

H. Q. GOLDER & ASSOCIATES LTD.

CONSULTING CIVIL ENGINEERS  
HEAD OFFICE - TORONTO, ONTARIO

H. Q. GOLDER  
V. MILLIGAN  
L. G. SODERMAN  
J. L. SEYCHUK

747 HYDE PARK ROAD  
LONDON, ONTARIO  
471-9600

June 8, 1967.

Department of Highways,  
Materials and Testing Division,  
Hwy. 401 and Keele St.,  
DOWNSVIEW, Ontario.

ATT: Mr. A. G. Stermac, P.Eng.

RE: Soils Investigation,  
Hwy. 4 and Dodds Creek  
W.P. 54/66

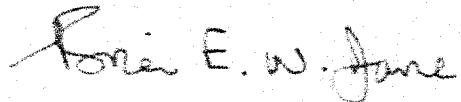
Dear Sirs:

Since completion of the subsurface investigation at the above site, the soil samples have been stored in our London laboratory.

We shall be disposing of these samples at the end of June 1967, and if you have further use for them, please contact our office or arrange to have them picked up at our office before this date.

Yours truly,

H. Q. GOLDER & ASSOCIATES LTD.,



Brian E. W. Dowse, P. Eng.

BEWD:cm  
665

Mr. B. E. Davis,  
Bridge Engineer,  
Bridge Division.

Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

September 27, 1966

SEP 27 1966

FOUNDATION INVESTIGATION REPORT BY:  
H. G. Golder and Associates Limited -  
Proposed Reid's Creek Crossing,  
Hwy. No. 4, Talbotville Royal, Ontario.  
District No. 2 (London) -- S.P. 54-66

Attached, please find the above mentioned report prepared and submitted by the consultant, H. G. Golder and Associates Limited.

We have reviewed the report and are in agreement with the recommendations. We also believe that the report contains all the necessary information for your further design work. However, should you have any additional questions that you would like to discuss, please feel free to contact this Office.

AGI/kneP  
Attach.

*Afternoon*  
A. C. Starano,  
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. B. E. Davis (2)  
H. A. Tregaskes  
D. M. Farren  
A. Gater  
A. P. Matt  
E. C. Barnier  
J. Roy  
A. Matt

Foundations Office ✓  
Gen. Files

66-1-2212

**H. Q. GOLDER & ASSOCIATES LTD.**

**CONSULTING CIVIL ENGINEERS**

**H. Q. GOLDER  
V. MILLIGAN  
L. G. SODERMAN  
J. L. SEYCHUK**

**2444 BLOOR STREET WEST  
TORONTO 9, ONTARIO  
763-4103  
767-9201**

**W.P. 54-66**

**REPORT**

**TO**

**DEPARTMENT OF HIGHWAYS, ONTARIO**

**ON**

**SOIL CONDITIONS AND FOUNDATIONS**

**PROPOSED DODD'S CREEK CROSSING**

**HIGHWAY NO. 4**

**TALBOTVILLE ROYAL                      ONTARIO**

**Distribution:**

**11 copies - Department of Highways, Ontario,  
Toronto, Ontario.**

**2 copies - H. Q. Golder & Associates Ltd.,  
London, Ontario.**

**September, 1966**

**66513**

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### ABSTRACT

The results of an investigation to determine the sub-surface conditions at the site of the proposed Dodd's Creek crossing, Highway 4, to the south of the Town of Lambeth, Ontario, are reported and recommendations made for the foundation design of the proposed structure.

It was found that the site is underlain by a deposit of clay till that contains varying percentages of silt and sand sizes with occasional fine to medium gravel sizes. The till was found to be generally very stiff to hard. In boreholes 1 and 2 the upper 7 feet of soil is soft to firm till fill forming the existing roadway embankments. At the locations of boreholes 3 and 4, which were drilled through the existing creek bed, a shallow layer of recent fluvial material (silty sandy clay) in a soft condition was found to a depth of 2 to 3 feet. No artesian conditions were encountered in the borings.

It is recommended that the abutment footings for the proposed single span structure be founded directly on the competent till stratum at or below elevation 775. The subsoil is competent to support adequately the fill heights for the proposed approach embankments; the soft, recently deposited stream bed material, as well as the organic surface layer, should be removed everywhere below the embankment fill sections.

## INTRODUCTION

H. Q. Golder & Associates Ltd. have been retained by the Department of Highways, Ontario, to carry out a soil investigation at the proposed modified crossing of Dodd's Creek on Highway No. 4, two miles north of Talbotville Royal, Ontario. The purpose of the borings put down during this investigation was to determine the subsoil and groundwater conditions at the proposed abutment locations and to make recommendations for foundation design.

## PROCEDURE

The field work for this investigation was carried out between September 9 and 14, 1966. A total of 4 boreholes, each accompanied by a dynamic cone penetration test, were put down using a skid-mounted diamond drillrig supplied and operated by the F. E. Johnston Drilling Co. Ltd. The borings which were generally started in NX casing size and were completed in BX casing size were put down to depths ranging from 16.5 to 51.5 feet. The cone penetration tests accompanying the boreholes were driven to refusal at shallower depths. The groundwater level at the site was observed during drilling and for several days after the investigation in piezometers installed in the two deeper borings. The field work was supervised throughout by a member of our engineering staff.

