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REPORT

TO

DE LEUW, CATHER & COMPANY OF CANADA LIMITED

ON

SITE INVESTIGATION

PROPOSED LEES AVENUE BRIDGE NO. 39

OTTAWA QUEENSWAY, W.P. 913-64

OTTAWA

ONTARIO

Distribution:

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Ottawa, Ontario

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64009

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ABSTRACT

The results of a site investigation carried out for the proposed Lees Avenue Bridge No. 39 on the Queensway in Ottawa, Ontario, are reported. It was found that the site is covered by a 2 to 10 foot thick layer of generally compact to dense granular fill followed by some 2 to 8 feet of compact to very dense weathered sandy till in the central and northern portions of the site. The fill and weathered till, below about elevation 187 to 191, are underlain by 10 to 15 feet of generally dense to very dense sand which grades down into very dense silty fine sand. A stratum of very dense lower sandy till resting on shale bedrock underlies the fine sand deposit below about elevation 170. The bedrock is some 35 to 40 feet below ground surface.

It is recommended that the proposed bridge structure be founded on spread footings in the dense to very dense sand or lower portion of the upper till using an allowable bearing pressure of 5,000 lb/sq.ft. The support of stub abutments on piles driven through the approach fill is discussed in the report. There will be no stability problem with the approach embankments at this site.

INTRODUCTION

H. Q. Golder & Associates Ltd. has been retained by De Leuw, Cather & Company of Canada Limited, Consulting Engineers, to carry out a soil investigation at the site of the proposed Lees Avenue Bridge No. 39 on the Queensway in Ottawa, Ontario. The purpose of this investigation was to determine the subsoil conditions at the site and to provide information relating to the foundation design of the proposed bridge structure and approach embankments.

PROCEDURE

The field work for this investigation was carried out during the period February 7 to February 22, 1964, using mobile power auger and diamond drilling equipment. Four boreholes (numbered 301 to 304, inclusive) with accompanying dynamic penetration tests were initially put down at the proposed bridge pier and abutment locations. These borings were taken to bedrock and bedrock was proved by core drilling. A shallow borehole (number 305) was put down to the north of the bridge location where the height of the proposed embankment is some 25 feet above existing ground surface. In addition five further shallow borings (numbered 306 to 310, inclusive) were put down in the bridge location area primarily to determine the extent of fill covering the site. Piezometers were installed

in boreholes 301 to 304, inclusive, following their completion, to determine the groundwater level.

A detailed log for each borehole is given on the Records of Boreholes following the text of this report. The locations of all the borings put down in this investigation together with a section of the inferred soil stratigraphy across the site are given on Figure 1.

The samples obtained during the investigation were brought to our laboratory for examination and testing. The results of laboratory grain size analyses carried out on samples of the subsoil are given on Figures 2 to 7, inclusive.

All elevations in this report were supplied by De Leuw, Cather & Company of Canada Limited and are referred to Geodetic datum.

SITE TOPOGRAPHY AND GEOLOGY

The bridge site is located at about chainage 461+50 on the proposed Queensway between the Rideau Canal and the Rideau River in Ottawa, Ontario. The area under consideration is approximately bounded by Hurdman Road to the north, the Ottawa Gas property to the west and Lees Avenue to the south. Several lines of railway tracks, presently in service, cross

the site in a general east-west direction. The area of the site is essentially flat with the existing ground level between about elevation 195 and 200. Beyond Hurdman Road, some 500 feet to the north of the Queensway centreline, the ground surface rises about 25 feet to form a ridge.

Geological information indicates that bedrock at the site is an Ordovician shale of the Billings formation. The bedrock is overlain by glacial deposits laid down during the Wisconsin stage of glaciation. The glacial deposits consist of sandy till chiefly in the form of ground moraine and fluvio-glacial or stratified drift in the form of kames and outwash sheets of sand and gravel. Following retreat of the ice sheet, the area in the Ottawa and tributary valleys was invaded by an arm of the ocean known as the Champlain Sea. During this period of submergence silts and clays were laid down over the glacial till. These marine deposits were then exposed by subsequent uplift which occurred after retreat of the glaciers.

SOIL CONDITIONS

A section giving the inferred soil stratigraphy across the site is shown on Figure 1. It was found that the site is covered by fill ranging between about 2 and 10 feet in thickness. There is a general trend for the thickness of the

fill to increase in a southerly direction. The fill is mainly brown in colour and ranges in composition from a sand with cinders to a till-like silty sand with gravel and a trace of clay together with occasional cobbles and boulders. Grading curves for two samples of fill, obtained using 1½ inch I.D. sampling equipment, are shown on Figure 2. Based on the standard penetration test results given on the Records of Boreholes the granular fill ranges from loose to very dense and is generally compact to dense.

A stratum of brown to grey brown weathered sandy till, about 2 to 8 feet thick, underlies the fill in the central and northern portions of the site. The till, as shown by the grading curve on Figure 3, is comprised of a well-graded composite of silt, sand and gravel with a trace of clay. Occasional cobbles are also present within the stratum. The till, as indicated by the penetration test results, is compact to very dense.

The fill and weathered till, below about elevation 187 to 191, are underlain by some 10 to 15 feet of dark grey sand. The sand, as shown by the grading curves on Figures 4 and 5, contains varying proportions of silt and gravel and is occasionally faintly stratified. Standard penetration tests

carried out in the sand indicate that it is generally dense to very dense.

The sand, in boreholes 301 to 304, which penetrated it completely, grades down into a deposit of very dense grey silty fine sand to fine sand some 4 to 7 feet thick. The fine sand is generally stratified with thin layers of silt and fine to coarse sand. Two grading curves for samples from this deposit are given on Figure 6.

A stratum of very dense dark grey lower till, up to about 12 feet in thickness, underlies the fine sand below about elevation 170. The lower till is comprised of sandy silt to silty sand with gravel and a trace of clay, and contains numerous cobbles and boulders, particularly in the lower portion of the stratum. A grading curve for a sample from the stratum is given on Figure 7.

Dark grey to black shale bedrock underlies the lower till between about elevation 159 and 163. This is some 35 to 40 feet below existing ground surface. The shale is generally sound, except in the upper few feet where it is weathered and partially fractured.

GROUNDWATER CONDITIONS

Piezometers were installed in boreholes 301 to 304, inclusive, following their completion, to determine the groundwater level. The details of the installation are given on the Records of Boreholes. Periodic readings were taken in these installations during February and March, 1964, following completion of the field work. A summary of the results obtained is given on the Records of Boreholes and on the stratigraphy section on Figure 1.

The groundwater level, as measured in open boreholes during the course of the field work and in the piezometers, was found to be between about 10 to 15 feet below ground surface and in the upper portion of the sand stratum underlying the fill and upper till deposits. Reference to Figure 1 shows that there is a general trend for the groundwater level to drop off across the site in a southerly direction from about elevation 190 at borehole 305 to about elevation 185 at borehole 301.

DISCUSSION

General

It is understood that Bridge 39 is to be a three span continuous steel structure with span lengths of 79, 125

and 79 feet. The approach embankments to the bridge are to be constructed with 2 horizontal to 1 vertical side and end slopes. The height of the approach fill at the south and north abutments is to be of the order of 10 and 20 feet, respectively.

Foundations

Due to its variable in situ density, the fill deposit covering the site is not a competent foundation stratum for the support of the proposed bridge structure. The weathered upper till is similarly variable in density, particularly in the upper portion of the deposit. It is recommended that the bridge structure be founded on spread footings placed in the dense to very dense sand stratum or lower portion of the upper till. The footings at the pier locations and at the south abutment may be founded at elevation 189. At the north abutment location the upper portion of the sand in borehole 304 is compact with a recorded standard penetration resistance or "N" value of 13 blows/ft. The footing at this location should be carried down to elevation 188 where the sand is dense.

The lowest recorded "N" value for the granular subsoil below the above foundation elevations is 32 blows/ft., however the remainder of the recorded "N" values are generally in excess of 40 blows/ft. Based on the standard penetration

test results, it is recommended that an allowable bearing pressure of 5,000 lb/sq.ft. be used for design of the footings.

Provided that the in situ density of the sand at and below foundation grade is not reduced during excavation for the footings, the total settlement of spread footings under the above loading should not exceed 1 inch. As the subsoil is granular most of the settlement will take place during the construction period.

In order to prevent disturbance of the subsoil at footing level due to construction operations and surface water runoff, it is recommended that a thin working mat of lean concrete be laid down immediately foundation grade is reached.

From readings taken in piezometers during February and March, 1964, the groundwater level at the proposed bridge pier and abutment locations was found to be between about elevation 185 and 188. This is at or a few feet below the recommended spread footing founding level. The water level readings were obtained during spring break-up which is normally the period of maximum groundwater levels. However, the periodic reading of the piezometers should be continued to establish whether there is a fluctuation in the groundwater level, particularly during periods of heavy precipitation. If the water

level is found to fluctuate above foundation level it will then be necessary to make provision for maintaining it below final excavation level during construction. This may be achieved by pumping from deep sumps placed around the perimeter of footing excavations.

If spill-through abutments are to be used for the structure it may be impracticable or uneconomical to carry the footings to the depths specified. It is suggested that stub abutments be founded on piles driven through the approach fill, since the structure is continuous. A 12 inch steel 'H' section pile, if driven to practical refusal in the very dense lower till or to bedrock, could carry a design load of 70 tons. Alternatively, the capacity of rammed concrete displacement piles, such as the 'Franki' type, with an expanded base at about elevation 180 would be of the order of 100 tons.

Approach Embankments

As shown by the proposed grade line on Figure 1, the roadway embankment is to reach a maximum height of about 25 feet above existing ground surface to the north of Hurdman Road. It is understood that the embankments to the bridge are to be constructed of granular material with 2 horizontal to 1 vertical side and end slopes.

There should be no problem with stability of the proposed approach embankments resting on the granular fill and subsoil underlying the site. However, prior to placement all topsoil, where it is present, across the site should be removed.



