

Soil Conditions and Foundations,
Proposed Crossing at Highway #401
and County Road #7 Interchange,
Sandwich S/Maidstone Townline -
W. P. 130-64

DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD

SCARBOROUGH, ONTARIO

TELEPHONE 421-2567

2ND FLOOR
363 QUEENS AVENUE
LONDON, ONTARIO
TELEPHONE GE. 33881



FOUNDATION ENGINEERS

P.O. BOX 933
SAULT STE. MARIE
ONTARIO
TELEPHONE AL. 42815

London, July 6th, 1964

4-3-17
Report

Ontario Department of Highways,
Materials and Research Division,
DORNSVILLE, Ontario.

Attention: Mr. A. Rutka, P. Eng.,
Materials and Research Engineer

Gentlemen:

Soil Conditions and Foundations, Proposed
Crossing at Highway #401 and County Road
#7 Interchange, Sandwich S/Maldstone
Townline - W.P. 150-64

We have completed the soil investigation at the above site in accordance with your letter of authorization dated 26th May, 1964. This report is a record of our findings and presents recommendations for the foundation design of the proposed interchange structure. We understand that the proposed structure will consist of four spans carrying County Road #7 over the existing Highway #401 pavement. The position of the structure on the site was located with the aid of your drawing, Plan 1-3106-1.

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

FIELD WORK

The field work was carried out during the period 26th to 28th May, 1964 and consisted of five exploratory boreholes at the locations shown on enclosure 2. The boreholes were placed as close as possible to the proposed positions of the bridge piers and abutments.

The holes were advanced using a skid-mounted diamond drill equipped for soil sampling. In the absence of a ready supply of water, dry boring methods were used. These consisted of lining the hole with 3x casing and cleaning out the spoil with 3x casing or with a split spoon sampler. In this way, a complete soil "core" was recovered from which a description of the stratification has been prepared.

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

Ontario Department of Highways,
July 6th, 1964

Generally, the soil was too stiff to permit the recovery of undisturbed samples by pushing a thin-walled tube sampler. Only one such sample was recovered (from borehole 3) and this had to be driven by hammer. The remaining soil samples were obtained by driving a standard 2-inch diameter split spoon sampler. Where practicable, the shear strength of the soil was determined in situ by means of shear tests using a 2-inch diameter, 4-bladed vane.

The results of the borings are recorded on the geotechnical data sheets comprising enclosures 3, 4 and 5. Elevations have been referred to a local bench mark as shown on the Department of Highways site plan (X and Z in foot of 2.5 foot elm). This has a given elevation of 611.06 feet above Geodetic Datum. From this datum, the elevation of the pavement at the intersection of the centre lines of highway #401 and County Road #7 was found to be 611.7 feet.

The results of laboratory tests performed on selected soil samples are given on the borehole logs and are tabulated on enclosure 10.

SOIL CONDITIONS

Details of the soil stratification in each borehole are shown on the geotechnical data sheets and a general picture of the subsurface conditions is given by the soil profiles on the drawing of enclosure 2. In addition, the field test results are summarized graphically on enclosure 12. In the following paragraphs, the relevant properties of the soil strata are described briefly.

Surface deposits of fill, topsoil and organic mixtures of clay and silt were encountered in all boreholes to depths ranging from 1.8 to 5.9 feet. "N" values of 9 to 12 blows per foot indicate a stiff consistency. Below these deposits, the soil is a cohesive glacial till throughout the depth of exploration.

The site lies within the St. Clair Clay Plains and the strata encountered are typical of the area. The till is a mixture of clay and silt with a small proportion of sand and gravel as shown by the results of grain-size distribution tests performed on representative samples plotted on enclosures 6 to 9 inclusive. The largest common particle size is about 0.5 inches and the proportions of the constituents are approximately as follows: clay (45%); silt (36%); sand (17%) and gravel (2%).

Ontario Department of Highways,
July 6th, 1964

Within the upper 7 to 10 feet below the ground surface, the till is weathered and the colour is brown or mottled grey-brown. In situ vane shear tests within this zone gave undrained shear strength values ranging from 1300 pounds per square foot to over 4700 pounds per square foot with a sensitivity of 2.5 to 3.0. One unconfined compression test performed in the laboratory gave a value of shear strength of 2,650 pounds per square foot taken as being equal to one-half of the compressive strength. Based on these measured shear strength values, the consistency of the till within this zone is described as being *stiff to very stiff*. This is confirmed by the results of the standard penetration tests which gave "N" values ranging between 12 and 24 blows per foot. One Atterberg Limit test performed on a representative sample from the weathered zone gave a liquid limit of 42.4 and a plastic limit of 19.5. The corresponding natural water content was 20.3% which is close to the plastic limit and thus the liquidity index is approximately zero. These values are typical of a clay of medium plasticity and high consistency.

Below the weathered zone the consistency of the clay increases, as shown by the "N" values which range from 44 to 66 blows per foot, thereafter decreasing below a depth of 12 to 14 feet, where the "N" values range from 21 to 34 blows per foot. At a depth of about 12 feet, the colour of the soil changes from brown to grey. Generally, the soil was too hard to permit vane testing except near the bottom of the boreholes where undrained shear strength values of 3,060 and 5,200 pounds per square foot were recorded. Based on these values and estimated from the "N" values, the consistency of the brown clay till is *hard* and that of the grey clay till is *very stiff*. The results of Atterberg Limit tests gave values of liquid limit ranging from 30.5 to 34.9 and of plastic limit ranging from 14.2 to 16.9. The corresponding natural water contents range from 15.1 to 16.9 and are thus close to the plastic limit. These findings confirm the high consistency of the till.

The results of a consolidation test performed on a sample of brown clay till from borehole 3 are plotted on enclosure 11. This shows that at this location the till has been pre-compressed by consolidation pressures two to three tons per square foot in excess of the existing overburden pressures. The compression index of the till measured on the normal consolidation part of the curve is 0.16.

WATER CONDITIONS

Within the duration of the field work the boreholes remained open and dry throughout their entire depth.