**GOLDER & ASSOCIATES**

A detailed log for each of the borings is given in the Record of Borehole sheets following the text of this report. The locations of the borings, together with sections of the inferred soil stratigraphy across the site, are shown on Figure 1.

Samples obtained during the investigation were returned to our laboratory for detailed examination and testing. The results of the laboratory testing are shown on the Records of Boreholes and on Figures 2 and 3.

The elevations given in this report are referred to D.H.O. Benchmark No. 64-16 located some 350 feet west of Highway No. 4 on the south side of the crossing. The elevation of this benchmark was given as 796.073 referred to Geodetic datum.

#### SITE AND GEOLOGY

Highway No. 4 presently crosses Dodd's Creek on a reinforced concrete rigid frame slab bridge 30 feet in clear span. The approach embankments on the north side of the existing bridge rise about 6 feet above the surrounding land. The abutments of a previous bridge are apparent just downstream from the existing bridge. Dodd's Creek flows sluggishly from east to west in a shallow depression. The general fall of the surrounding land is from south to north.

The major soil type found in this part of Ontario is glacial till. The till underlies the site to considerable depth with some minor shallow alluvial deposits in the depression along which the creek flows.

#### SUBSOIL CONDITIONS

The detailed stratigraphy encountered in the 4 boreholes is shown on the Record of Borehole sheets. The stratigraphy interpolated from this data is presented on Figure 1. The soil conditions at the site may be summarized in the following manner.

The site is underlain by silty clay till with some sand and occasional fine to medium gravel. The till is generally very stiff to hard. The upper 7 feet in boreholes 1 and 2, drilled through the existing roadway embankment, is considered to be fill material which is till-like in composition but softer in consistency than the undisturbed till below. Boreholes 3 and 4, which were drilled through the creek bed, showed 2 to 3 feet of soft silty sandy clay which is probably recently deposited material.

The till was found to extend to at least elevation 736. Standard penetration tests carried out in the till stratum and reported on the Records of Boreholes gave 'N' values that range from 23 to greater than 100 blows/ft. and have an average of about 48. Grain size distribution curves for samples tested at various depths from the till are presented in Figures 2 and 3. The natural water



content varies from 10 percent to 18 percent with an average of 15.

### GROUNDWATER CONDITIONS

After completion of the two deeper boreholes piezometers were installed and sealed as sketched on the Records of Boreholes. Readings taken up to five days after completion of drilling showed the groundwater to have stabilized at about creek water level. No artesian water pressure was encountered at the site.

### DISCUSSION

#### General

It is understood that the proposed new crossing is to be a single span rigid frame structure, with a clear span approximately 40 feet long. The proposed highway grade is to be raised 5 feet above the existing grade. The existing structure, which is a rigid frame slab bridge, shows no evidence of movement. The present stream bottom appears to have been paved between the abutments.

#### Foundations

The abutments of the bridge may be safely founded on spread footings within the glacial till using an allowable bearing pressure of 3 tons/sq.ft. at or below elevation 775. The settlement

of the bridge founded as recommended should be negligible. Excavations for the abutments should be carried out in the dry to prevent softening of the subsoil. Either a local earthen dyke around each footing or a stream diversion can be used. The soil types occurring at the footing locations are relatively impervious, consequently seepage into the footing excavations will be negligible.

For retaining type abutments, it is recommended that free-draining and non-frost-susceptible granular backfill be used behind the abutments. The granular backfill should be compacted in thin horizontal lifts and should extend horizontally from the back face of the abutment walls for a minimum distance of 4 feet.

A maximum loose lift of 18 inches may be used providing vibratory equipment is used for compaction. It is recommended that, providing there is effective drainage behind the walls, a coefficient of earth pressure at rest,  $K_0$ , of 0.5 and a total unit weight,  $\gamma$ , of 130 lb/cu.ft. be used for the compacted granular backfill in design of rigid frame walls.

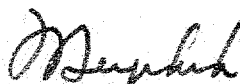
#### EMBANKMENTS

The approach embankments may be safely built to their required height in one stage using compacted fill, properly controlled in the field, with a maximum slope of 2 horizontal to 1

vertical. Material should be compacted to 100 percent of Standard Proctor maximum density under conditions of controlled water content.



*for* B. E. W. Dowse, P.Eng.



*for* L. G. Soderman, P.Eng.

BEW:hdg

66513

September 22, 1966.

## 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

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

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

#### NOTES:

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

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

## LIST OF SYMBOLS

### I. GENERAL

$\pi$	$= 3.1416$
$e$	$=$ 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
$\sigma$	normal stress
$\sigma'$	normal effective stress ( $\bar{\sigma}$ is also used)
$\tau$	shear stress
$\epsilon$	linear strain
$\epsilon_{xy}$	shear strain
$\nu$	Poisson's ratio ( $\mu$ is also used)
$E$	modulus of linear deformation (Young's modulus)
$G$	modulus of shear deformation
$K$	modulus of compressibility
$\eta$	coefficient of viscosity

### III. SOIL PROPERTIES

#### (a) Unit weight

$\gamma$	unit weight of soil (bulk density)
$\gamma_s$	unit weight of solid particles
$\gamma_w$	unit weight of water
$\gamma_d$	unit dry weight of soil (dry density)
$\gamma'$	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 $= -\Delta e' / \Delta \log_{10} \sigma'$
$c_s$	coefficient of consolidation
$T_v$	time factor $= c_s t / d^2$ ( $d$ , drainage path)
$U$	degree of consolidation