J. L. Seychuk, P. Eng.



V. Milligan, P. Eng.

JLS/NG
64009

April, 1964

LIST OF ABBREVIATIONS

The abbreviations commonly employed on each "Record of Borehole," on the figures and in the text of the report, are as follows:

I. SAMPLE TYPES

<i>AS</i>	auger sample
<i>CS</i>	chunk sample
<i>DO</i>	drive open
<i>DS</i>	Denison type sample
<i>FS</i>	foil sample
<i>RC</i>	rock core
<i>ST</i>	slotted tube
<i>TO</i>	thin-walled, open
<i>TP</i>	thin-walled, piston
<i>WS</i>	wash sample

II. PENETRATION RESISTANCES

Dynamic Penetration Resistance: The number of blows by a 140-pound hammer dropped 30 inches required to drive a 2-inch diameter, 60 degree cone one foot, where the cone is attached to 'A' size drill rods and casing is not used.

Standard Penetration Resistance, *N*: The number of blows by a 140-pound hammer dropped 30 inches required to drive a 2-inch drive open sampler one foot.

WH sampler advanced by static weight—weight, hammer

PH sampler advanced by pressure—pressure, hydraulic

PM sampler advanced by pressure—pressure, manual

III. SOIL DESCRIPTION

(a) Cohesionless Soils

<i>Relative Density</i>	<i>N, blows/ft.</i>
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) Cohesive Soils

<i>Consistency</i>	<i>c_u, lb./sq. ft.</i>
Very soft	Less than 250
Soft	250 to 500
Firm	500 to 1,000
Stiff	1,000 to 2,000
Very stiff	2,000 to 4,000
Hard	over 4,000

IV. SOIL TESTS

<i>C</i>	consolidation test
<i>H</i>	hydrometer analysis
<i>M</i>	sieve analysis
<i>MH</i>	combined analysis, sieve and hydrometer ¹
<i>Q</i>	undrained triaxial ²
<i>R</i>	consolidated undrained triaxial ²
<i>S</i>	drained triaxial
<i>U</i>	unconfined compression
<i>V</i>	field vane test

NOTES:

¹Combined analyses when 5 to 95 per cent of the material passes the No. 200 sieve.

²Undrained triaxial tests in which pore pressures are measured are shown as \bar{Q} or \bar{R} .

LIST OF SYMBOLS

I. GENERAL

π	= 3.1416
e	= base of natural logarithms 2.7183
$\log_e a$ or $\ln a$	natural logarithm of a
$\log_{10} a$ or $\log a$	logarithm of a to base 10
t	time
g	acceleration due to gravity
V	volume
W	weight
M	moment
F	factor of safety

II. STRESS AND STRAIN

u	pore pressure
σ	normal stress
σ'	normal effective stress ($\bar{\sigma}$ is also used)
τ	shear stress
ϵ	linear strain
ϵ_{xy}	shear strain
ν	Poisson's ratio (μ is also used)
E	modulus of linear deformation (Young's modulus)
G	modulus of shear deformation
K	modulus of compressibility
η	coefficient of viscosity

III. SOIL PROPERTIES

(a) Unit weight

γ	unit weight of soil (bulk density)
γ_s	unit weight of solid particles
γ_w	unit weight of water
γ_d	unit dry weight of soil (dry density)
γ'	unit weight of submerged soil
G_s	specific gravity of solid particles $G_s = \gamma_s / \gamma_w$
e	void ratio
n	porosity
w	water content
S_r	degree of saturation

(b) Consistency

w_L	liquid limit
w_P	plastic limit
I_P	plasticity index
w_s	shrinkage limit
I_L	liquidity index = $(w - w_P) / I_P$
I_C	consistency index = $(w_L - w) / I_P$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
D_r	relative density = $(e_{max} - e) / (e_{max} - e_{min})$

(c) Permeability

h	hydraulic head or potential
q	rate of discharge
v	velocity of flow
i	hydraulic gradient
k	coefficient of permeability
j	seepage force per unit volume

(d) Consolidation (one-dimensional)

m_v	coefficient of volume change = $-\Delta e / (1 + e) \Delta \sigma'$
C_c	compression index = $-\Delta e / \Delta \log_{10} \sigma'$
c_c	coefficient of consolidation
T_v	time factor = $c_v t / d^2$ (d , drainage path)
U	degree of consolidation

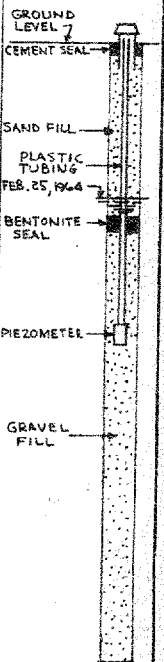
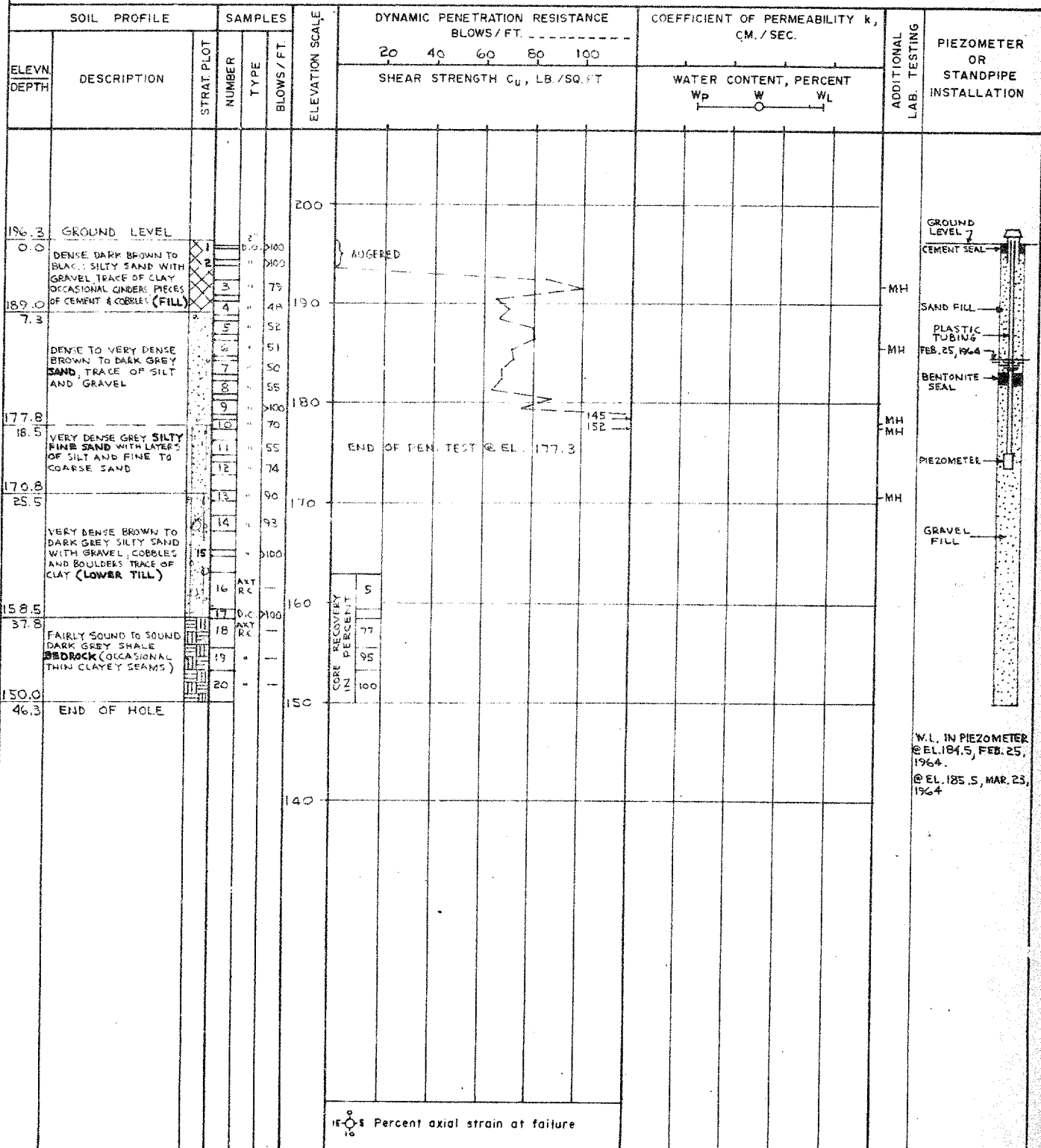
(e) Shear strength

τ_f	shear strength
c'	effective cohesion
ϕ'	effective angle of shearing resistance, or friction
c_u	apparent cohesion*
ϕ_u	apparent angle of shearing resistance, or friction
μ	coefficient of friction
S_t	sensitivity

*For the case of a saturated cohesive soil, $\phi_u = 0$ and the undrained shear strength $\tau_f = c_u$ is taken as half the undrained compressive strength.

RECORD OF BOREHOLE 301

LOCATION See Figure 1 BORING DATE FEB. 7-14, 1964 DATUM GEODETIC
 BOREHOLE TYPE POWER AUGER & WASH BORING BOREHOLE DIAMETER 4.5" & 8" CASING
 SAMPLER HAMMER WEIGHT 140 LB. DROP 30 INCHES PEN. TEST HAMMER WEIGHT 140 LB. DROP 30 INCHES