Ontario Department of Highways
July 6th, 1964

DISCUSSION

It is understood that the proposed interchange will consist of a 4-span structure supported on two spill-through type end abutments and three intermediate piers. Further details of the proposed construction are not available.

The investigation has shown that the site is underlain by clayey till strata of stiff to h. J consistency for a significant depth below the existing ground surface. It is considered that the site is suitable for the use of spread and strip footing foundations which should be supported at El. 608 on the very stiff till below any existing fill or organic clay strata. At this elevation the footings will have at least 4 feet of earth cover which is sufficient for the purpose of frost protection. At the elevations given, the foundations may be designed for an allowable bearing value of 6,000 pounds per square foot for isolated spread footings and 5,000 pounds per square foot for continuous strip footings. These bearing values incorporate a factor of safety of at least three against general shear failure of the underlying soil and the resulting total and differential settlements will be about 1.25 inches and 0.5 inches respectively. Consideration might be given to founding the structure on the hard till stratum which is encountered generally at about elevation 605. In this case, the allowable bearing values may be increased to 8,000 pounds per square foot for isolated spread footings and 7,000 pounds per square foot for continuous strip footings, whilst still retaining a factor of safety of three against shear failure. Furthermore, the resulting total and differential settlements will be reduced to about 0.5 inches and 0.25 inches respectively. In addition to the above computed settlements due to the structural loads, the abutments will be subjected to consolidation settlements induced by the weight of the approach fill. It is estimated that this additional settlement would amount to about one inch.

The above settlements have been computed on the basis of the consolidation test results obtained on sample 4 from borehole 3 using a modulus of compressibility of 85 tons per square foot for the stiff till, and an assumed modulus of compressibility of 150 tons per square foot for the hard till based on published data. It was estimated that the loads on the abutments and pier footings are about 5 tons per linear foot and 10 tons per linear foot respectively. Further, it is estimated that most of the consolidation settlement under the footing loads will occur within six months after completion of the structure. Settlement under the weight of the approach fill will probably be spread over a period of several years.

Ontario Department of Highways,
July 6th, 1964

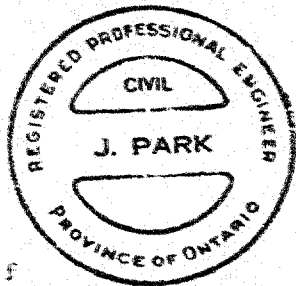
It is anticipated that approach fills approximately 20 feet in height with normal side slopes of about 1 in 2 will be required. Because of the high consistency of the underlying soil strata, it is considered that there will be an adequate factor of safety against shear failure and that there is no danger of a slide occurring.

Excavation for the proposed foundations will be carried out within the stiff cohesive soil and no undue construction problems are anticipated. The upper fill layers should be braced or sloped but, in general, the amount of bracing need only be minimal. The amount of water seeping into the excavation will probably be small and it could readily be handled by pumping from sumps.

CONCLUSIONS AND RECOMMENDATIONS

- (i) The prevailing soil type underlying the site is a clay till which is weathered above fl. 605. The consistency in the weathered zone varies from stiff to very stiff. The lower material is of hard consistency decreasing with depth.
- (ii) It is recommended that the structure be supported on spread footings at or below fl. 607. As discussed in the report, net soil pressures in the range of 5,000 to 8,000 pounds per square foot may be used in design, depending on the elevation and shape of the footings. The corresponding calculated settlements lie within tolerable limits.
- (iii) No unusual construction problems are anticipated.

The field and laboratory work described were supervised by Mr. I. P. Lieszkowszky, P. Eng., the report was prepared by Mr. J. Park, P. Eng., and has been reviewed by Mr. K. H. King, P. Eng.



Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED

A handwritten signature in cursive script that reads "James Park".

James Park, B. Sc., P. Eng.

JP/mkf

ENCLOSURES

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-IN
$\phi > 8"$	3"	$\frac{3}{4}"$	4.75mm	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 :



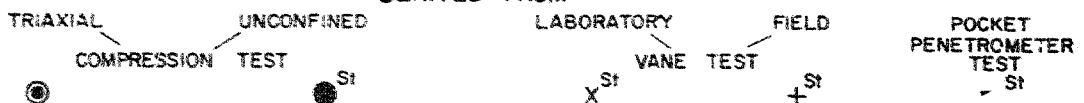
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SOIL PROPERTIES.

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

UNDRAINED SHEAR STRENGTH.

— DERIVED FROM —



Strain at failure is represented by direction of stem
 20%
 15% — 5%
 10%

St : sensitivity = $\frac{\text{shear strength in undisturbed state}}{\text{shear strength in remoulded state}}$

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

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 182 .

OUR REFERENCE NO. 4-5-L7

CLIENT DEPARTMENT OF HIGHWAYS ONTARIO
 PROJECT PROPOSED CROSSING OF HIGHWAY #401 AT
 LOCATION SANDWICH SOUTH & MAIDSTONE TOWNLINE
 DATUM ELEVATION: GEODETIC

METHOD OF BORING DRYBORING
 DIAMETER OF BOREHOLE 2 7/8"
 DATE MAY 1964

ENCLOSURE NO. 3

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N or Advancement of Sampler	20	40	60	80	100	PL	W	LI	
							SHEAR STRENGTH 100 lbs/sq ft				10 20 30 40				
							10	20	30	40	50				

611.0	0.0	Ground surface					BH1										
610.0		Dark grey organic silty CLAY stiff, moist		1	SS	10										NO GROUND WATER OBSERVED	
	4.0	brown mottled very stiff		2	SS	20											
605.0	7.0	Silty clay brown hard		3	SS	66											
	9.5	TILL grey		4	SS	63										END OF CONE TEST 9'-9"	
600.0				5	SS	29											
	14.0	End of borehole															

614.9	0.0	Ground surface					BH2										
		Dark grey organic silty CLAY stiff, moist		1	SS	13										NO GROUND WATER OBSERVED	
610.0	4.5			2	SS	14											
		brown mottled stiff		3	SS	12											
605.0	9.0	Silty clay brown hard		4	SS	44											
	13.0	TILL grey very stiff		5	SS	26											
600.0				6	SS	24											
595.0	19	End of borehole															

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: L.K.