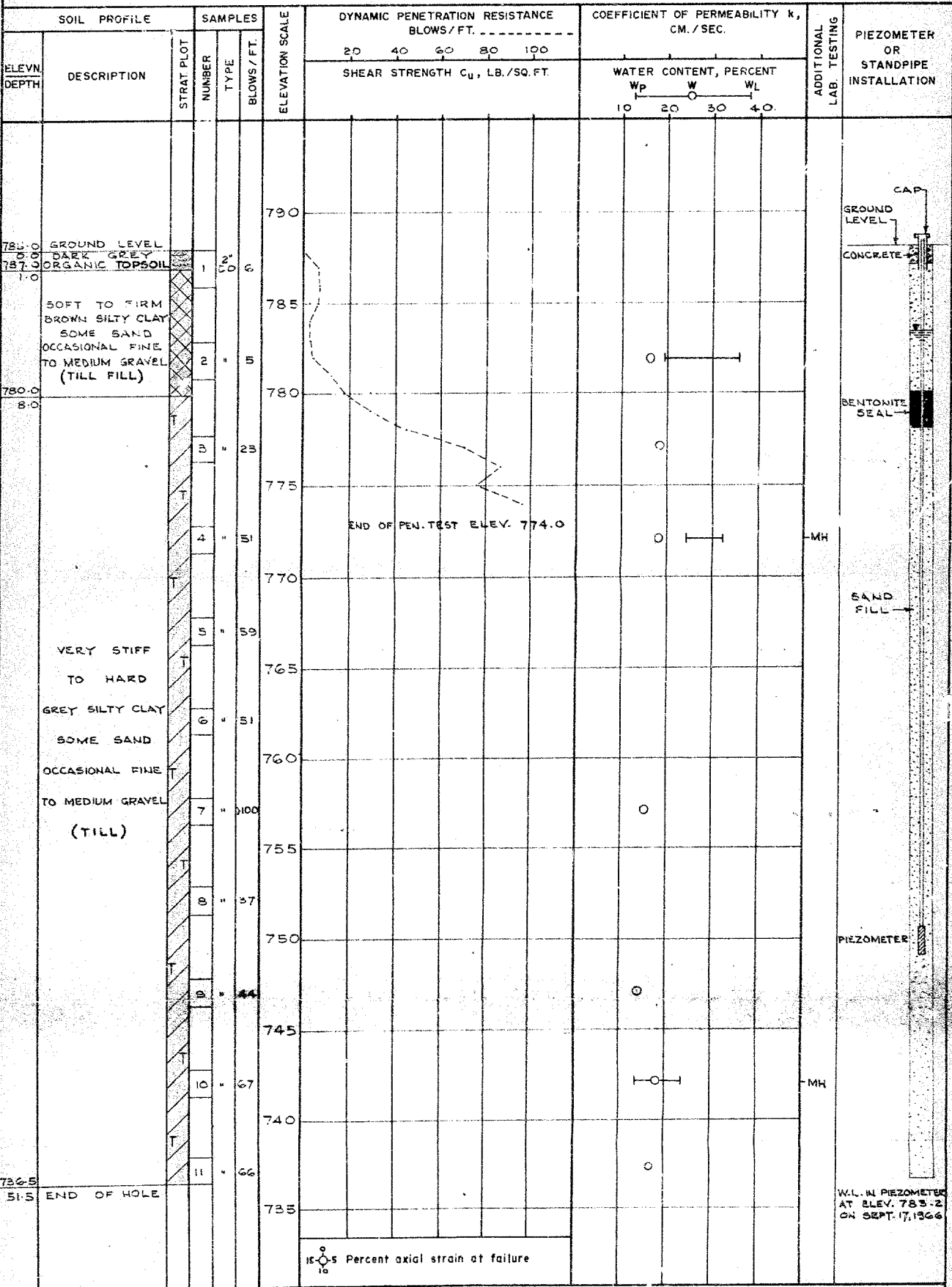
#### (e) Shear strength

$\tau_f$	shear strength
$c'$	effective cohesion
$\phi'$	effective angle of shearing resistance, or friction
$c_u$	apparent cohesion*
$\phi_u$	apparent angle of shearing resistance, or friction
$\mu$	coefficient of friction
$S_i$	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.