W.L. IN PIEZOMETER @ EL. 184.5, FEB. 25, 1964.
 @ EL. 185.5, MAR. 23, 1964

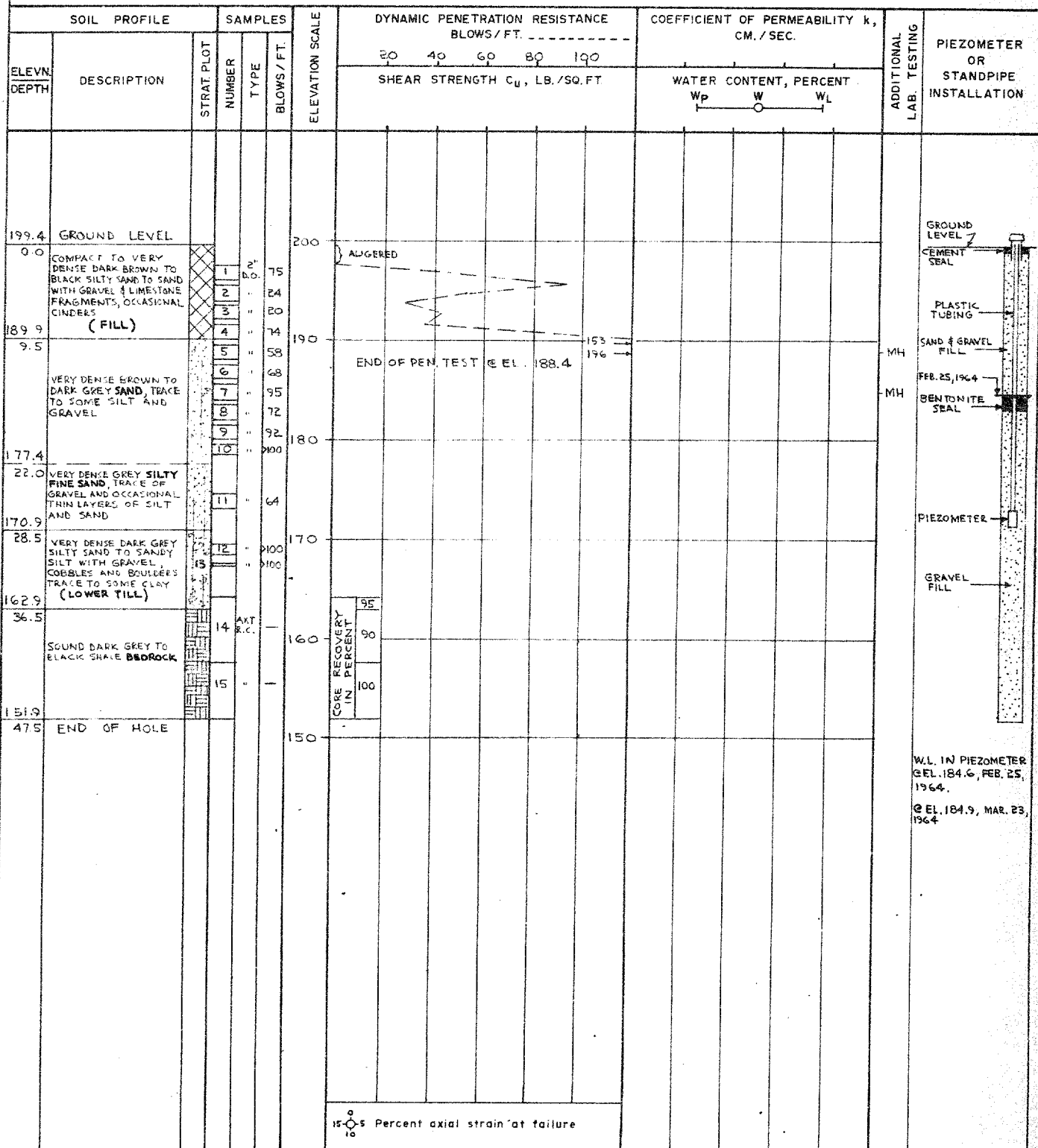
VERTICAL SCALE
 1 INCH TO 10'-0"

COLDER & ASSOCIATES

DRAWN J.A.
 CHECKED 808

RECORD OF BOREHOLE 302

LOCATION See Figure 1 BORING DATE FEB. 10-17, 1964 DATUM GEODETIC
 BOREHOLE TYPE POWER AUGER & WASH BORING BOREHOLE DIAMETER 4.5" & 8X CASING
 SAMPLER HAMMER WEIGHT 140 LB. DROP 30 INCHES PEN. TEST HAMMER WEIGHT 140 LB. DROP 30 INCHES



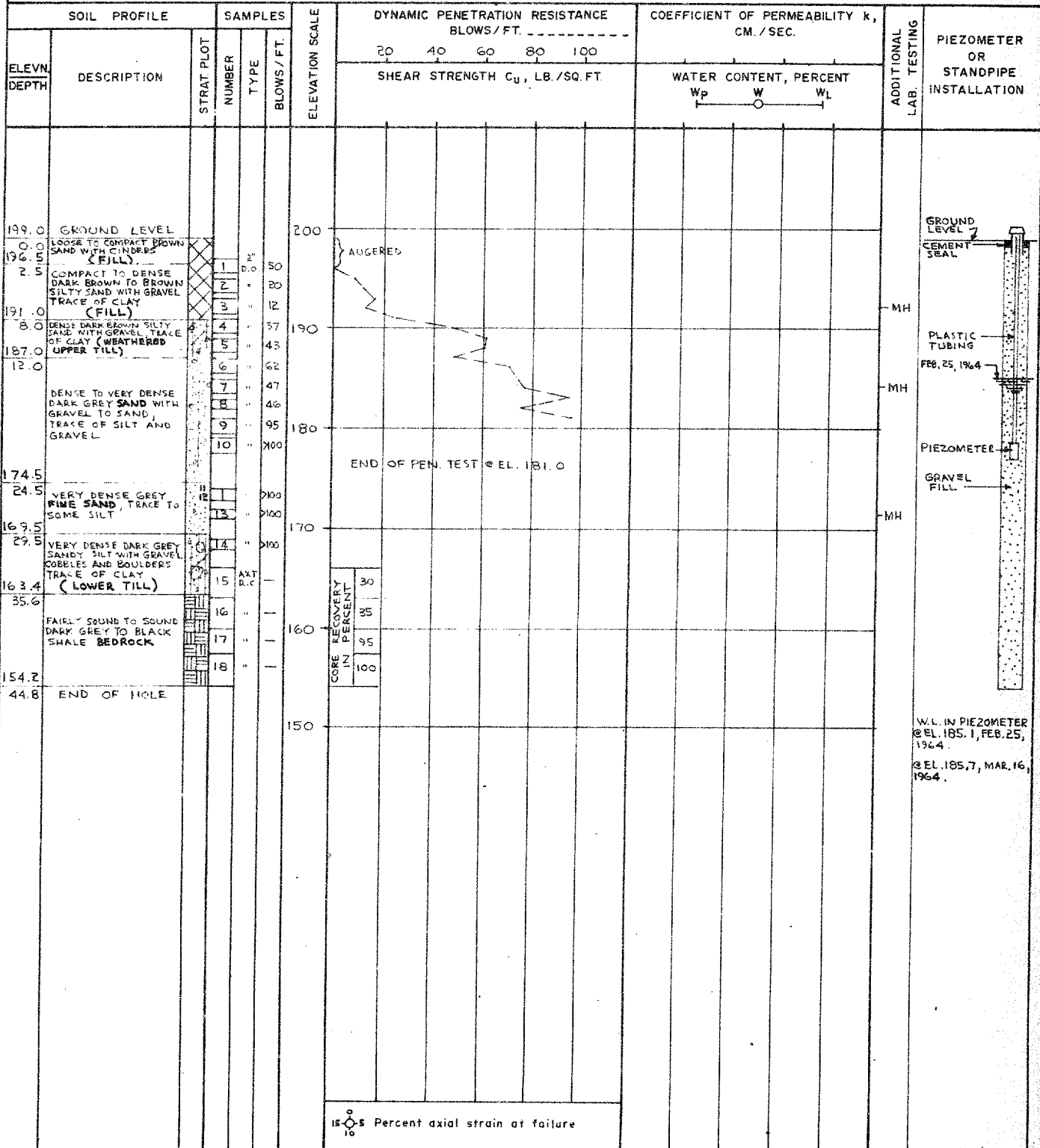
VERTICAL SCALE
 1 INCH TO 10'-0"

GOLDER & ASSOCIATES

DRAWN J.A.
 CHECKED J.M.

RECORD OF BOREHOLE 303

LOCATION See Figure 1 BORING DATE FEB. 11-19, 1964 DATUM GEODETIC
 BOREHOLE TYPE POWER AUGER & WASH BORING BOREHOLE DIAMETER 4.5" #5X CASING
 SAMPLER HAMMER WEIGHT 140 LB. DROP 30 INCHES PEN. TEST HAMMER WEIGHT 146 LB. DROP 30 INCHES



VERTICAL SCALE
 1 INCH TO 10'-0"

