W.S - WASHED SAMPLE
R.C - ROCK CORE

ABBREVIATIONS
V INSITU VANE SHEAR TEST
M MECHANICAL ANALYSIS
U UNCONFINED COMPRESSION
Q_c TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
γ UNIT WEIGHT
K PERMEABILITY
C - CONSOLIDATION
CA - CASING
W.L - WATER LEVEL IN CASING
W.T - WATER TABLE IN SOIL

SOIL PROFILE

ELEV. DEPTH 707.60 | WATER CONDITIONS | DESCRIPTION | STRAT PLOT | ELEVATION SCALE

No Ground Water

STIFF CLAY

No Ground Water

685.60 — 22.0 Limit Of Penetration Test

681.60 — 26.00 Limit Of Borehole

@ SHEAR STRENGTH TONS/SQ.FT. OR $Q_c/2$ (1, 2, 3)
X Cone Penetration Test Resistance Blows Per Foot Std Energy 4200 lb in (50, 100, 150, 200)
WATER CONTENT • W% (20, 40, 60)
□ P.W. Δ L.W.

SAMPLES

OTHER TESTS	CONDITION	TYPE	No	PENETRATION RESISTANCE	ELEV. RECOV. 707.60	%
		Wash Sample	1		701.60	40%
γ=136		TO 2"	2		699.60	67%
γ=133		TO 2"	4		697.60	
γ=130		TO 2"	5		695.60	70%
γ=134		TO 2"	6		693.60	63%
γ=128		TO 2"	7		691.60	63%
γ=127		TO 2"	8		689.60	67%
γ=133		TO 2"	9		687.60	83%
γ=127		TO 2"	10		685.60	79%
γ=124		TO 2"	11		683.60	67%
γ=124		TO 2"	12		681.60	

Limit Of Borehole

FIG 1.

54-90

MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS ONTARIO

OFFICE REPORT ON SOIL EXPLORATI

DRILL RIG Core Drill — JOB 54-F-23 Mud Creek Hwy #81 — BORING No 3
CASING BX (STANDARD SAMPLERS TO FIT UNLESS NOTED) — DATUM 707.5 — DATE REPORT
SAMPLER HAMMER WT 250 lbs — DROP — INCHES — COMPILED BY P.B.L. CHECKED BY S.T.B. — BORING DATE Dec 14/54 to Jan 12/55

SAMPLE CONDITION
DISTURBED
GOOD
LOST

SAMPLE TYPES Location Sta 24+70 35' Lt.
C.S - CHUNK
D.O - DRIVE OPEN
D.F - DRIVE FOOT VALVE
T.O - THIN WALLED OPEN
W.S - WASHED SAMPLE
R.C - ROCK CORE

ABBREVIATIONS
V - INSITU VANE SHEAR TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Q_c - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
γ - UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION
CA - CASING
W.L - WATER LEVEL IN CASING
W.T - WATER TABLE IN SOIL

SOIL PROFILE

ELEV. DEPTH 707.50 | WATER CONDITIONS | DESCRIPTION | STRAT PLOT | ELEVATION SCALE

SILTY CLAY

End Of Pen. Test @ 30'-0"

