

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 41 A-137

W.P. No. _____

CONT. No. _____

W. O. No. _____

STR. SITE No. 2 - 236

HWY. No. _____

LOCATION BR. 142

OPPOSITE LOT 21, CON. 2,

HURON TWP.

=====

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. NONE

REMARKS: _____

MR. B. M. ROSS
CONSULTING ENGINEER
GODERICH ONTARIO

41A-137
GEOCRES No.

STRUCTURE SITE No. 2-236

Report on
SOIL INVESTIGATION
for
BRIDGE BR 142
OPPOSITE LOT 21, CONCESSION 2
TOWNSHIP OF HURON



by
DOMINION SOIL INVESTIGATION LIMITED
363 Queens Avenue
LONDON ONTARIO
Reference No. 4-10-L15
December 14th, 1964

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SUMMARY

The strata consist of a 10 feet to 14 feet thickness of sandy fill overlying very stiff clay till.

It is recommended that the structure should be supported on spread footings at El. 662 using a maximum net soil pressure of 4,000 pounds per square foot. The estimated consolidation settlement is 1.0 inch.

No unusual construction problems are anticipated.

I INTRODUCTION

Verbal authorization, which was confirmed by the letter of November 10th, 1964, was received from Mr. B. M. Ross's office to carry out a soil investigation at a site in the Township of Huron where it is proposed to replace an existing road bridge with a new structure.

The existing structure is a 52 foot span steel truss and it is understood that the new bridge will probably be a concrete rigid frame with a span of about 50 feet. The west abutment of the new bridge will be 8 feet west of the existing west abutment.

The purpose of this investigation was to reveal the subsurface conditions at the site and to determine the relevant soil properties for the design and construction of the new foundations.

II FIELD WORK

The field work was done during the period 2nd and 3rd November, 1964, and consisted of two boreholes to a depth of 31 feet 6 inches. The borehole locations are shown on enclosure 2.

The boreholes were advanced by washboring and lined with Bx casing. Standard penetration tests were performed at frequent intervals of depth to determine the relative density or consistency of the soil and to recover representative samples. Dynamic cone penetration tests were performed adjacent to each borehole.

The results of the field tests are recorded on Enclosures 3 and 4. Elevations have been referred to a Geodetic Bench Mark established by the client (Bottom steel of existing bridge, El. 681.1).

III SUBSURFACE CONDITIONS

Detailed descriptions of the strata encountered at each borehole are shown on Enclosures 3 and 4 and a general picture of the soil stratigraphy is given in the form of a subsurface profile on Enclosure 2.

Both boreholes penetrated a sandy fill stratum which is associated with the construction of the existing bridge. This is generally loose with a thickness of 14 feet in borehole 1 and 10 feet in borehole 2.

The fill is underlain by a very stiff to hard glacial till deposit consisting mainly of grey silty clay with embedded fine gravel.

IV GROUNDWATER CONDITIONS

Water levels were recorded in the boreholes after drilling was completed as shown on the Geotechnical Data Sheets. In borehole 1 the free standing water was observed at El. 668.1 which coincides with the elevation in the river at the time that the investigation was carried out. In borehole 2 the water level was at El. 674.3, coinciding approximately with the top of the till stratum. It is believed that the latter observation has been influenced by the impermeable nature of the till and therefore does not represent the true condition at this location.

V DISCUSSION

The soil profile disclosed, consists generally of 10 to 14 feet of fill overlying the very stiff clay till deposit.

The bed of the river extends to El. 666.4 and allowing for scour it is probable that the footings will be at or below El. 662.0. This level lies within the very stiff till stratum, and on the basis of the field observations a maximum net soil pressure of 4,000 pounds per square foot is recommended for the design of footings. It is estimated that the settlement due to consolidation of the soil below a footing 5 feet wide loaded to 4,000 pounds per square foot will be less than 1.0 inch. This is expected to take place over a period of 2 to 3 years after the completion of the structure. In view of the very similar conditions at the two boreholes no appreciable differential settlement is anticipated.

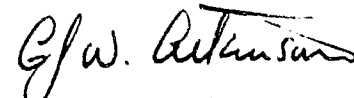
In estimating the resistance of the abutments to horizontal sliding it may be assumed that the shear strength of the soil at El. 662.0 is 2,000 pounds per square foot. The factor of safety against sliding should be at least 1.5.