COLDER & ASSOCIATES

DRAWN J.A.
 CHECKED

RECORD OF BOREHOLE 304

LOCATION See Figure 1

BORING DATE FEB. 10-20, 1964

DATUM

GEODETIC

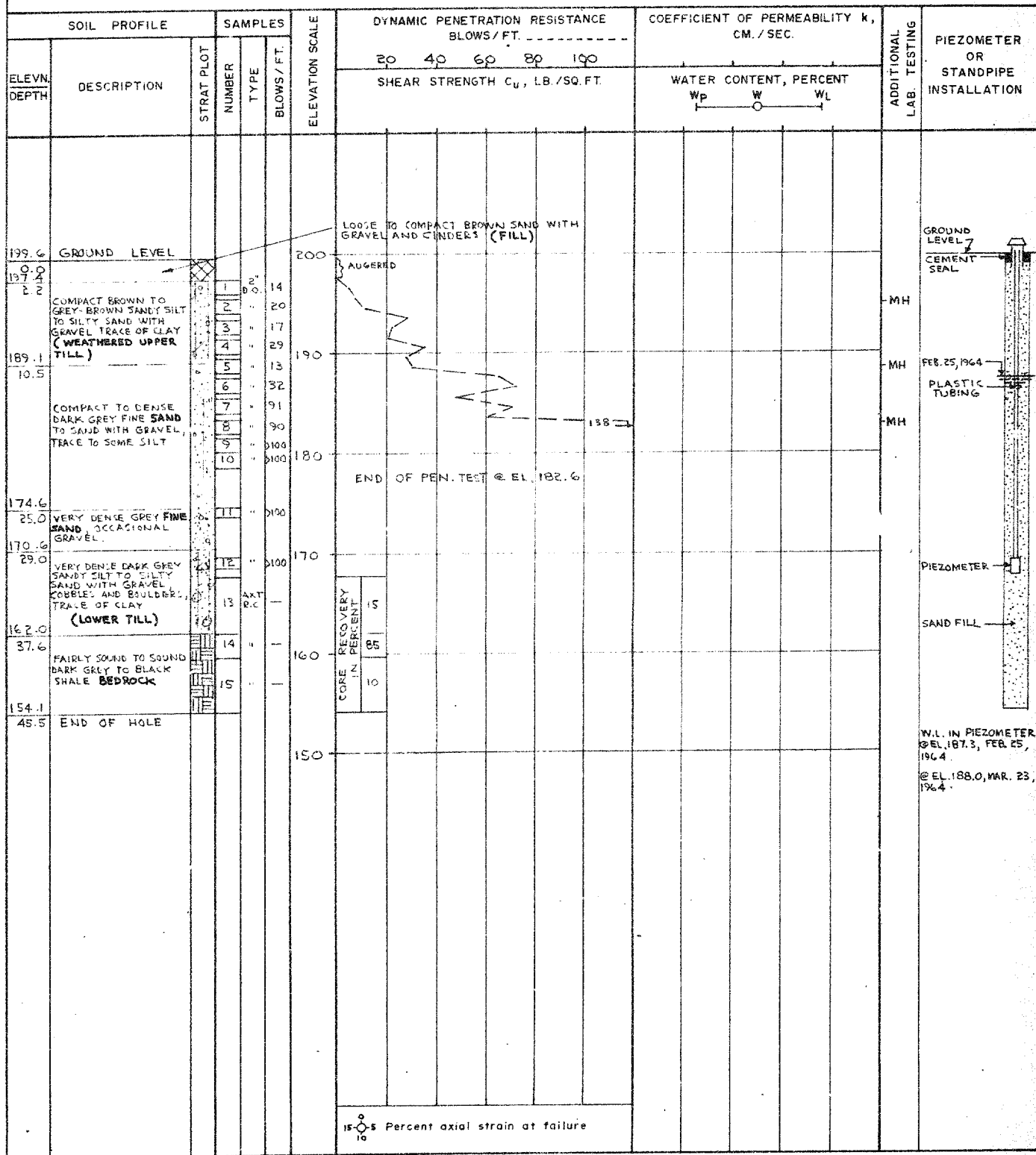
BOREHOLE TYPE POWER AUGER & WASH BORING

BOREHOLE DIAMETER

 4.5" \pm BX CASING

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 INCHES

PEN. TEST HAMMER WEIGHT 140 LB. DROP 30 INCHES


 VERTICAL SCALE
 1 INCH TO 10'-0"

GOLDER & ASSOCIATES

 DRAWN J.A.
 CHECKED J.A.

PEN. TEST HAMMER WEIGHT — LB. DROP — INCHES

VERTICAL SCALE
1 INCH TO 10'-0"

DRAWN J.A.
CHECKED [Signature]

PEN. TEST HAMMER WEIGHT — LB. DROP — INCHES

DRAWN J.A.
CHECKED my

RECORD OF BOREHOLE 309, 310

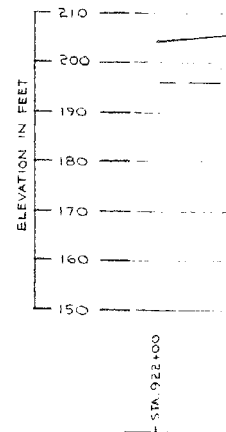
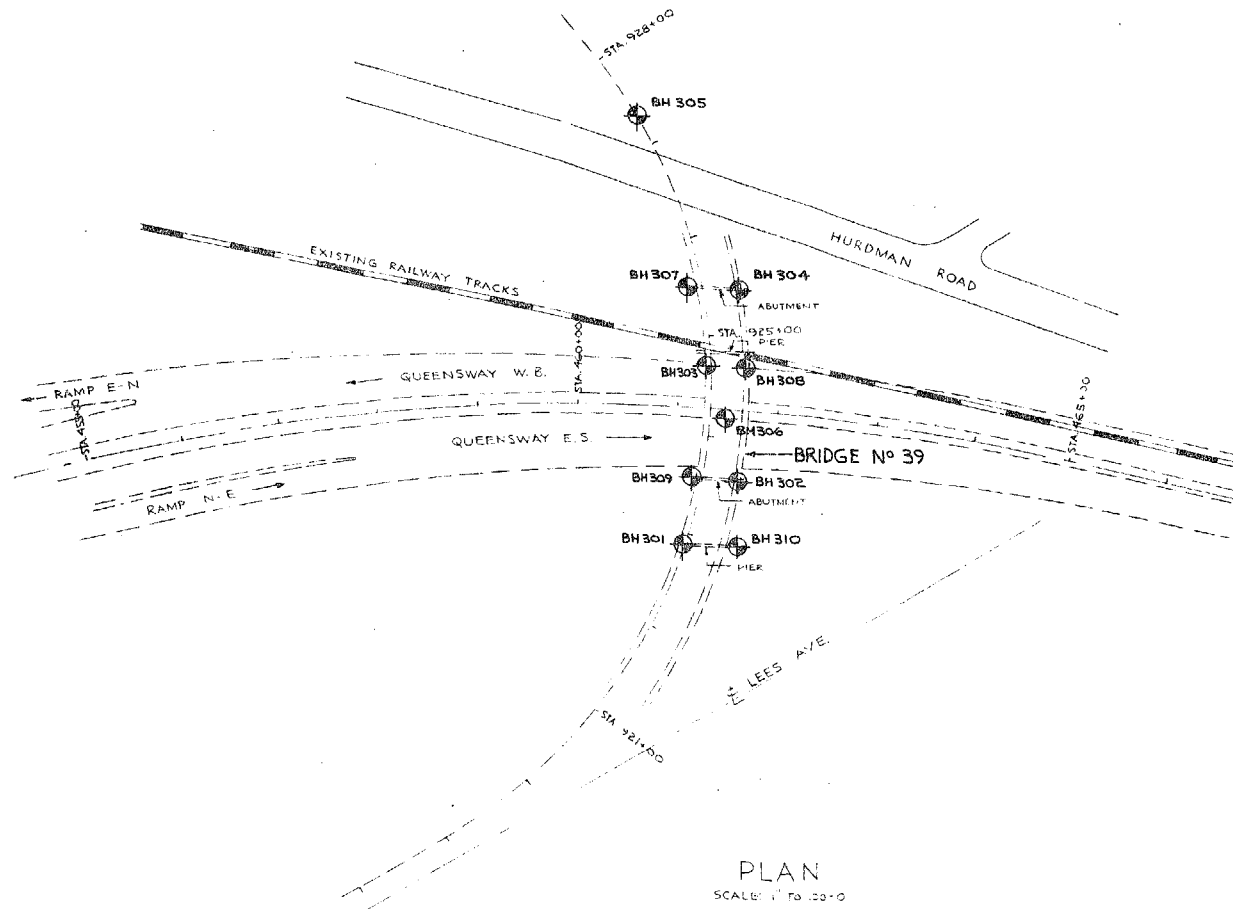
LOCATION See Figure 1 BORING DATE FEB. 21, 22, 1964 DATUM GEODETIC
 BOREHOLE TYPE WASH BORING BOREHOLE DIAMETER BX CASING
 SAMPLER HAMMER WEIGHT 140 LB. DROP 30 INCHES PEN. TEST HAMMER WEIGHT -- 18. DROP -- INCHES

SOIL PROFILE			SAMPLES		ELEVATION SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FT. -----				COEFFICIENT OF PERMEABILITY K, CM./SEC.				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
ELEVATION DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		SHEAR STRENGTH C_u , LB./SQ. FT.				WATER CONTENT, PERCENT Wp W Wl						
199.4 0.0	GROUND LEVEL				200	309									W.L. IN BOREHOLE AFTER COMPLETION OF DRILLING AT EL. 184.5, FEB. 21, 1964.	
	COMPACT TO DENSE BROWN TO DARK BROWN SAND TO SILTY SAND WITH GRAVEL (FILL)		1	D.P.	100											
			2	"	21											
			3	"	16											
188.9 10.5			4	"	53											
			5	"	39											
	DENSE TO VERY DENSE DARK GREY SAND TRACE OF SILT, SOME GRAVEL		6	"	68											
181.9 17.5	END OF HOLE		8	"	49											
197.8 0.0	GROUND LEVEL				200	310									BOREHOLE DRY TO EL. 184.3 AFTER COMPLETION OF DRILLING, FEB. 22, 1964.	
	DENSE TO VERY DENSE DARK BROWN SILTY SAND WITH GRAVEL, A FEW COBBLES AND BOULDERS (FILL)		1	2" D.C.	100											
			2	"	83											
188.8 9.0			3	"	54											
			4	"	56											
	VERY DENSE DARK GREY SAND, TRACE TO SOME SILT AND GRAVEL		5	"	57											
184.3 13.5	END OF HOLE		7	"	58											
						15-10-5 Percent axial strain at failure										

VERTICAL SCALE
 1 INCH TO 10'-0"

GOLDER & ASSOCIATES

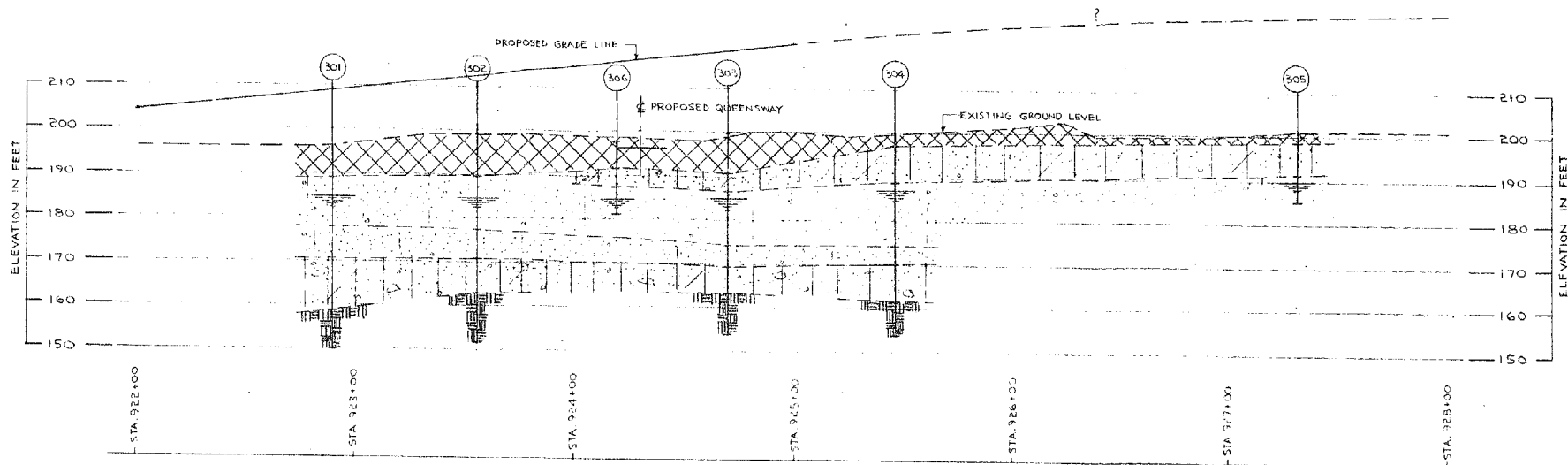
DRAWN J.A.
 CHECKED *dy*



LEGEND

- BOREHOLE IN PLAN
- BOREHOLE IN ELEVATION
- W. L. IN BOREHOLE, FEBRUARY, 1964







PLAN
 SCALE: 1" TO 100' 0"