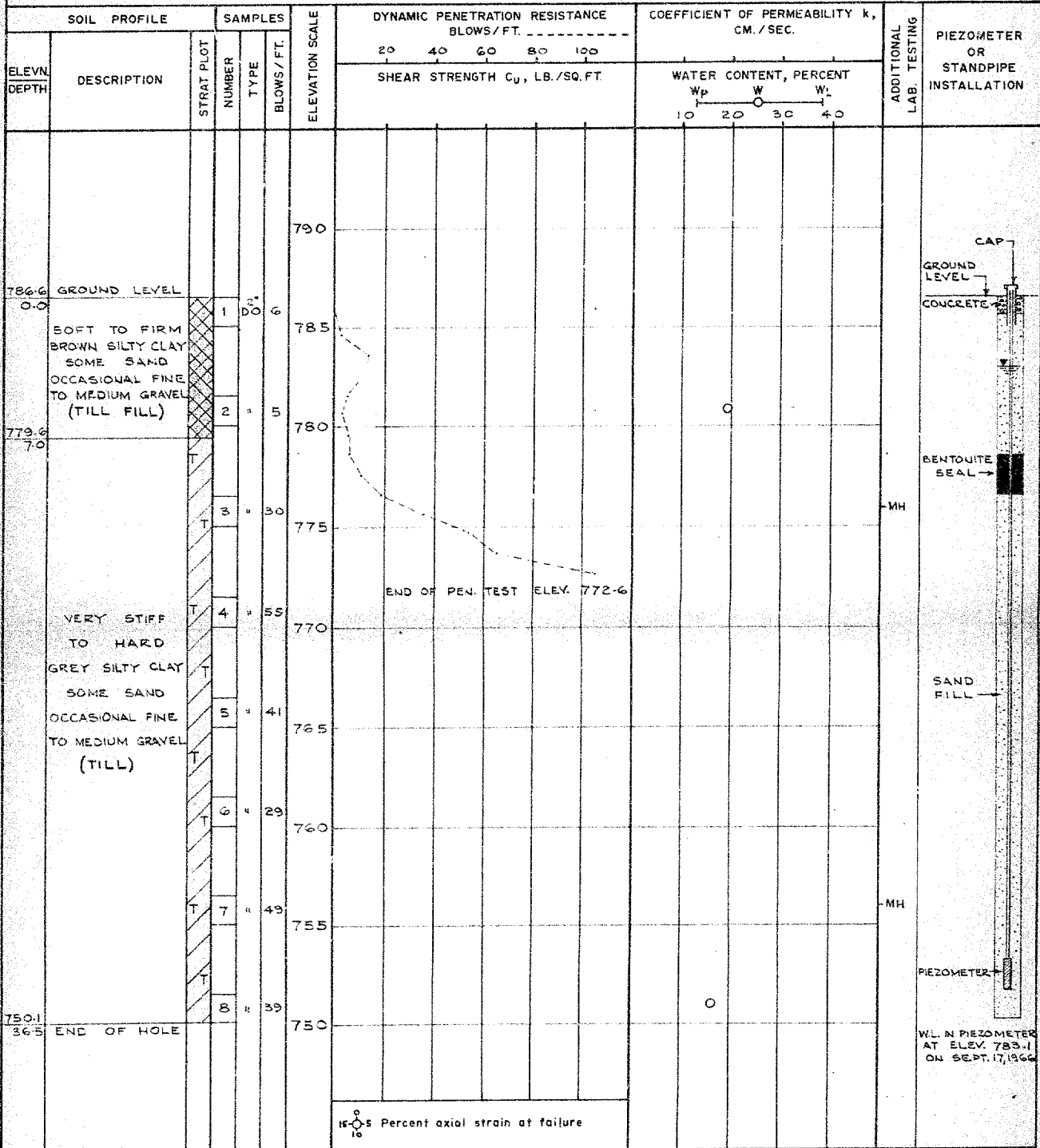
RECORD OF BOREHOLE 1

LOCATION See Figure 1 BORING DATE SEPT. 24, 1966 DATUM GEODETIC  
BOREHOLE TYPE WASH BORING BOREHOLE DIAMETER NX CASING  
SAMPLER HAMMER WEIGHT 140 LB. DROP 3 INCHES PEN. TEST HAMMER WEIGHT 140 LB. DROP 30 INCHES



# RECORD OF BOREHOLE 2

LOCATION See Figure 1 BORING DATE SEPT. 12, 1966 DATUM GEODETIC  
 BOREHOLE TYPE WASH BORING BOREHOLE DIAMETER 8X CASING  
 SAMPLER HAMMER WEIGHT 140 LB. DROP 30 INCHES PEN. TEST HAMMER WEIGHT 140 LB. DROP 30 INCHES



VERTICAL SCALE  
1 INCH TO 5' - 0"