654 — 53.50 Limit Of Bore Hole

60 Limit Of Penetration Test

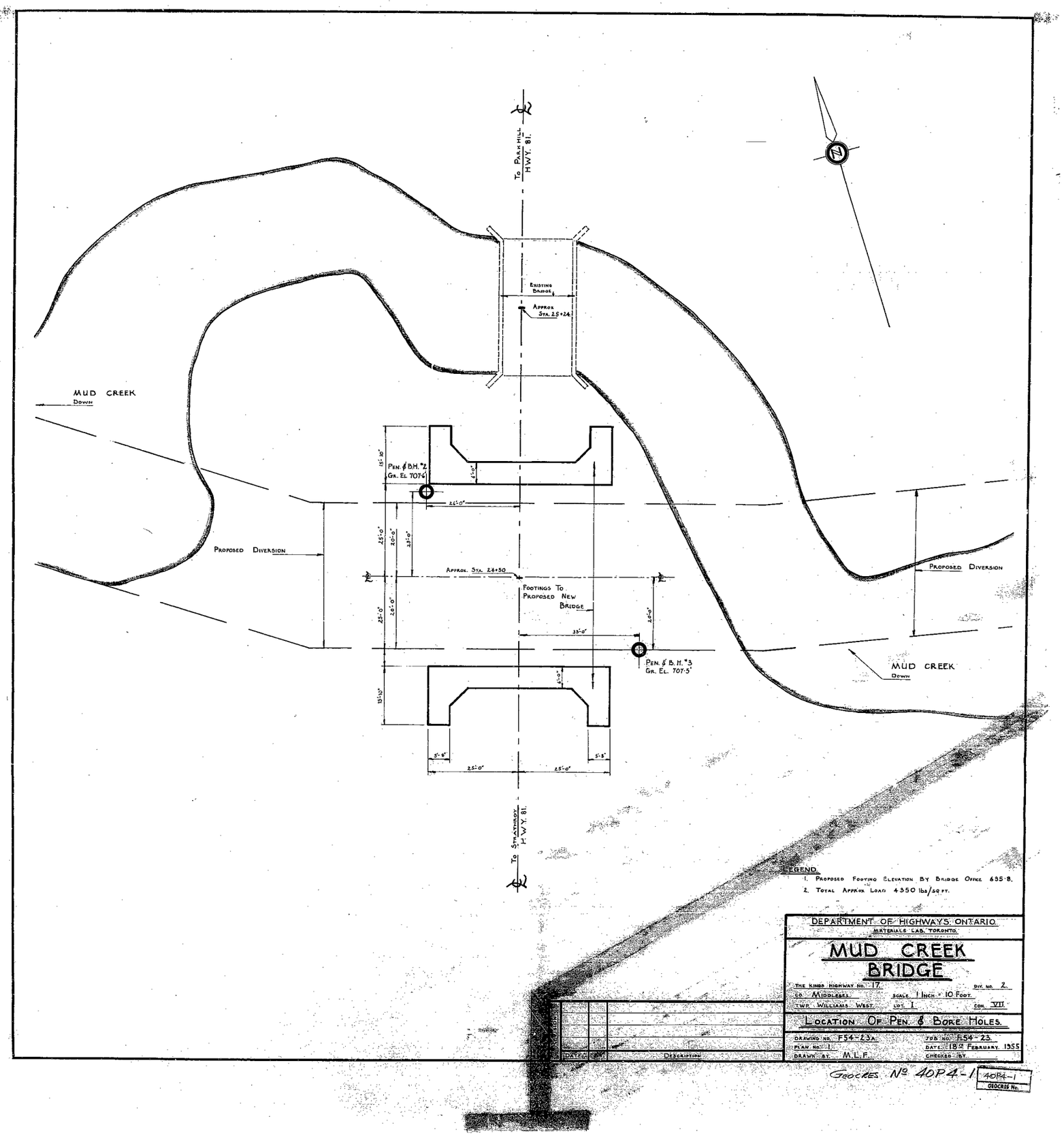
Note. On Water Conditions. With 14' of 4 1/2" Casing Remaining and BX Complete Withdrawn Water Rose to 42" above GL in piping

@ SHEAR STRENGTH TONS/SQ.FT. OR $Q_c/2$ (1, 2, 3)
X Cone Penetration Test Resistance Blows Per Foot Std Energy 4200 lb in (50, 100, 150, 200)
WATER CONTENT • W% (20, 40, 60)
□ P.W. Δ L.W.