CH'D: JP

GEOTECHNICAL DATA SHEET FOR BOREHOLE 3 & 4.

OUR REFERENCE: NO 4-5-L7

CLIENT: DEPARTMENT OF HIGHWAYS ONTARIO
 PROJECT: PROPOSED CROSSING OF HIGHWAY #401 AT
 LOCATION: SANDWICH SOUTH & MAIDSTONE TOWNLINE
 DATUM ELEVATION: GEODETTIC

METHOD OF BORING: DRYBORING
 DIAMETER OF BOREHOLE: 2 7/8"
 DATE: MAY 1964

ENCLOSURE NO. 4

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N ^o Advancement of Sampler	20	40	60	80	100	PL W LI				
							SHEAR STRENGTH 100 lbs/sq ft					10 20 30 40				
							10 20 30 40 50									

615.0	0.0	Ground surface		BH3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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OUR REFERENCE NO 4-5-L7

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 5. . . .

CLIENT: DEPARTMENT OF HIGHWAYS ONTARIO
 PROJECT: PROPOSED CROSSING OF HIGHWAY # 401 AT
 LOCATION: SANDWICH SOUTH & TOWNLINE
 DATUM ELEVATION: GEODETIC

METHOD OF BORING DRYBORING
 DIAMETER OF BOREHOLE 27/8"
 DATE MAY 1964

ENCLOSURE NO. 5

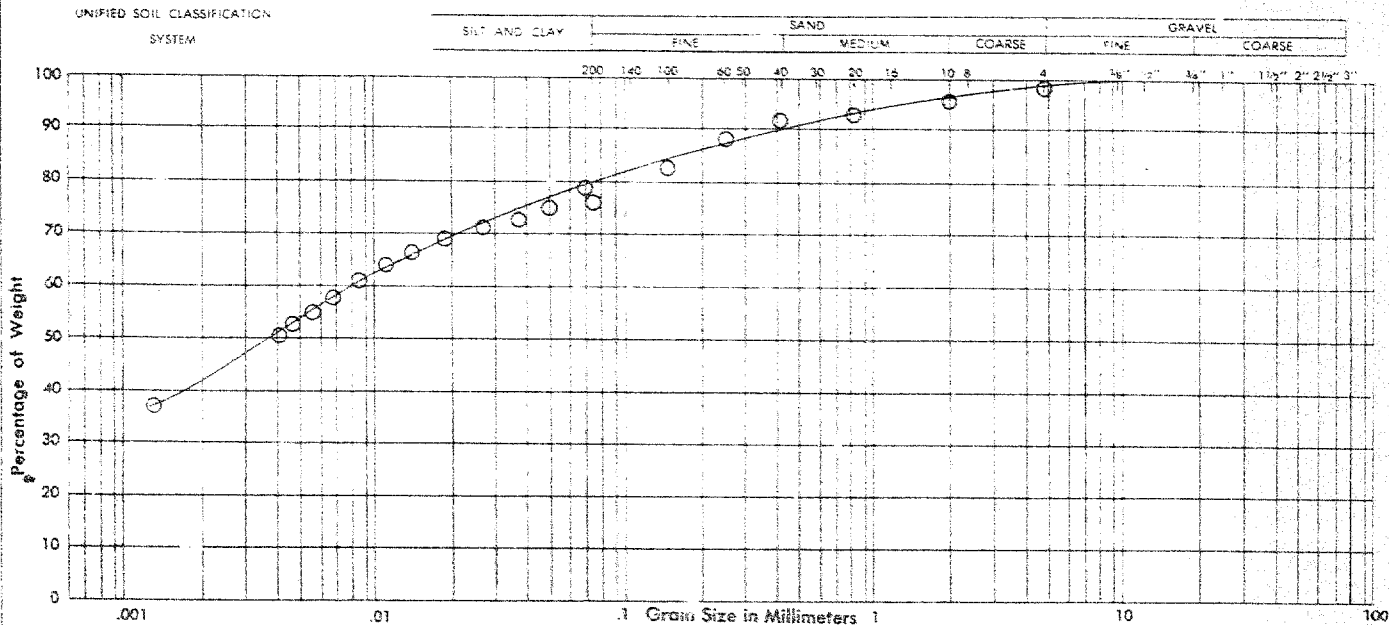
ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	Advance- ment of Sample	20	40	60	80	100	PL	W	LI	
							SHEAR STRENGTH 100 lbs sq ft								
							10	20	30	40	50	10	20	30	40
611.5	0.0	Ground surface					BH 5								
610.0	1.8	Dark grey organic clayey SILT		1	SS	9									NO GROUND WATER OBSERVED
		brown mottled		2	CS										
		very stiff		3	SS	24									
605.0	6.0	Silty clay		4	SS	48									
	8.0	TILL		5	SS	27									
		hard		6	SS	22									
600.0	11.0	grey very stiff													
595.0	16.0	End of borehole													

St = 3.0
 c = 2840 psf.

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO 4-5-L7



PROJECT: Hwy. #401 Overpass at
 LOCATION: Sandwich S/Maidstone
 BOREHOLE NO. 2 Townline
 SAMPLE NO.: 4
 DEPTH OF SAMPLE 10 feet
 ELEVATION OF SAMPLE: 605 feet

COEFFICIENT OF UNIFORMITY
 COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:
 Sandy silty clay (CL)

PLASTIC PROPERTIES:

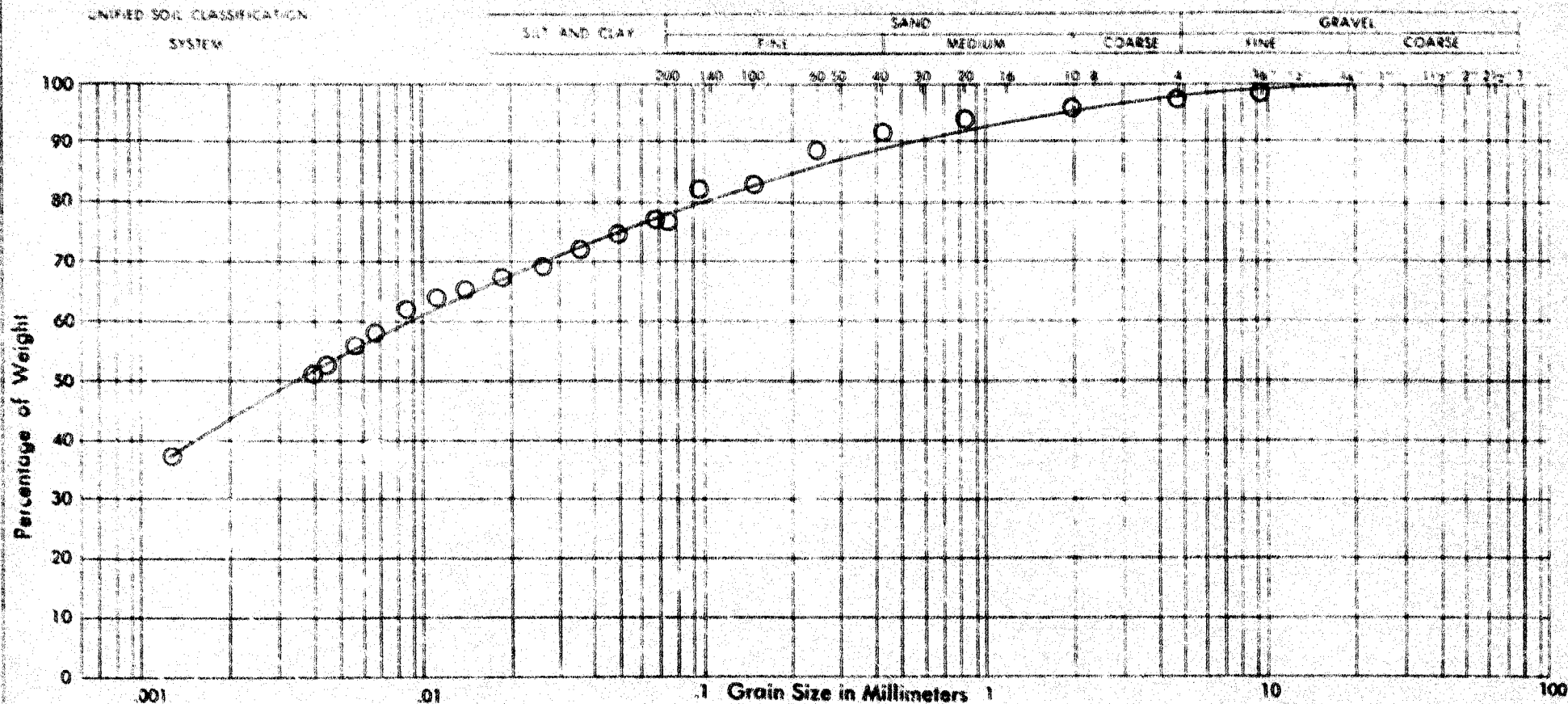
LIQUID LIMIT	% = 32.5
PLASTIC LIMIT	% = 16.4
PLASTICITY INDEX	% = 16.1
MOISTURE CONTENT	% = 15.1
ACTIVITY	= 0.38

Enclosure No. 6

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 4-5-L7



PROJECT Hwy. #401 Overpass at
 LOCATION Sandwich S/Maidstone
 BOREHOLE NO. 2 Townline
 SAMPLE NO. 5
 DEPTH OF SAMPLE 15.5 feet
 ELEVATION OF SAMPLE 599.5 feet

COEFFICIENT OF UNIFORMITY
 COEFFICIENT OF CURVATURE

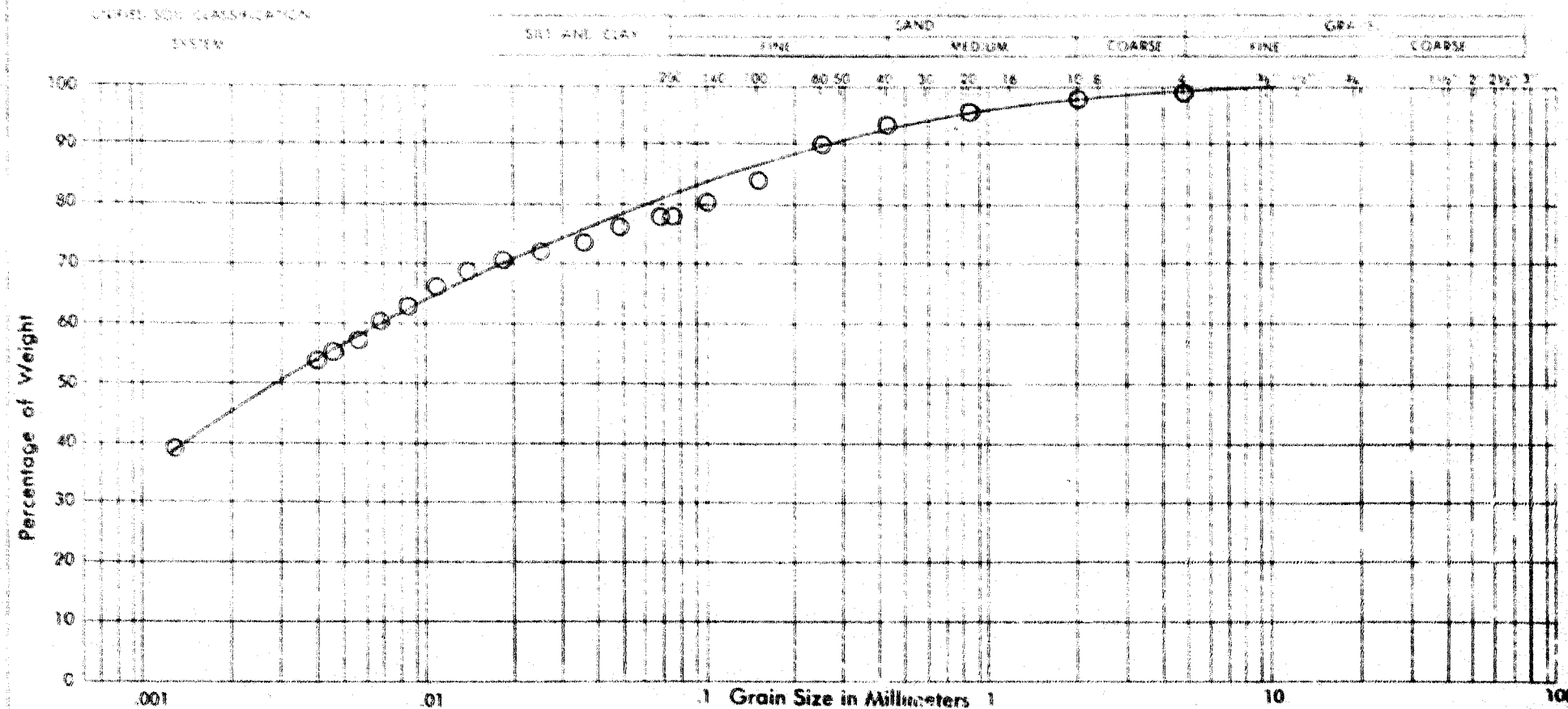
Classification of Sample and Group Symbol:
 Sandy silty clay (CL)