GOLDER & ASSOCIATES

DRAWN JWA  
CHECKED TGL

## RECORD OF BOREHOLE 3

LOCATION                      See Figure 1

BORING DATE SEPT. 13, 1966

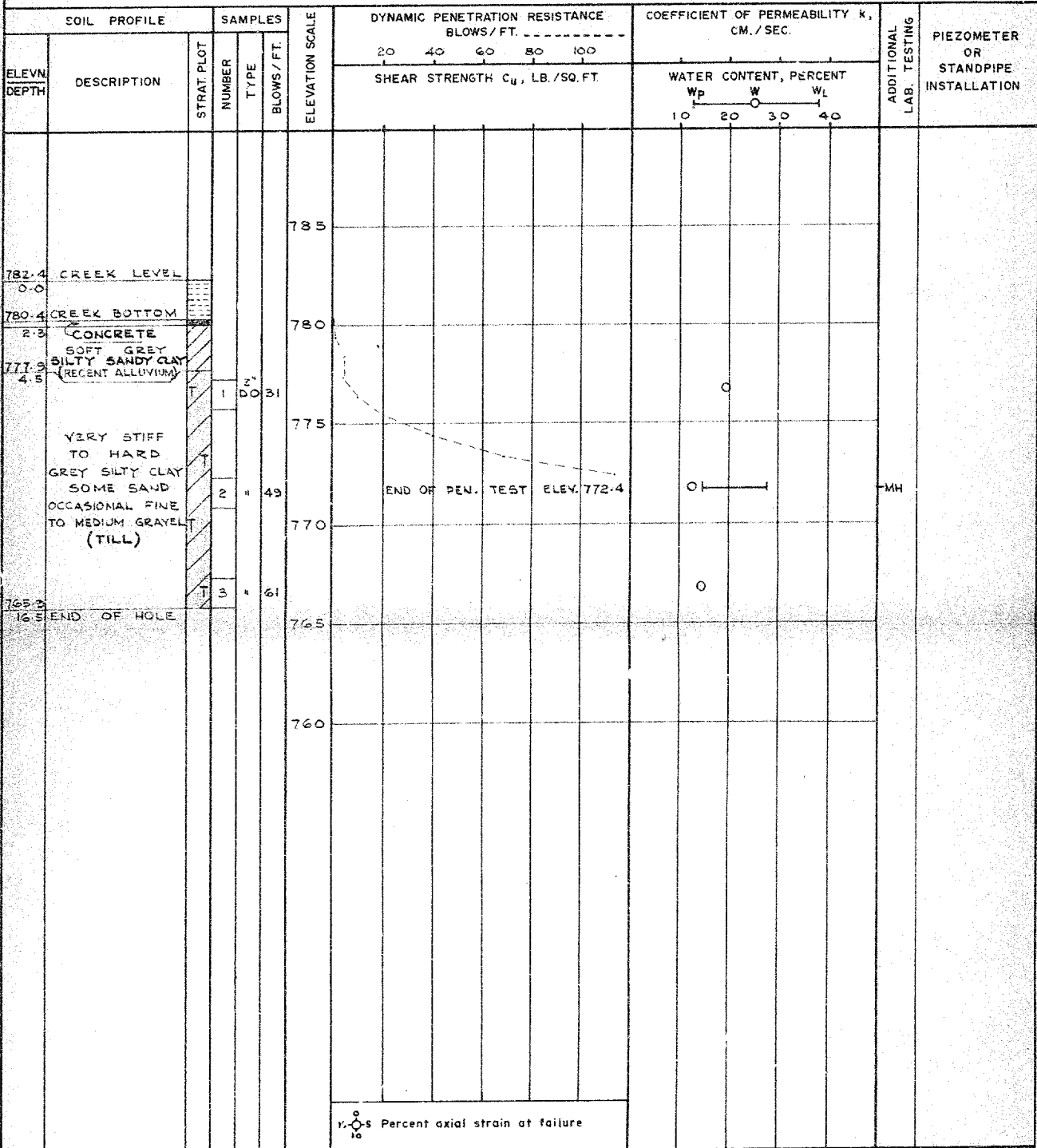
DATUM            GEODETIC

BOREHOLE TYPE WASH BORING

BOREHOLE DIAMETER BX CASING

SAMPLER HAMMER WEIGHT 140 LB. DROP 30 INCHES

PEN. TEST HAMMER WEIGHT 140 LB. DROP 30 INCHES



VERTICAL SCALE  
1 INCH TO 5'-0"

**GOLDER & ASSOCIATES**

DRAWN J.K.A.  
CHECKED [Signature]



LOCATION	See Figure 1	BORING DATE	SEPT. 14, 1966	DATUM	GEODETIC
	BOREHOLE TYPE	WASH BORING		BOREHOLE DIAMETER	5X CASING
SAMPLER HAMMER WEIGHT 140 LB.	DROP 30 INCHES			PEN. TEST HAMMER WEIGHT 140 LB.	DROP 30 INCHES

VERTICAL SCALE  
1 INCH TO 5'-0"