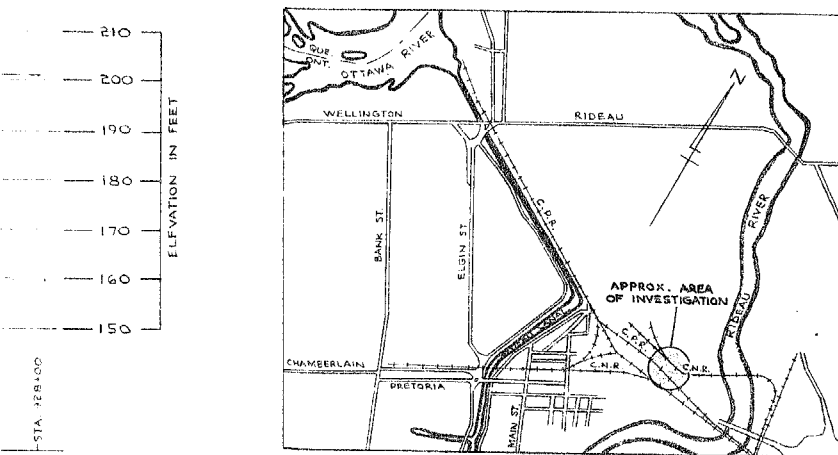
SCHEMATIC SECTION ALONG CENTRELINE OF PROPOSED LEES AVENUE

SCALE: HORIZ. 1" TO 40'-0"
VERT. 1" TO 20'-0"

STRATIGRAPHY

-  LOOSE TO VERY DENSE BROWN TO BLACK SILTY SAND WITH GRAVEL, OCCASIONAL COBBLES AND BOULDERS (FILL)
-  COMPACT TO VERY DENSE BROWN TO GREY SILTY SAND WITH GRAVEL, TRACE OF CLAY (WEATHERED UPPER TILL)
-  DENSE TO VERY DENSE DARK GREY SAND WITH SILT AND GRAVEL
-  VERY DENSE GREY SILTY FINE SAND
-  VERY DENSE DARK GREY SILTY SAND TO SANDY SILT WITH GRAVEL, COBBLES AND BOULDERS, TRACE OF CLAY (LOWER TILL)
-  FAIRLY SOUND TO SOUND DARK GREY SHALE BEDROCK

SPECIAL NOTE: DATE LOGS INDICATE THE VARIOUS STRATA HAVE BEEN EXPOSED BY THE VARIOUS TRENCHES ONLY. THE SOIL SAMPLES WERE TAKEN FROM BOREHOLE NO. 301 AND 302. THE SOIL SAMPLES WERE TAKEN FROM BOREHOLE NO. 301 AND 302. THE SOIL SAMPLES WERE TAKEN FROM BOREHOLE NO. 301 AND 302.



KEY PLAN

SCALE 1" TO 2,000 (APPROX.)

REFERENCE

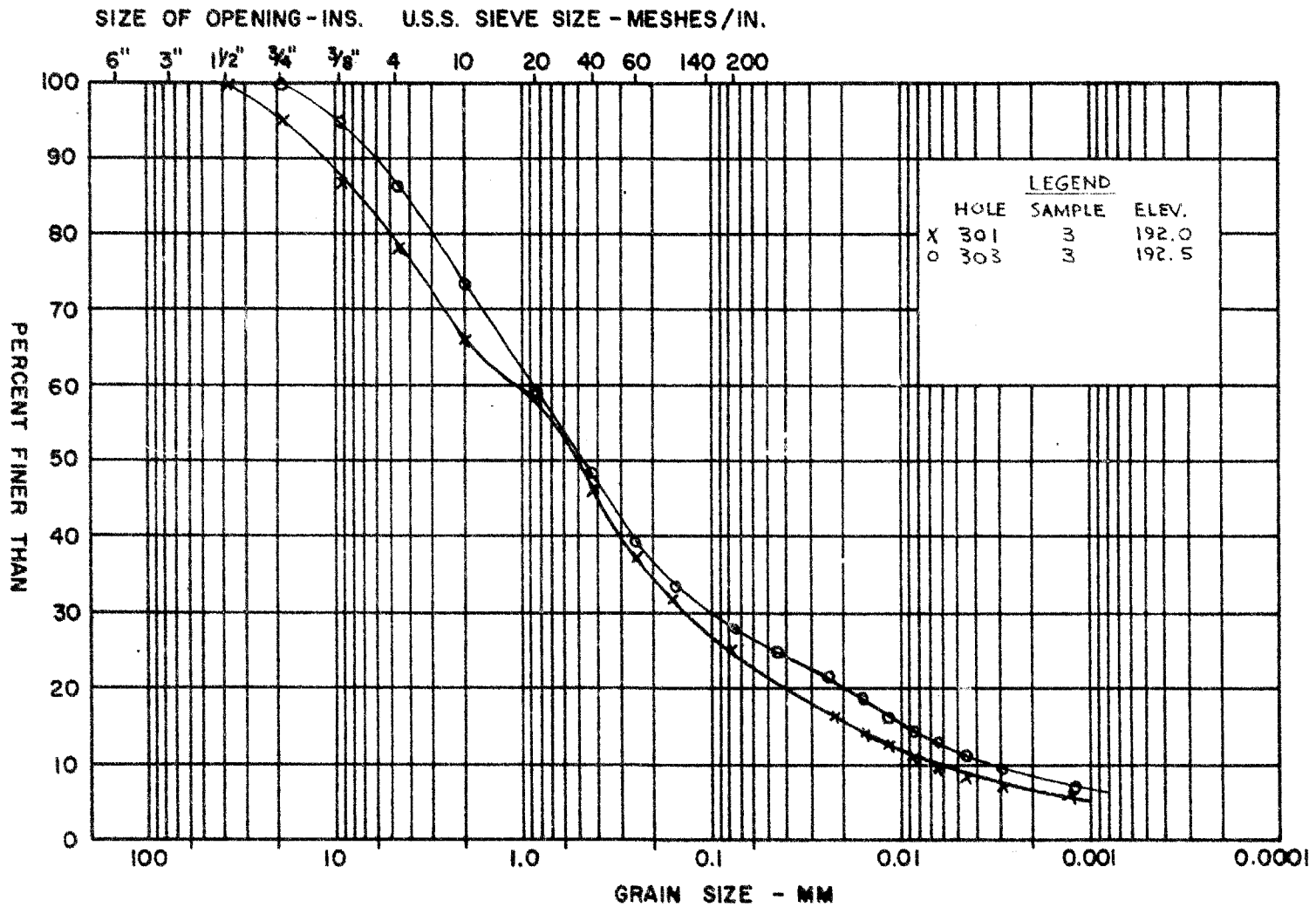
DPWG. N. C45H-28 - DELEUW, CATHER & CO. OF CANADA LIMITED,
OTTAWA QUEENSWAY - STAGE IV PRELIMINARY SITE PLAN, LEES
AVE BRIDGE NO 39, DATED DEC. 31, 1963, REVISED JAN. 17, 1964.

SPECIAL NOTE: DATA CONCERNING THE VARIOUS
STRATA HAVE BEEN OBTAINED AT A NUMBER OF LOCATIONS
THROUGHOUT THE SITE. THE DATA HAVE BEEN OBTAINED
FROM A NUMBER OF BOREHOLES HAS BEEN OBTAINED FROM A NUMBER OF
EVIDENCE AND DO NOT VARY FROM THAT SHOWN.