Excavations into the upper layers of fill should be cut back at a slope of 1:1. The sides of excavations into the clay till stratum will stand almost vertically without support.

The permeability of the clay is very low and seepage into the excavation will easily be controlled by pumping from a sump.

Yours very truly

DOMINION SOIL INVESTIGATION LIMITED



C. J. W. Atkinson, M. Sc.,
Project Engineer.

CA/sg

LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE.

SOIL COMPONENTS AND GROUND WATER CONDITIONS.

BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY	ORGANICS	BEDROCK	GROUND WATER LEVEL	DEPTH OF CAVE-1
		COARSE	FINE	COARSE	MEDIUM	FINE						
Ø > 8"	3"	3/4"	4.76mm	2.0	0.42	0.074	0.002	>	NO SIZE LIMIT			
U.S. Standard Sieve Size :		No.4	No.10	No.40	No.200							

SAMPLE TYPES.

AS Auger sample	RC Rock core	TP Piston, thin walled tube sample
CS Sample from casing	% Recovery	TW Open, thin walled tube sample
ChS Chunk sample	SS Split spoon sample	WS Wash sample

SAMPLER ADVANCED BY static weight : w
 " pressure : p
 " tapping : t

OBSERVATIONS MADE WHILE CORING

Steady pressure
 No pressure
 Intermittent pressure

Washwater returns
 Washwater lost

PENETRATION RESISTANCES.

DYNAMIC PENETRATION RESISTANCE : to drive a 2" ϕ , 60° cone attached to the end of the drilling rods into the ground, expressed in blows per foot.

STANDARD PENETRATION RESISTANCE, -N- : to drive a 2" outside dia, split spoon sampler 1 foot into the ground, expressed in blows per foot.

EXTRAPOLATED -N- VALUE

The energy for the penetration resistances is supplied by a 140 lb. hammer falling 30 inches

SYMBOL :



322

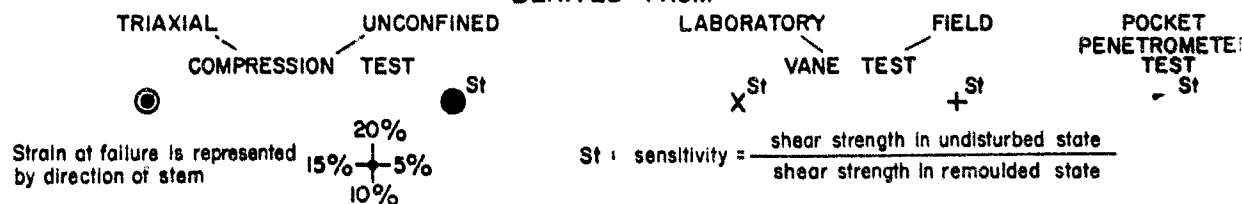
SOIL PROPERTIES.

W % Water content	γ^* Natural bulk density (unit weight)	k Coeff. of permeability
LL % Liquid limit	e Void ratio	C Shear strength
PL % Plastic limit	RD Relative density	ϕ Angle of int. friction
PI % Plasticity index	C_v Coeff. of consolidation	C' Cohesion
LI Liquidity index	m_v Coeff. of volume compressibility	ϕ' Angle of int. friction