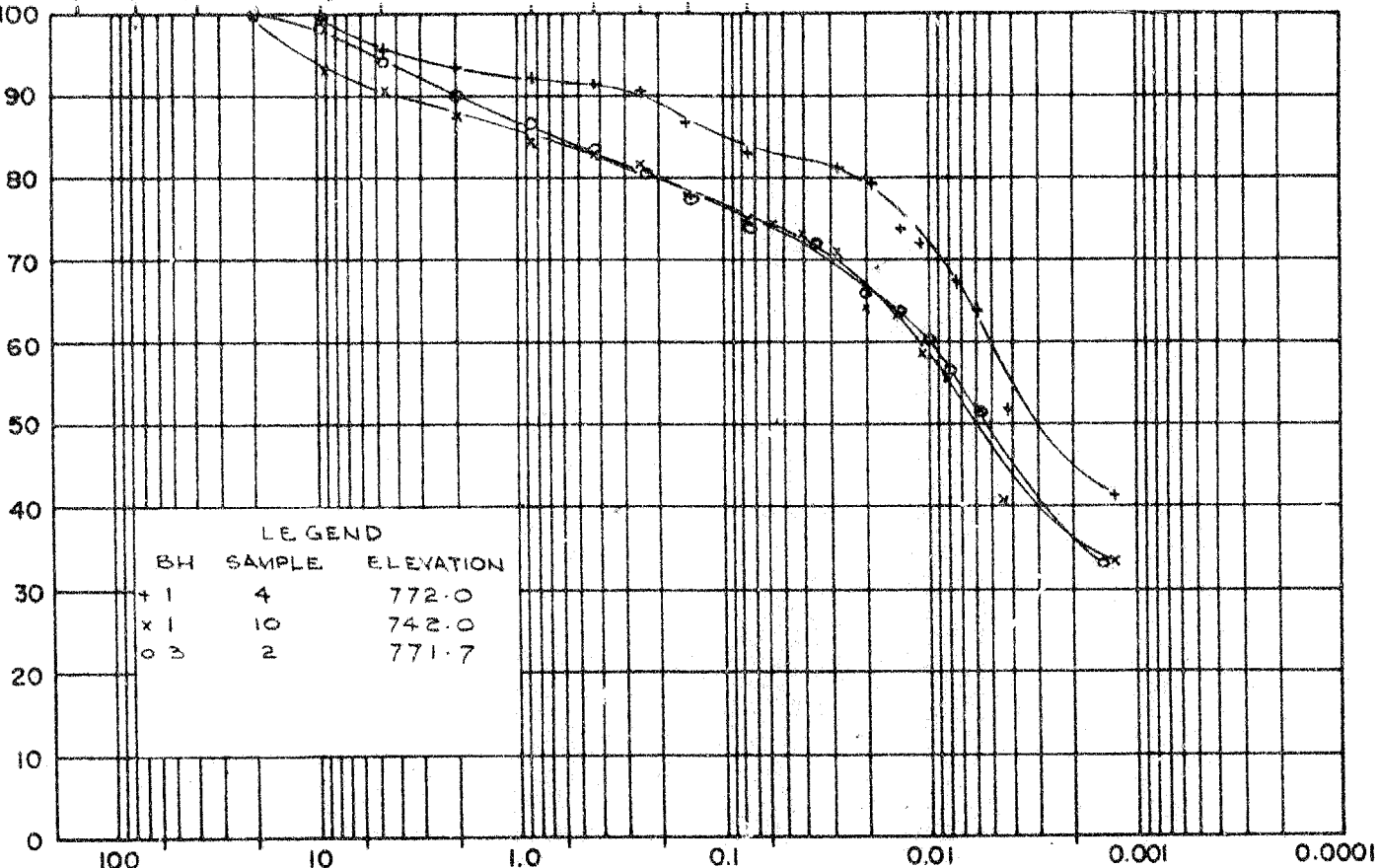
DRAWN JWA  
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M.I.T. GRAIN SIZE SCALE