GOLDER & ASSOCIATES

Made 10/1
Chkd. 000
Appd. 000

M.I.T. GRAIN SIZE SCALE



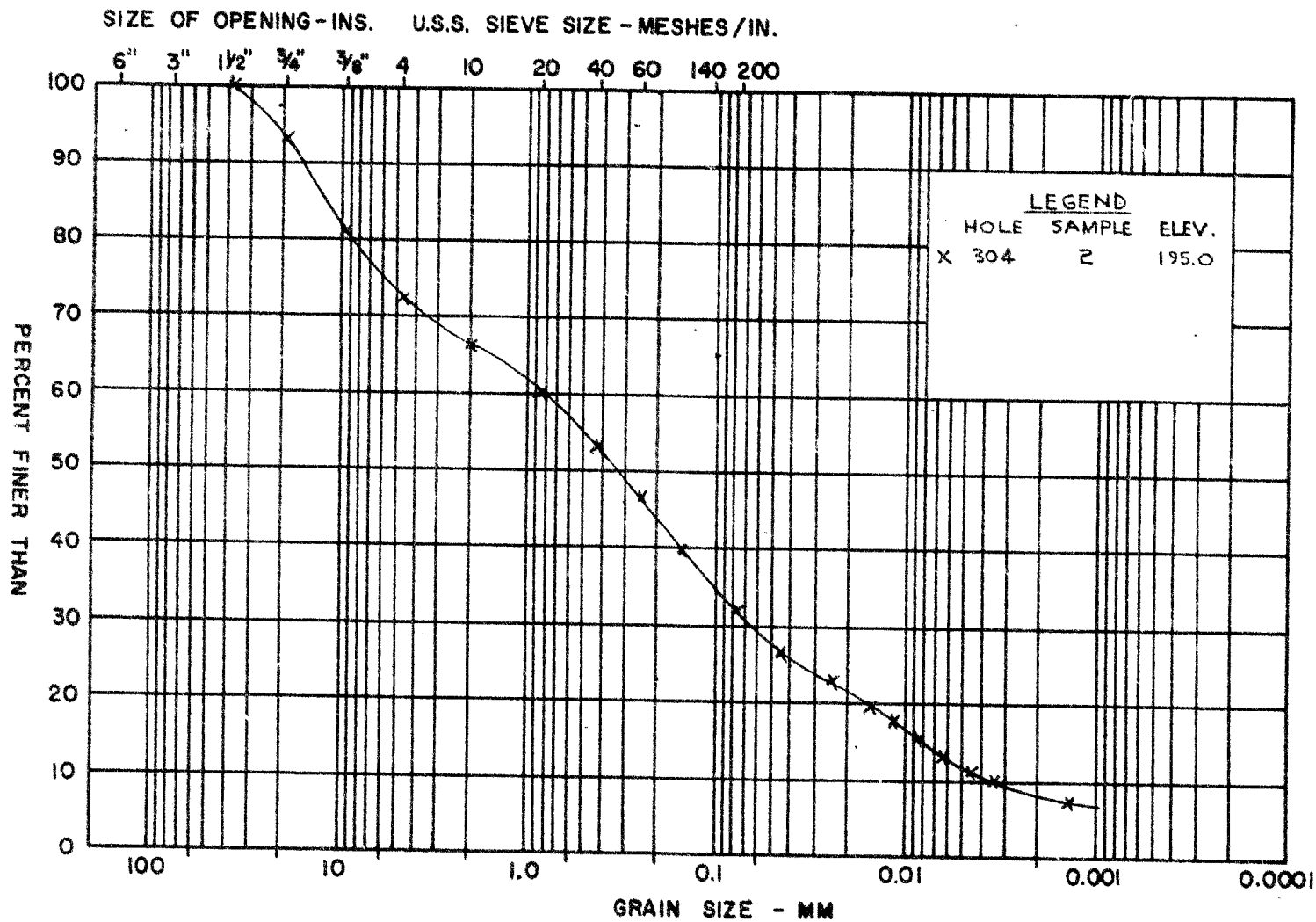
GOLDER & ASSOCIATES

GRAIN SIZE DISTRIBUTION
FILL

FIGURE 2

COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

M.I.T. GRAIN SIZE SCALE



GOLDER & ASSOCIATES

GRAIN SIZE DISTRIBUTION
UPPER WEATHERED TILL

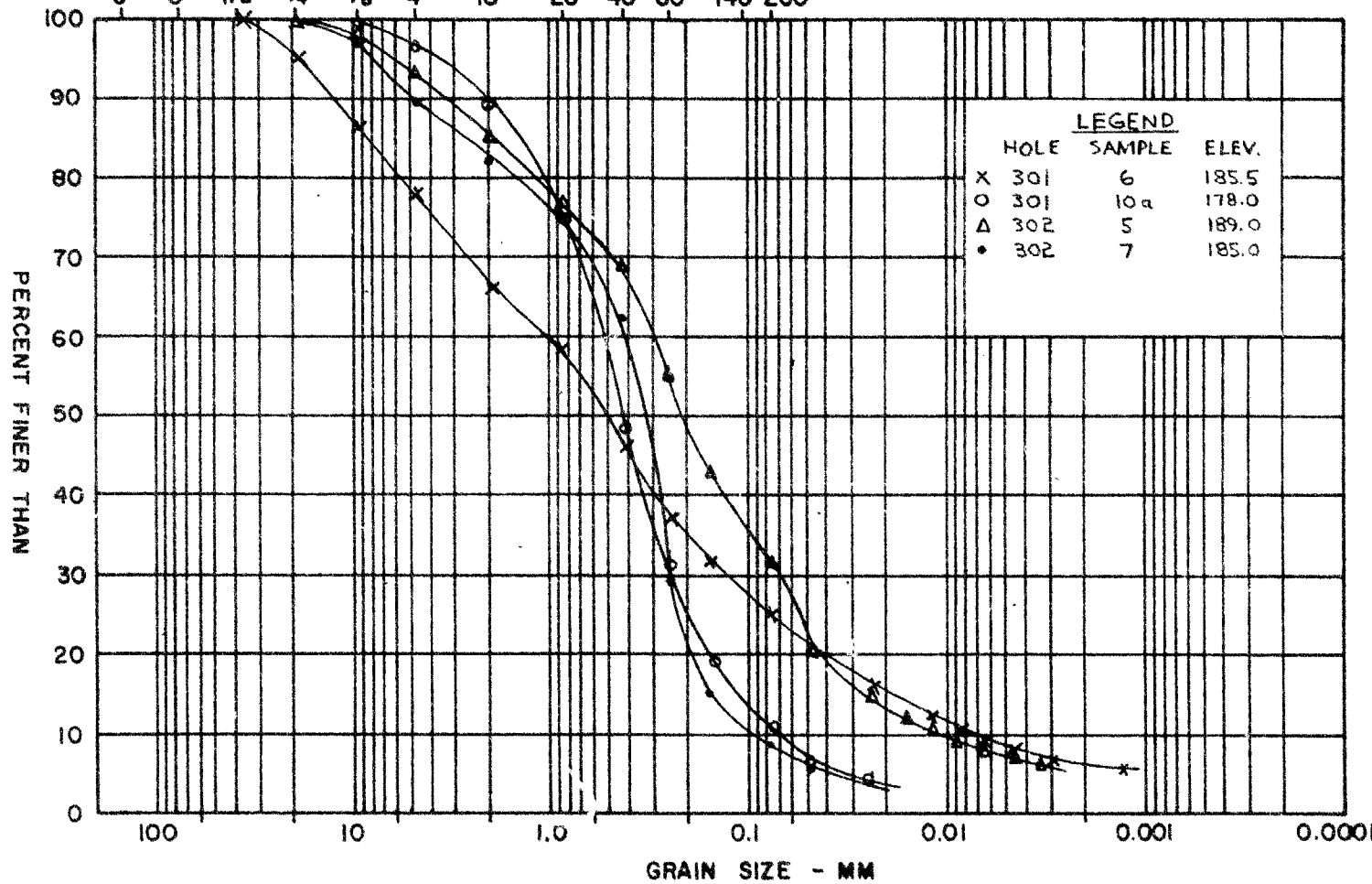
FIGURE 3

COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE		CLAY SIZE	
	GRAVEL SIZE			SAND SIZE			FINE GRAINED			

M.I.T. GRAIN SIZE SCALE

SIZE OF OPENING - INS. U.S.S. SIEVE SIZE - MESHES/IN.