In terms of total stress
 In terms of effective stress

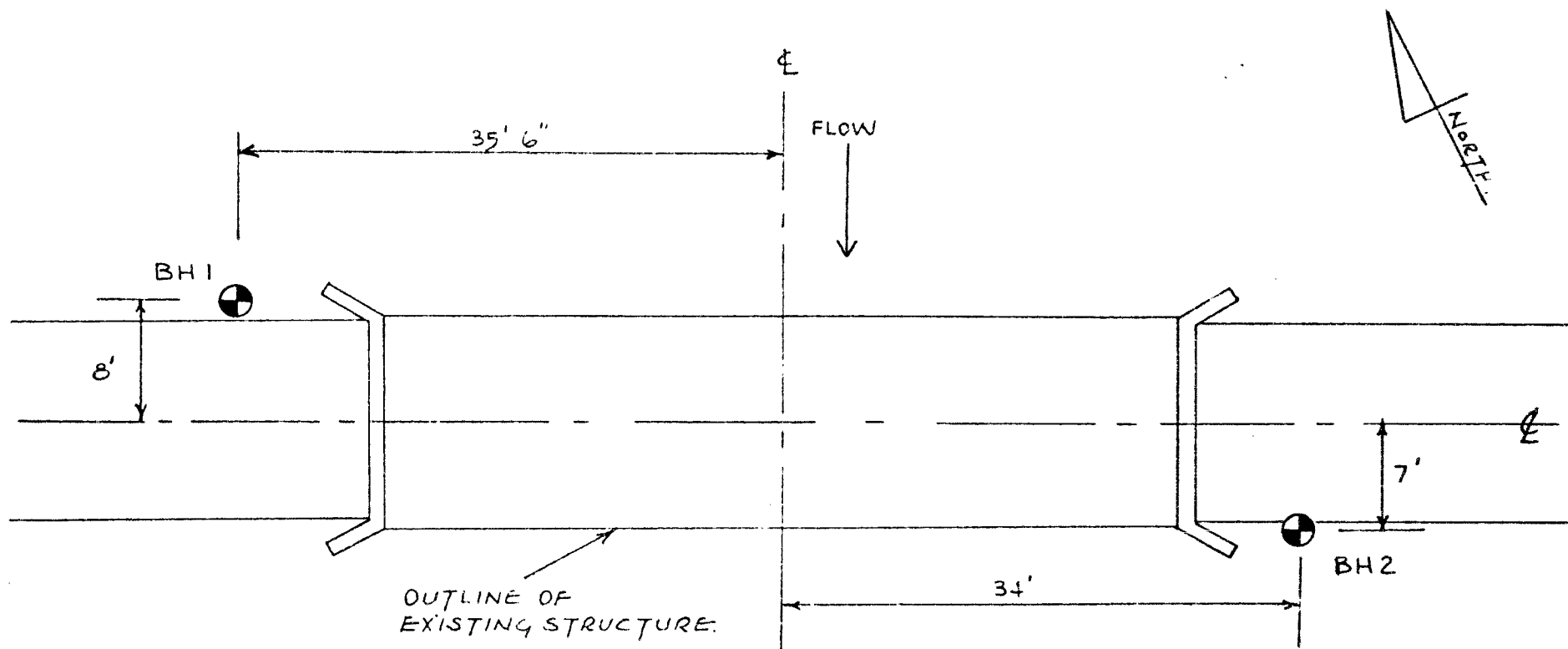
UNDRAINED SHEAR STRENGTH.