PLASTIC PROPERTIES

LIQUID LIMIT	% = 30.5
PLASTIC LIMIT	% = 14.2
PLASTICITY INDEX	% = 16.3
MOISTURE CONTENT	% = 16.2
ACTIVITY	= 0.57

Enclosure No. 1

OUR REFERENCE IS TO 4-5-67



PROJECT Hwy. #401 Overpass at
LOCATION Sandwich S/Maldstone
BOREHOLE NO. 3 Townline
SAMPLE NO. 4
DEPTH OF SAMPLE 11.0 feet
ELEVATION OF SAMPLE 603.5 feet

COEFFICIENT OF UNIFORMITY
COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:
Sandy silty clay (CL-CL)

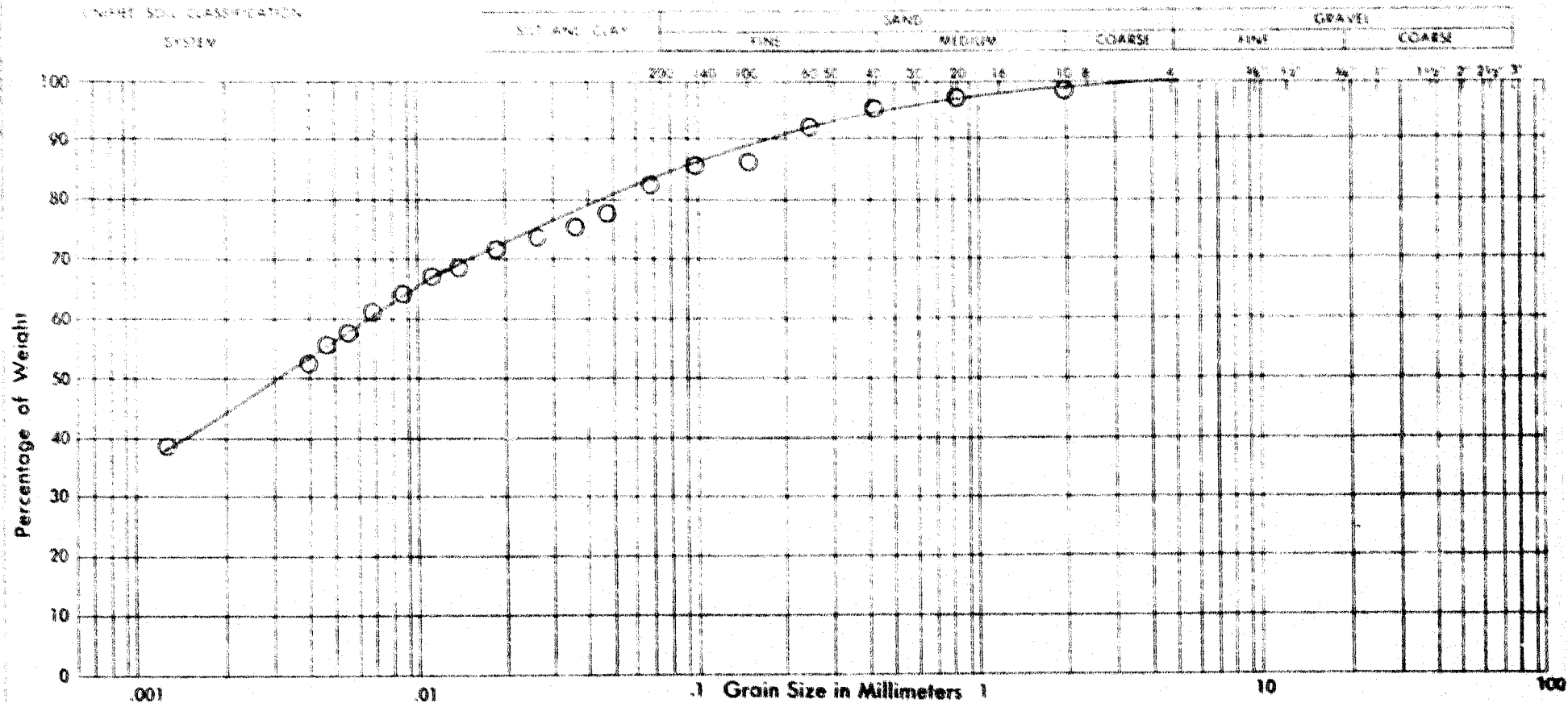
PLATE 10 伊藤忠商事株式会社

LIQUID LIMIT	%	=	34.2
PLASTIC LIMIT	%	=	16.4
PLASTICITY INDEX	%	=	17.8
MOISTURE CONTENT	%	=	16.1
ACTIVITY =	0.39		

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 4-5-L7



PROJECT Hwy. #401 Overpass at
 LOCATION Sandwich S/Maidstone
 BOREHOLE NO. 4 Townline
 SAMPLE NO. 5
 DEPTH OF SAMPLE 15.0 feet
 ELEVATION OF SAMPLE 599.5 feet