6" 3" 1 1/2" 3/4" 3/8" 4 10 20 40 60 140 200

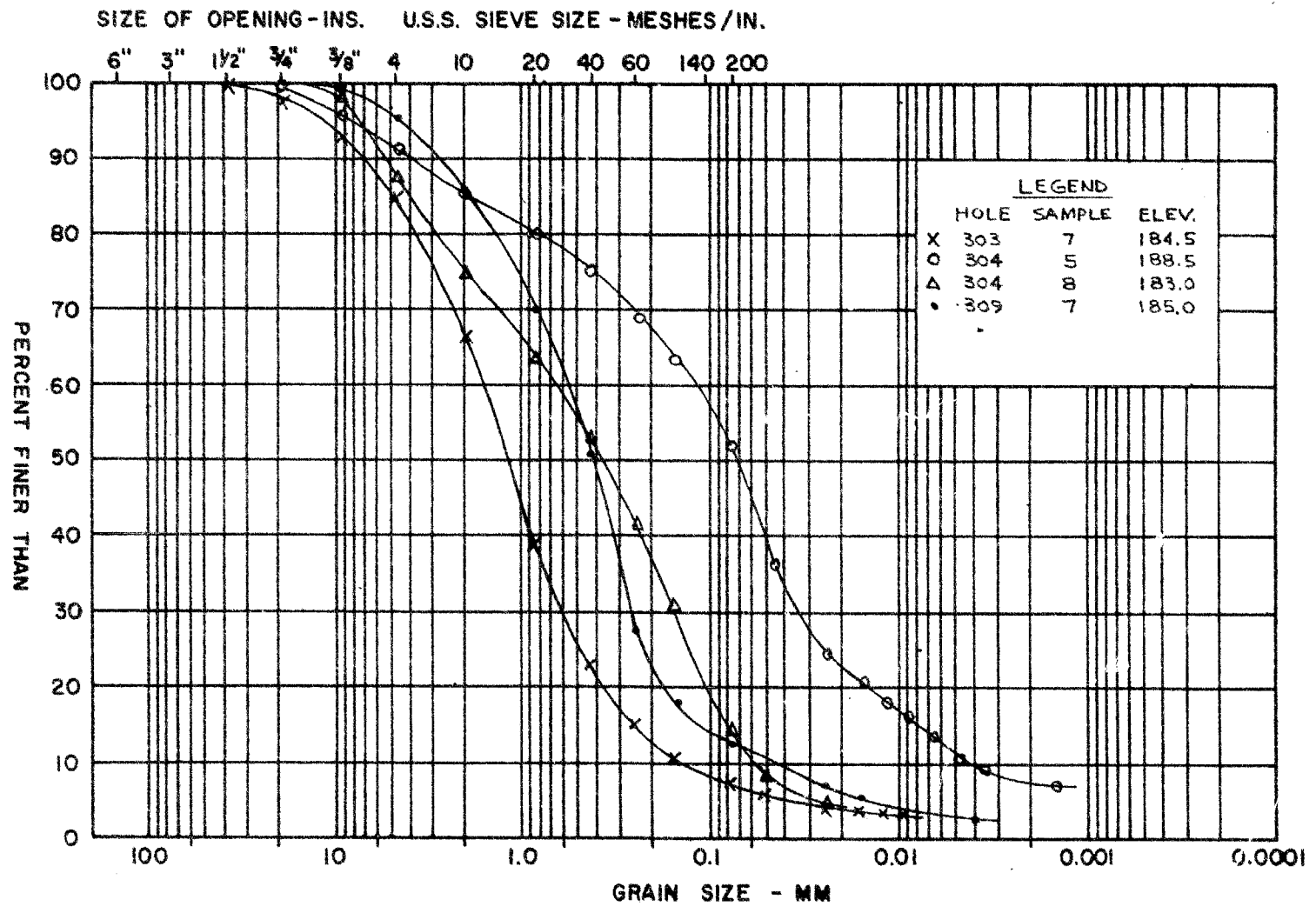


GOLDER & ASSOCIATES

GRAIN SIZE DISTRIBUTION
SAND

FIGURE 4

M.I.T. GRAIN SIZE SCALE



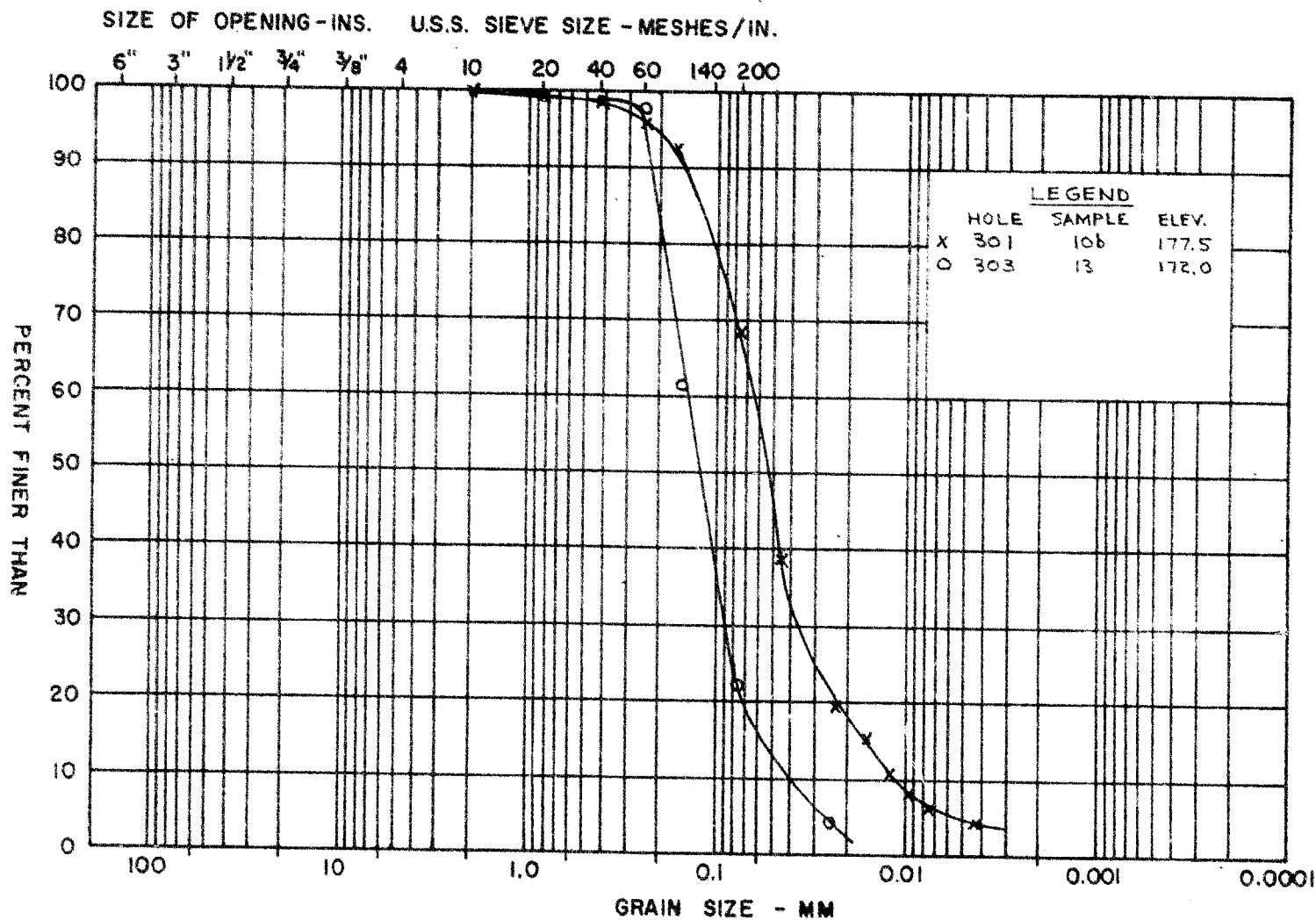
GOLDER & ASSOCIATES

GRAIN SIZE DISTRIBUTION
SAND

COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED	

FIGURE 5

M.I.Y. GRAIN SIZE SCALE

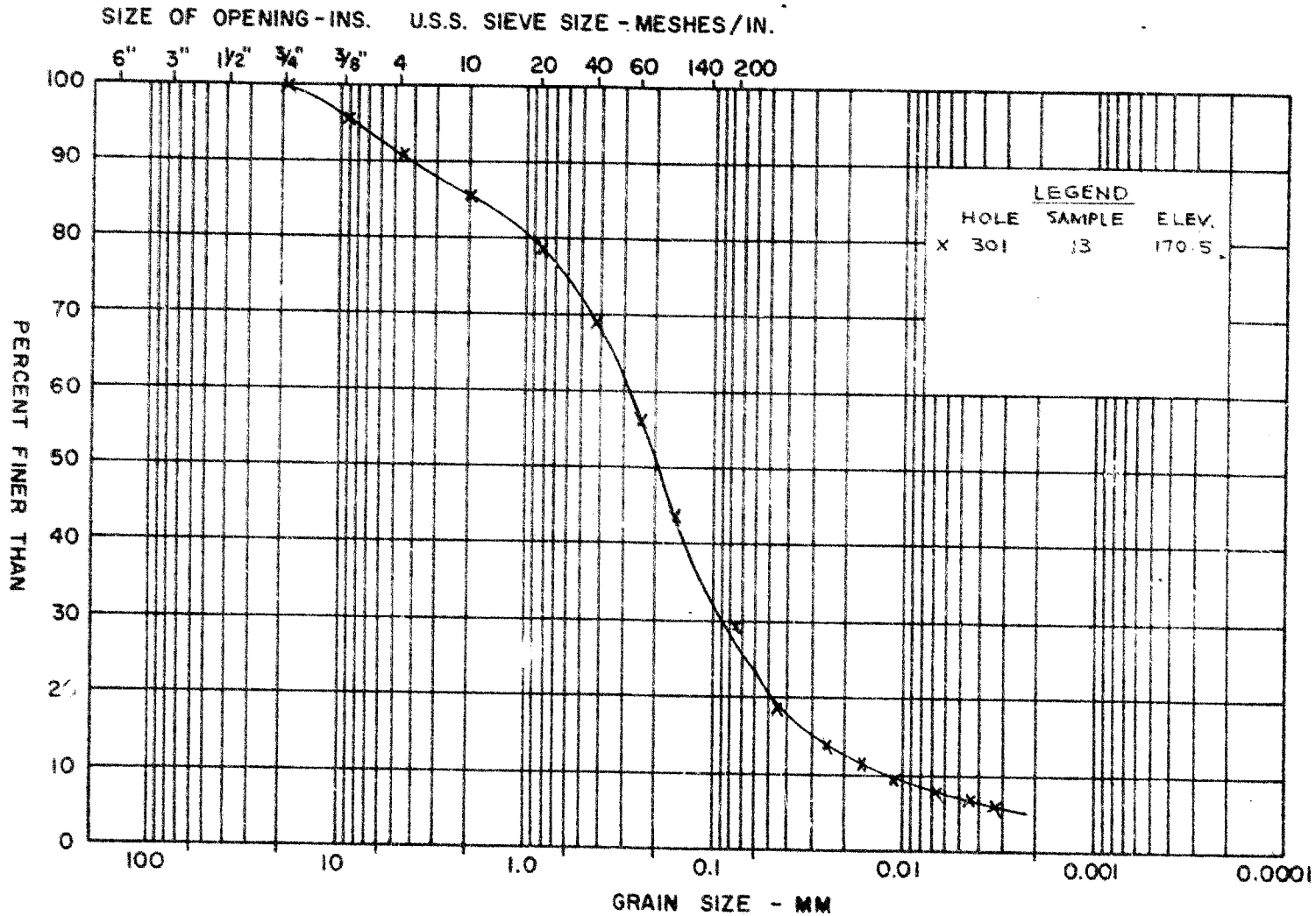


GOLDER & ASSOCIATES

GRAIN SIZE DISTRIBUTION
FINE SAND

FIGURE 6

M.I.T. GRAIN SIZE SCALE



GOLDER & ASSOCIATES

GRAIN SIZE DISTRIBUTION
LOWER TILL

FIGURE 7

COBBLE SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE		CLAY SIZE
	GRAVEL SIZE			SAND SIZE			FINE GRAINED		

Solomon 64

Mr. A.G. Stornas,
Principal Foundation Engineer,
Room 107,
Lab. Building.

Bridge Division,
Downsview, Ontario.

May 8, 1964.

M.F. 913-64,
Lees Avenue Bridge # 39,
Ottawa Queensway,
District # 9.

Attached please find one copy of the Preliminary
Bridge Plan D-5875-P1 for the above structure.

Would you kindly review the bridge foundations
proposed and inform the Bridge Office if they are
satisfactory.

Apwatt

APW/aci

A.P. Watt,
Regional Bridge Location Engineer.