- DERIVED FROM -



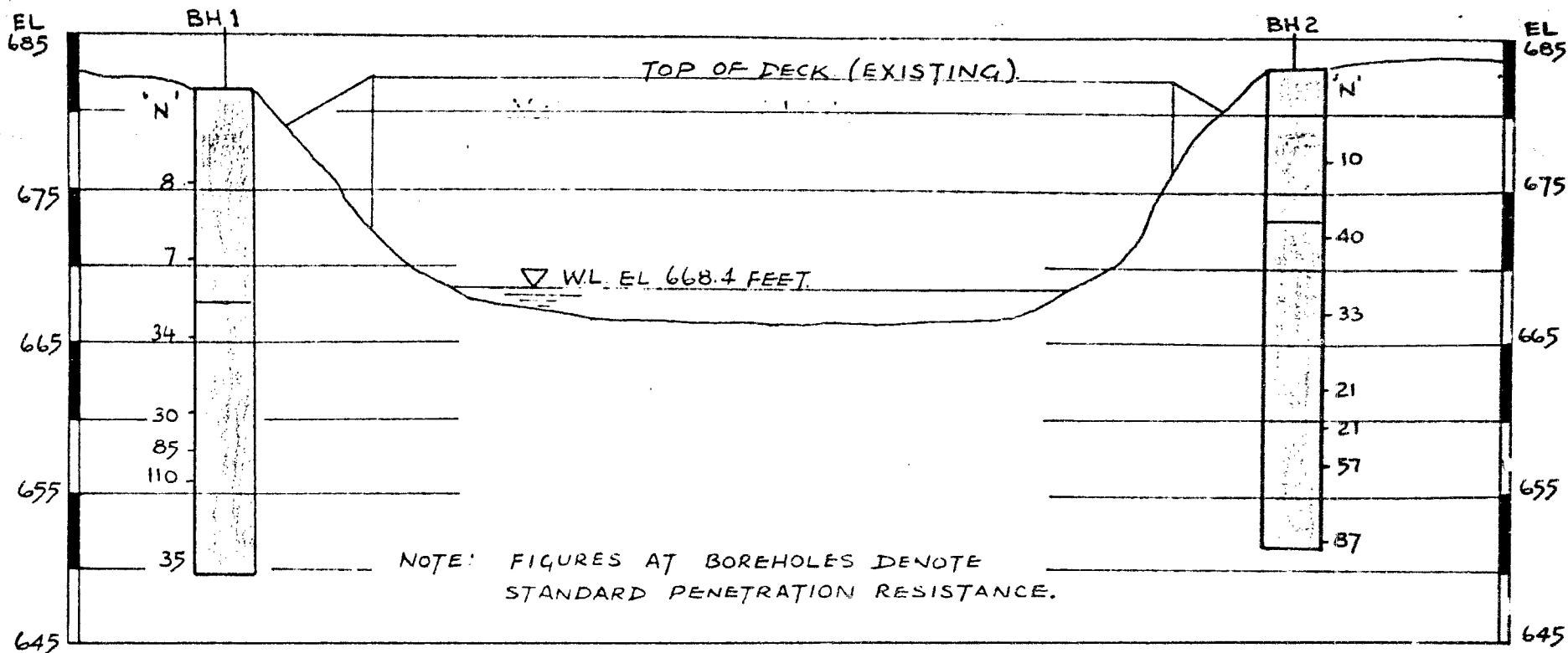
SOIL DESCRIPTION.

COHESIONLESS SOILS :	RD :	COHESIVE SOILS :	C lbs/sq.ft.
Very loose	0 - 15 %	Very soft	less than 250
Loose	15 - 35 %	Soft	250 - 500
Compact	35 - 65 %	Firm	500 - 1000
Dense	65 - 85 %	Stiff	1000 - 2000
Very dense	85 - 100 %	Very stiff	2000 - 4000
		Hard	over 4000



LOCATION OF BORE-HOLES.

SCALE: 1 INCH TO 10 FEET.



LEGEND.

- SANDY FILL
- CLAY TILL

SUBSURFACE PROFILE

SCALE: 1 INCH TO 10 FEET.

OUR REFERENCE NO 4-10-1.12

METHOD OF BORING: Hand Drilling
DIAMETER OF BOREHOLE: 1 1/2 (3/4) inch
DATE: November 2nd, 1966

ENCLOSURE NO 3

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE 20 40 60 80 100 lb./sq. in.	SHEAR STRENGTH lb./sq. ft.	CONSISTENCY water content % PL W LI	REMARKS
				NUMBER	TYPE	ADJUSTMENT OF SAMPLER				
681.74	0.0	Ground surface								
680		3" Topsoil								
675		Loose brown fine and medium sand and fine gravel (Fill)		1	SS	8				
670				2	SS	7				
665	14.0			3	SS	34				
660		Hard silty clay with embedded gravel (Glacial Till)		4	SS	30				
				5	SS	85				
655				6	SS	110				
650	31.5	End of borehole		7	SS	35				

Well
 11.000.0
 10.0 hours
 10.000.0

Cave-in
 11.000.0
 10.0 hours
 10.000.0

Extrapolated
 "S" value.
 Sa. "0": 30/6"
 55/6"

VERTICAL SCALE 1 IN TO \$ FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE IN U.S.A. ONE JF

OUR REFERENCE NO. 4-10-115

GEOTECHNICAL DATA SHEET FOR BOREHOLE 2

CLIENT: B. F. HESS

PROJECT: Bridge SR-142

LOCATION: Township of Huron

DATUM ELEVATION: 681.1 feet (Top disk)