COEFFICIENT OF UNIFORMITY
 COEFFICIENT OF CURVATURE

Classification of Sample and Group Symbol:
 Sandy silty clay (CL-CL)

PLASTIC PROPERTIES

LIQUID LIMIT	% = 34.9
PLASTIC LIMIT	% = 16.9
PLASTICITY INDEX	% = 18.0
MOISTURE CONTENT	% = 16.9
ACTIVITY	= 0.40

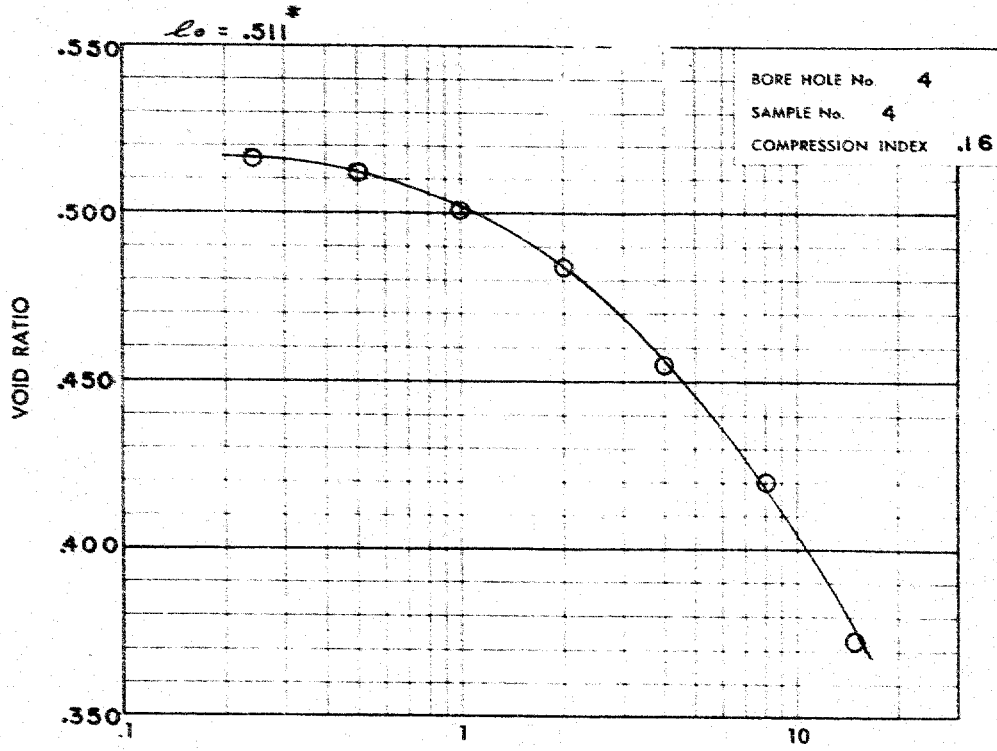
Job No. 4-5-L7

SUMMARY OF LABORATORY TEST DATA

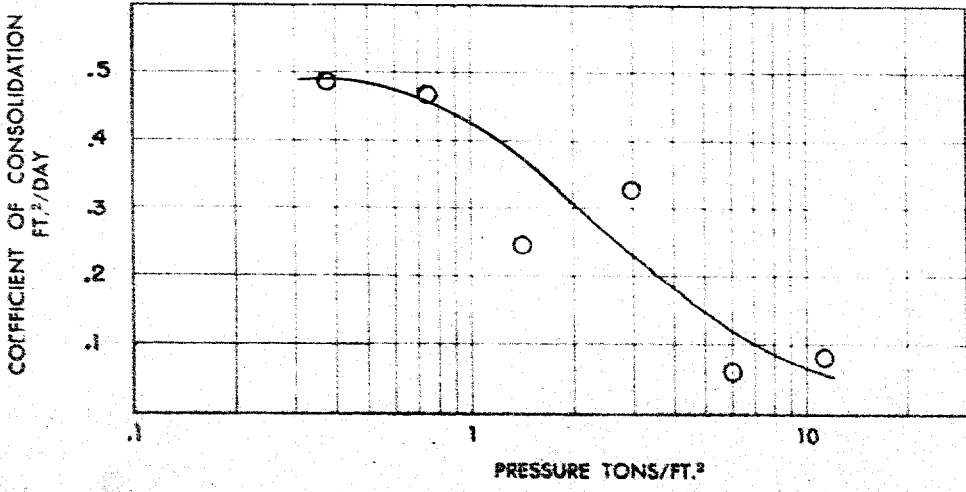
BH no.	Sample number	Depth (feet)	Elevation (feet)	Unit weight (p.c.f.)	w (%)	LL (%)	PL (%)	PI (%)	LI	Shear* strength (p.s.f.)	Compression index
2	1	3.0	612.0	-	25.4	-	-	-	-	-	-
	2	6.0	609.0	-	22.3	-	-	-	-	-	-
	3	8.0	607.0	-	22.4	-	-	-	-	-	-
	4	10.0	605.0	135.5	15.1	52.5	16.4	16.1	-0.1	-	-
	5	15.5	599.5	137.0	16.2	50.5	14.2	16.3	+0.1	-	-
	6	18.5	596.5	-	16.0	-	-	-	-	-	-
3	4a	7.0	608.0	132.5	18.7	-	-	-	-	-	.16
	4b	7.0	608.0	127.0	20.3	42.4	19.5	22.9	0.0	2650	-
4	1	3.0	611.5	-	15.7	-	-	-	-	-	-
	2	5.3	609.2	-	19.0	-	-	-	-	-	-
	3	8.0	606.5	-	15.5	-	-	-	-	-	-
	4	11.0	603.5	134.0	16.1	34.2	16.4	17.8	0.0	-	-
	5	15.0	599.5	139.0	16.9	34.9	16.9	18.0	0.0	-	-
	6	18.0	596.5	-	17.5	-	-	-	-	-	-

* As determined by unconfined compression test.