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

6" 3" 1 1/2" 3/4" 3/8" 4 10 20 40 60 100 200

PERCENT FINER THAN



GRAIN SIZE - MM

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

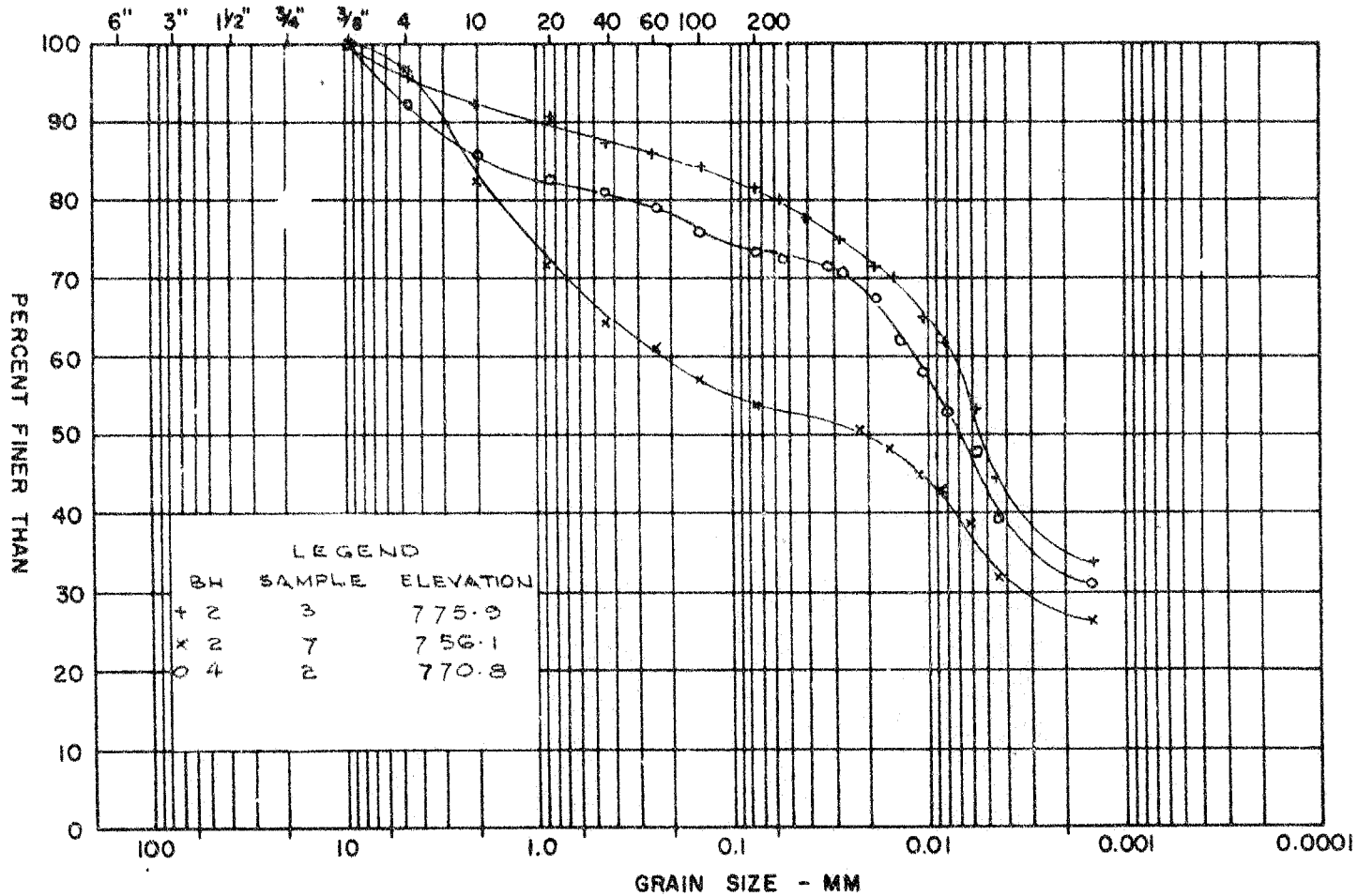
GOLDER & ASSOCIATES

GRAIN SIZE DISTRIBUTION  
TILL

FIGURE 2

M.I.T. GRAIN SIZE SCALE

SIZE OF OPENING - INS.	U.S.S. SIEVE SIZE - MESHES/IN.
10	20
5	30
2.5	60
1.5	100
1.0	150
0.75	200
0.6	250
0.425	350
0.3	50
0.25	60
0.15	100
0.106	150
0.075	200
0.06	250
0.0425	350
0.03	50
0.025	60
0.015	100
0.0106	150
0.0075	200
0.006	250
0.00425	350
0.003	50
0.0025	60
0.0015	100
0.00106	150
0.00075	200
0.0006	250
0.000425	350
0.0003	50
0.00025	60
0.00015	100
0.000106	150
0.000075	200
0.00006	250
0.0000425	350
0.00003	50
0.000025	60
0.000015	100
0.0000106	150
0.0000075	200
0.000006	250
0.00000425	350
0.000003	50
0.0000025	60
0.0000015	100
0.00000106	150
0.00000075	200
0.0000006	250
0.000000425	350
0.0000003	50
0.00000025	60
0.00000015	100
0.000000106	150
0.000000075	200
0.00000006	250
0.0000000425	350
0.00000003	50
0.000000025	60
0.000000015	100
0.0000000106	150
0.0000000075	200
0.000000006	250
0.00000000425	350
0.000000003	50
0.0000000025	60
0.0000000015	100
0.00000000106	150
0.00000000075	200
0.0000000006	250
0.000000000425	350
0.0000000003	50
0.00000000025	60
0.00000000015	100
0.000000000106	150
0.000000000075	200
0.00000000006	250
0.0000000000425	350
0.00000000003	50
0.000000000025	60
0.000000000015	100
0.0000000000106	150
0.0000000000075	200
0.000000000006	250
0.00000000000425	350
0.000000000003	50
0.0000000000025	60
0.0000000000015	100
0.00000000000106	150
0.00000000000075	200
0.0000000000006	250
0.000000000000425	350
0.0000000000003	50
0.00000000000025	60
0.00000000000015	100
0.000000000000106	150
0.000000000000075	200
0.00000000000006	250
0.0000000000000425	350
0.00000000000003	50
0.000000000000025	60
0.000000000000015	100
0.0000000000000106	150
0.0000000000000075	200
0.000000000000006	250
0.00000000000000425	350
0.000000000000003	50
0.0000000000000025	60
0.0000000000000015	100
0.00000000000000106	150
0.00000000000000075	200
0.0000000000000006	250
0.000000000000000425	350
0.0000000000000003	50
0.00000000000000025	60
0.00000000000000015	100
0.000000000000000106	150
0.000000000000000075	200
0.00000000000000006	250
0.0000000000000000425	350
0.00000000000000003	50
0.000000000000000025	60



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

# GRAIN SIZE DISTRIBUTION

FIGURE 3

Mr. C. S. Grebski,  
Bridge Design Engineer,  
Bridge Division,  
Admin. Bldg.

Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

March 17, 1967

Dodd's Creek Bridge,  
2.1 Miles North of North Jet. Hwy. #3,  
W.P. 54-66, Site 5-4, Report by:  
H. Q. Golder and Associates Limited,  
Hwy. #4, District #2 (London).

We have reviewed the Preliminary Bridge Plan  
Dwg. D-6068-P for the above mentioned structure. Our comments  
are as follows:

Prior to placing the fill material behind the  
abutments, all organic material should be removed and backfilled  
with suitable material.

RD/adeF

*M. Devata*

M. Devata,  
SUPERVISING FOUNDATION ENGINEER  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. S. McCombie  
A. P. Watt

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Copy for the information of

Mr. A. Stermac, Principal Foundation Engineer,  
Room 107, Lab. Building

Mr. A.P. Watt,  
Regional Bridge Location Engineer,  
London Regional Office

Bridge Division,  
Downsview, Ontario

March 1, 1967

Dodd's Creek Bridge  
2.1 Miles North of North Jct. Hwy. 3  
W.P. 54-66, Site 5-4  
Highway 4, District No. 2

Attached herewith are prints of the Preliminary Bridge  
Plan Drawing D-6068-F for the above-mentioned structure.

The estimated cost of the proposed structure is \$66,000.  
This cost includes tender, materials, engineering and sundry  
construction.

Any comments or revisions you may have should be submitted  
within three weeks.