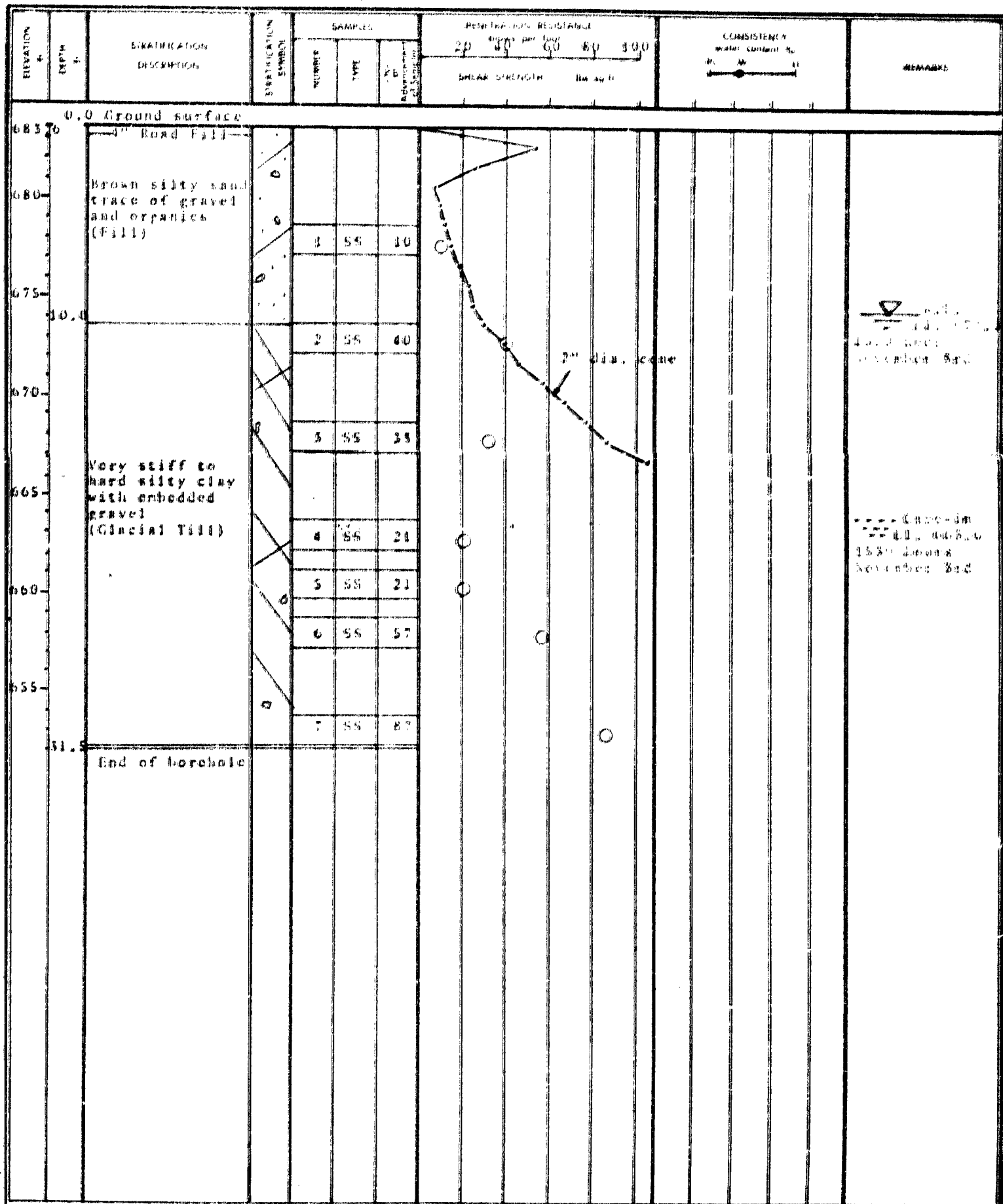
METHOD OF BORING: Washboring

DIAMETER OF BOREHOLE: 4 1/2 (3-1/4)

DATE: November 8th, 1964

ENCLOSURE NO.

4



VERTICAL SCALE: 1 IN TO 5 FT

MINISTÈRE DES TRAVAUX PUBLICS DU QUÉBEC

1964-1965