Dominion Soil Investigation Ltd.
CONSOLIDATION TEST



* Sample swelled during 1/4 ton load period



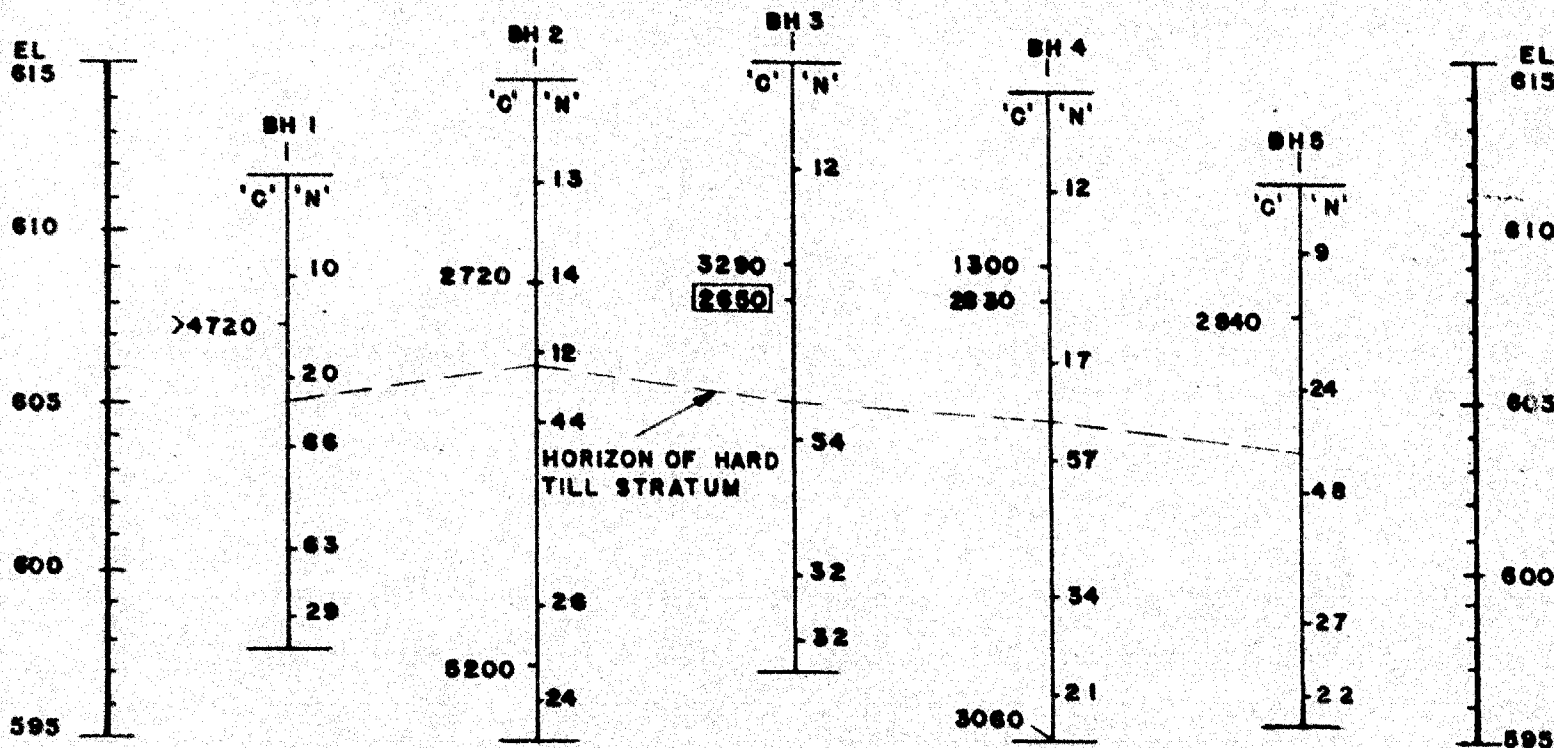
'N' DENOTES BLOW COUNT IN
STANDARD PENETRATION TEST.

'C' DENOTES UNDRAINED SHEAR STRENGTH
AS MEASURED IN FIELD VANE SHEAR TEST.

2650 DENOTES UNCONFINED COMPRESSION TEST RESULT.

Prep. By MKF

Our Ref. No. 4-5-L7



GRAPHICAL SUMMARY OF FIELD TEST RESULTS

VERTICAL SCALE: 1 INCH TO 5 FEET

Enclosure No. 12

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Bldg.

FROM: Bridge Division,
Downsview, Ontario.

DATE: May 15, 1964.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 130-64 Br. Site 6-230
County Road #7 Interchange
Hwy. 401 - District 1

We are sending to you herewith two prints of Bridge Site Plan E 3106-1 on which we have marked in red the proposed location of the above structure. Site Plan E 3106-1 was prepared on February 1956, we have added in blue the presently proposed location of the intersection as obtained from Plan B-108-4.

Please make the necessary arrangements for a Foundation Soils Investigation. We will be pleased to have your report in due course.

N. Zoltay

NZ/im
cc. S. McCombie
G. Scott
R. Fitzgibbon
N. D. Smith

N. Zoltay,
for G. Scott,
Regional Bridge Location Engineer.

JOE GIVEN TO DOMINION SOIL

MAY 20, 1964

AGS

LETTER OF AUTHORITY, PLEASE.

SHOULD INCLUDE GABAGE (HIEG252) AS WELL
WILL MAKE MOBILISATION CHEAPER

AGS

Materials and Research Division

May 26, 1964

Dominion Soil Investigation, Ltd.,
77 Crockford Blvd.,
Scarborough, Ontario.

Attention: Mr. A. Rucka

Re: W.P. 130-64, Hwy. 401, County Rd. #7 Interchange; and
Proposed Pike Creek Patrol Yard, Lots 19 & 20,
Sandwich S. Twp., District 1, Chatham, Ontario.

Dear Sir:

Please consider this your authority to carry out foundation investigations at the above sites. Plans and profiles were provided to your representative.