#64-F-221C

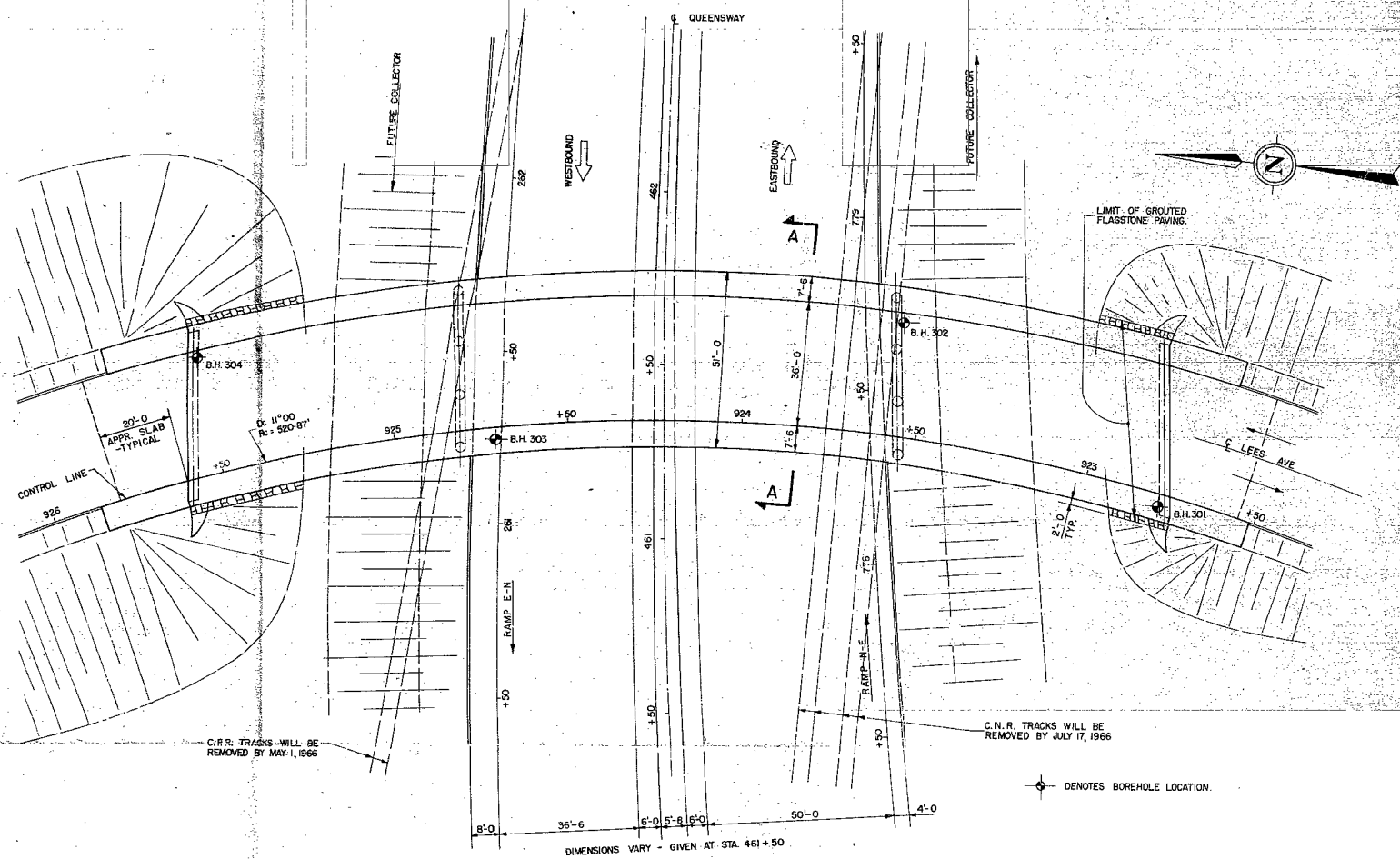
W.P. #913-64

OTTAWA

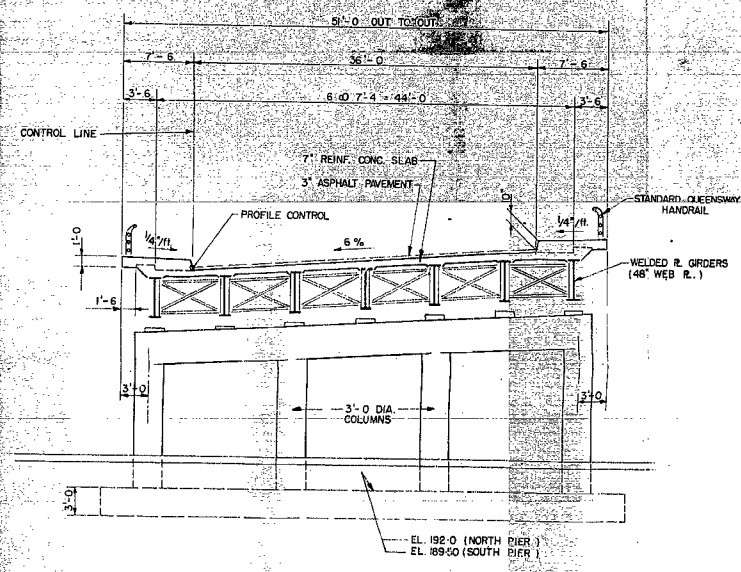
QUEENSWAY

BRIDGE #39

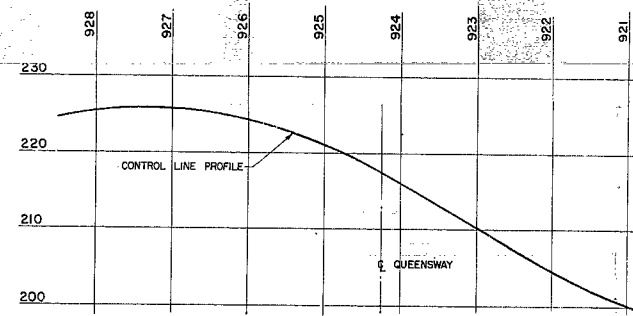
AT LEES AVE.



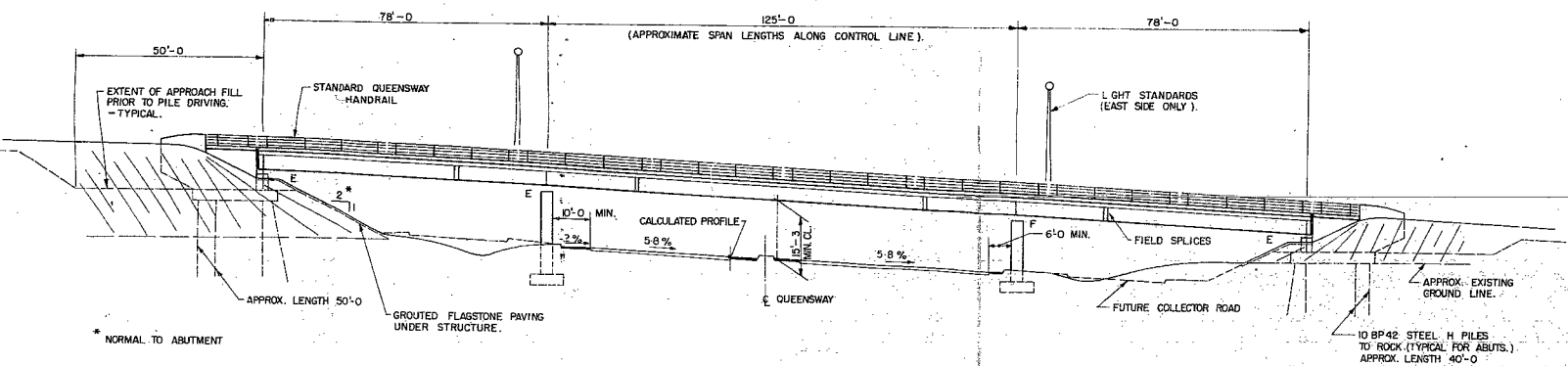
BRIDGE PLAN
SCALE: 1" = 20'-0"



SECTION 'A A'
SCALE: 1" = 8'-0"



LEES AVE. PROFILE
SCALE: HORIZ. 1" = 100'-0"
VERT. 1" = 10'-0"

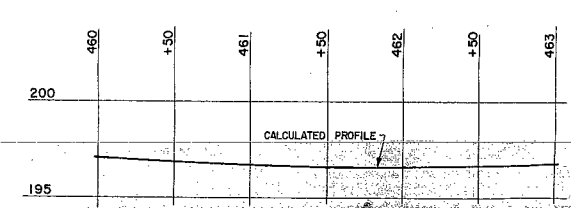


WEST ELEVATION
SCALE: 1" = 20'-0"

	B.H. 301	B.H. 302	B.H. 303	B.H. 304
200				
195				FILL
190	FILL	FILL	FILL	WEATHERED UPPER TILL
185			WEATHERED UPPER TILL	
180	SAND	SAND	SAND	SAND
175	SILTY FINE SAND	SILTY FINE SAND	FINE SAND	FINE SAND
170		LOWER TILL	LOWER TILL	LOWER TILL
165	LOWER TILL			
160		BEDROCK	BEDROCK	BEDROCK
155	BEDROCK			
150				

BOREHOLE LOG

- NOTES:**
- DESIGN SPECIFICATIONS:**
A.A.S.H.O. STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES 1961 AND D.A.O. BRIDGE DIVISION TENTATIVE STANDARDS AND MEMORANDUM.
 - LIVE LOAD:**
H-80-S16-44
 - CONCRETE:**
3000 P.S.I. AT 28 DAYS.
 - STRUCTURAL STEEL:**
C.S.A. SPECIFICATIONS 640-8 GRADE A
 - SUPERSTRUCTURE:**
CONTINUOUS WELDED PLATE GIRDERS WITH REINFORCED CONCRETE DECK SLAB - COMPOSITE ACTION IN POSITIVE MOMENT ONLY. FASCIA GIRDERS TO BE CURVED IN PLAN; INTERIOR GIRDERS TO BE STRAIGHT BETWEEN BEND POINTS LOCATED AT FIELD SPLICES.
 - FOUNDATIONS:**
ABUTMENTS SUPPORTED ON STEEL BEARING PILES - 10 8P42 WITH POINT REINFORCEMENT. ALLOWABLE LOAD 50 TONS. PIERS SUPPORTED ON SPREAD FOOTINGS - ALLOWABLE BEARING PRESSURE 5000 P.S.F.
 - PRELIMINARY ESTIMATE OF COST:**
\$ 194,000



QUEENSWAY PROFILE
SCALE: HORIZ. 1" = 50'-0"
VERT. 1" = 4'-0"

No.		Revisions		By Date	
DEPARTMENT OF HIGHWAYS OF ONTARIO					
OTTAWA QUEENSWAY					
LIMITED-ACCESS HIGHWAY					
OTTAWA CANADA					
BRIDGE No. 39 AT LEES AVE.					
PRELIMINARY BRIDGE PLAN					
DE LEUW CATHY & CO. OF CANADA LIMITED Consulting Engineers <i>Leon J. Marshall</i>			DEPT. OF HIGHWAYS OF ONTARIO Director of Planning & Design		
Designed by: G.S.S.		Date: APRIL 1964		DWG. No. D5475-PI	
Drawn by: P.T. - A.G.Y.		Scale: AS SHOWN		Sheet 1 of 1	
Checked by: L.J.M.					

CONTRACT NUMBERS			
WORKS PROJECT No. 913-64	DISTRICT No. 9		