SAMPLES

OTHER TESTS	CONDITION	TYPE	No	PENETRATION RESISTANCE	ELEV. RECOV. 677.50	%
		TO 3"	1		677.50	99%
γ=135		TO 3"	2		695.50	90%
γ=137		TO 3"	3		693.50	90%
γ=133		TO 2"	4		692.00	100%
γ=131		TO 2"	5		691.50	50%
γ=131		TO 2"	6		689.50	78%
γ=131		TO 2"	7		687.50	56%
γ=123		TO 2"	8		685.50	67%
γ=127		TO 2"	9		683.50	73%
γ=123		TO 2"	10		681.50	83%
γ=126		TO 2"	11		679.50	93%
γ=124		TO 2"	12		677.50	83%
		TO 2"	13		675.50	100%
γ=126		TO 2"	14		673.50	100%
		TO 2"	15		671.50	100%
γ=125		TO 2"	16		669.50	100%
γ=129		TO 2"	17		667.50	100%
γ=134		TO 2"	18		665.50	100%
		TO 2"			663.50	0%
					659.50	
		W.S.	19			
		TO 2"			657.50	0%
		D.F.	20	14	655.50	70%

FIG 2.



Report of

Foundation Investigation

at Highway #21

over the

Mud Creek

Copies to: Mr. H. Lamont
Bridge Engineer (2)

Mr. J. Walter
Construction Engineer (1)

F-54-23

Mr. W. L. Fraser
Division Engineer, Division #2 (1)

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Introduction

A subsurface investigation was carried out on Highway #31 where it is proposed to build a bridge over the diverted course of Mud Creek.

It is proposed to alter the course of Mud Creek to cut out the meander which the existing bridge crosses, and to build the new bridge over the diverted part of the creek.

It was required to determine the type of foundations most suitable for the proposed structure which is a rigid frame bridge.

Procedure

The investigation took place during the period 6-14 December 1954.

Two dynamic penetration holes and two boreholes were made during that period.

The position and results of each borehole are shown in plan F-54-234 and Appendix I.

Soil Conditions and Testing

Boring was carried down to 50' and 55.5' for boreholes 2 and 3 respectively and in each case a stiff clay was discovered for the whole length of the borehole.

Dynamic cone penetration tests were carried to a depth of 25'-0" in borehole 2 and 30'-0" in borehole 3. The moisture content of the clay is about 20%. A number of tests were made to find the liquid limits which gave a value of approximately 39%.

The tests indicate that the soil is a stiff glacial clay.

Unconfined compression tests were made on a large number of undisturbed samples and from these an average value of the shear stress was found to be about 2600 lbs. per square foot; although in borehole #3 at depths below approximately 24' the value fell off to approximately 1000 lbs. per square foot.

Water Conditions

No ground water was observed during the boring operations.

Analysis of results and Recommendations

The results of the unconfined tests show that spread footings can be used with approximately bearing capacity twice the shear strength which is about 2.5 tons per square foot. If this value is used there will be a settlement of approximately 4 inches on the glacial clay.

There is a difference of 11'-6" between H.W.L. and L.W.L. The glacial clay is not easily subjected to scour.

However for protection against any possible scouring timber sheet pile of at least 10 feet long could be placed on the front of the footing facing the creek.

Short treated wooden piles can also be used. Assuming an average shear strength of 1500 lbs. per square foot and a safety factor of 3 it has been calculated that wooden piles 15-25 feet long will support a load of 15 tons/pile.

Owing to the fact that a rigid frame type structure is proposed, a piled foundation would be preferable to avoid excessive settlement of the foundation.

Careful supervision of the pile driving must be provided if the wooden piles are to be effective.

Summary & Conclusions

A simply supported structure founded on spread footings with a bearing capacity of 2.5 tons per square foot would be recommended. Timber sheet piles should be provided, as an insurance against possible scour under flood conditions.

A rigid frame structure can be supported on treated timber piles 15-25 feet long.

Careful supervision of pile driving should be provided.

The undersigned would appreciate being present on foundation excavation and pile driving to collect information to correlate pile driving resistance with the test data.

F. C. Brewbridge
Materials & Research Engineer

Per:

(G. N. Faramtatos)

CBF:HR

Appendix I