CSG:rd

C.S. Grebski,  
Bridge Design Engineer

Attach.

c.c. S. McCombie  
A. Stermac  
E. Cross  
R. Forrest

Box 401 & Leslie St.,  
Scarborough, Ontario.

September 7, 1966

Materials and Testing Division

H. G. Solder and Associates Ltd.,  
8044 Kilar Street East,  
Toronto, Ontario.

Attention: Mr. J. E. Perschke -- Letter of Authority --

- Re: 1) H.G. 54-66, Bridge Site 5-3,  
Leslie Creek Bridge,  
2.1 Miles North of Jct. of Hwy. 3,  
Highway 4, District 2 (London).  
2) H.G. 25-66, Bridge Site 17-44,  
O.R.B. Overhead,  
St. Mary's Express,  
3.8 Miles east of Hwy. 13,  
Highway 7, District 3 (Stratford).  
3) H.G. 182-66-2,  
L.R. & S.R. Railway Subway,  
Highway 2 in Paris, Ontario,  
District 4 (Hamilton).

Dear Sir:

Please consider this your authority to carry out the above  
mentioned investigations.

The completion dates for these jobs are as follows:

H.G. 54-66 -- September 27, 1966 -- (11 copies)  
H.G. 25-66 -- October 3, 1966 -- (11 copies)  
H.G. 182-66-2 -- October 17, 1966 -- (12 copies)

We realize that the time allowed for the job (H.G. 54-66)  
is rather short, and would therefore request you to submit a  
preliminary report in a letter form, in case you are unable to meet  
the deadline. The letter should outline the field conditions  
encountered, and should also contain the main recommendations  
pertaining to the foundations of the structure.

September 7, 1966

It is understood that for the jobs which are closer to London, you will mobilize from your Regional Office.

In accordance with our terms of reference, you are to have a qualified soils engineer in charge of the field work at all times. Any deviation from this arrangement has to be approved by the Foundation Section, O.E.O.

Should you require any additional information regarding the alignment or surveying on the jobs E.P. 54-66 and E.P. 28-66, please contact the Regional Bridge Location Engineer in London, Mr. A. P. Watt - 105 Saskatoon Street, E.O. Box 4940, Postal Station C, Phone: 451-3400 (Area Code 519).

Any additional information regarding the job E.P. 182-66-2 (Paris), can be obtained from the Regional Bridge Location Engineer, Toronto, Mr. S. S. Melinysky - Phone: 288-3535 - or through the Foundation Section.

The necessary plans for all works above mentioned sites were given to your Mr. J. L. Daychuk, on September 4, 1966.

Since the drawings accompanying the foundation reports, showing the location of borings, the inferred subsoil conditions, etc., are to become contract drawings, you are requested to prepare them in accordance with the O.E.O. Standards. To enable you to do this, we are supplying you with a sample drawing with all the necessary explanations, together with linen sheets for your drawings. You are also requested to provide us with Greenflex copies of the drawings.

Previous requirements as to preliminary borehole information and laboratory testing program should be followed.

Charges for the work performed will be in accordance with your Schedule of Rates, dated October 1, 1965, and invoices to be addressed to the attention of the undersigned.

We are attaching the following Purchase Orders: E-08891 for E.P. 54-66; E-08892 for E.P. 28-66, and E-08893 for E.P. 182-66-2, covering the purchase of any new material required for this work, in order that you may use this as a basis for exemption from the Federal Tax for such purchases. The Exemption Certificate is printed thereon.

AGG/edf

cc: Messrs. E. McCombie  
G. E. Hunter  
A. Carter  
R. Greenham  
J. G. Tillock  
R. C. Bernier  
I. J. Kovish  
J. Roy  
R. Koninga  
Mrs. J. Steinberg

Yours very truly,

A. P. Watt  
S. S. Melinysky, Sales,  
MATERIALS & TESTING ENGINEER  
R. Kuyumzhi (2) ✓  
A. Crowley  
Foundations Office  
Gen. Files (2)

*A. P. Watt*

**H. Q. GOLDER & ASSOCIATES LTD.**

**CONSULTING CIVIL ENGINEERS**

H. Q. GOLDER  
V. MILLIGAN  
L. G. SODERMAN  
J. L. SEYCHUK

2444 BLOOR STREET WEST  
TORONTO 9, ONTARIO  
763-4103  
767-9201

September 27, 1966.

Department of Highways, Ontario,  
Materials & Testing Division,  
Hwy. 401 & Keele Street,  
DOWNSVIEW, Ontario.

Attention: Mr. A.G. Stermac, P.Eng.,  
Principal Foundation Engineer.

RE: W.P.54-66,  
SOIL INVESTIGATION,  
PROPOSED DODD'S CREEK CROSSING,  
HIGHWAY NO. 4,  
NEAR LONDON, ONTARIO.

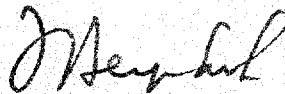
Dear Sirs:

Eleven copies of our report covering the above investigation were delivered to you today by messenger. A Cronaflex copy of Figure 1 from our report was included with the report shipment.

We trust that our report contains sufficient information for your requirements. If you have any questions, however, please call us.

Yours truly,

H. Q. GOLDER & ASSOCIATES LTD.,



JLS:hdg  
66513

J. L. Seychuk, P.Eng.



# 66-F-227-C  
W.P. # 54-66  
HWY. # 4 &  
DODD'S CREEK