It is understood that a qualified Soils Engineer will be in charge of the field work at all times.

Eleven copies of each completed foundation report, with one additional copy of each subsoil profile, should be submitted to the Foundation Section prior to July 3, 1964. Previous requirements as to preliminary borehole information and laboratory testing program, should be followed.

Because 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 D.H.C. standards. To enable you to do this, we are supplying you with sample drawings with all the necessary explanations, together with linen sheets for your drawings. You are also requested to provide the D.H.C. with Cronaflex copies of the drawings.

Charges for the work performed will be in accordance with your Schedule of Rates, dated February 17, 1959, except that the drilling rates will be in accordance with the Contract Agreement signed November 1, 1963, and invoices to be addressed to the attention of the undersigned.

RDS/MAR

cc: Messrs. S. McCombie
A. Gater
F. C. Brown
J. Roy
M. D. Smith (2)

H. Konings
Foundations (2)
Gen. Files (2)

Yours very truly,

A. Rucka

A. Rucka

MATERIALS & RESEARCH ENGINEER

DOMINION SOIL INVESTIGATION LIMITED

77 CROCKFORD BOULEVARD

SCARBOROUGH, ONTARIO

TELEPHONE 421-2567

BRANCH

3 QUEENS AVENUE

LONDON, ONTARIO

TELEPHONE GE. 3-3951



FOUNDATION ENGINEERS

P.O. BOX 933

SAULT STE. MARIE

ONTARIO

TELEPHONE AL. 4-2615

London, July 8th, 1964

4-5-L7

Ontario Department of Highways,
Materials and Research Division,
DOWNSVIEW, Ontario.

Attention: Mr. A. Rutka, P. Eng.,
Materials and Research Engineer

Gentlemen:

Soil Conditions and Foundations, Proposed
Crossing at Highway #401 and County Road
#7 Interchange, Sandwich S/Maldstone
Townline - N. P. 130-64

This letter accompanies 11 copies of our report on this project.

We are glad to have had this opportunity to be of service to you, and should any questions arise in connection with the report or during excavation for the structure, please do not hesitate to get in touch with us.

Soil samples are normally stored for a period of 3 months from the date of issue of the report, and thereafter destroyed. Kindly advise us if you have any other instructions.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED

JP/mkf

James Park, P. Eng.,
Vice-President.

Encl. 11

Mr. A. M. Loya,
Bridge Engineer,
Bridge Division,

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

Attention: Mr. A. M. Loya

July 13, 1964

FOUNDATION INVESTIGATION REPORT BY:
Dominion Soil Investigation Limited.
Proposed Crossing at Highway #401 &
County Road #7 Interchange, Sandwich &
Midstone Townline, District #1, Chatham.
W.P. 136-64

Attached, we are forwarding to you the above-mentioned report submitted by the Consultant, Dominion Soil Investigation Ltd. We have reviewed the report and found the factual information adequate and well presented. We are also in agreement with the recommendations contained in the report and believe that they will be sufficient for your further work.

Should there be any additional information that you would require, please feel free to call us our office.

ASL/ndaf
attach.

cc: Messrs. A. M. Loya (2)
H. A. Gregaskes
H. D. McMillan
A. Cater
F. C. Brown
J. Day
A. Watt

Foundations Office
Gen. Files

A. C. Lomas
A. C. Lomas,
PRINCIPAL FOUNDATION ENGINEER

ESSEX COUNTY Rd No 7

BETWEEN FLEURY & WINDSOR

ON HWY 401

SOMERSON

LENGTH AND TYPE OF PILES FOR
ABUTMENTS

W.P. 130-CH

STEEL TUBE PILES DRIVEN TO

EL. 600.0 SHOULD BE USED

ALLOWABLE LOAD PER PILE

SHOULD BE 50 TONS.

MESSAGE TO CHRIS BASSI AUGUST 18, 1964

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Bldg.

From: Bridge Division,
Downsview, Ontario.

Date: August 31, 1964.

Our File Ref.

In Reply To

SUBJECT: W.P. 130-64
Br. Site 6-230
Essex County Rd. No. 7 Underpass
Hwy. 401 - Dist. 1

We are sending to you herewith two prints of
Preliminary Plan D-5507-P-1 of the above structure.

Would you please let us have your written
comments.



NZ/sp
cc. S. McCombie
G. Scott
N. D. Smith

N. Zoltay,
for G. Scott,
Regional Bridge Location Engineer.

Mr. G. Scott,
Regional Bridge Location Engr.,
Bridge Division.

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

Attention: Mr. N. Zoltar

September 3, 1964

Review of Preliminary Plan #D-5507-P1,
Essex County Road #7 Interchange,
W.P. 130-64 -- District #1, Chatham.

We have reviewed the Preliminary Plan for the above-mentioned proposed structure and submit the following comments:

(1) Insofar as the bridge foundations are concerned, the designer appears to have complied with the recommendations contained in the Foundation Report and with the verbal recommendations given to Mr. C. Bassi, regarding pile lengths by Mr. A. G. Stermac on August 18, 1964.

(2) Although not recommended in the Foundation Report, we feel that it would be advisable to remove the organic clay silt material which overlies the clay till deposit before constructing the embankments on County Rd. #7. The exact extent of this material can best be determined in the field at the time of construction, but should be removed for at least a distance of 50 ft. behind each abutment.

If we can be of any further assistance in this matter, please contact this Office.

HGS/MceF

cc: Foundations Office ✓
Gen. Files

R. L. Sullivan
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

Mr. A. M. Toye,
Bridge Engineer,
Bridge Division.

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

Attention: Mr. S. McCombie

July 13, 1964

FOUNDATION INVESTIGATION REPORT BY:
Dominion Soil Investigation Limited.
Proposed Crossing at Highway #401 &
County Road #7 Interchange, Sandwich S/
Maidstone Townline, District #1, Chatham.
W.P. 130-64

Attached, we are forwarding to you the above-mentioned report submitted by the Consultant, Dominion Soil Investigation Ltd. We have reviewed the report and found the factual information adequate and well presented. We are also in agreement with the recommendations contained in the report and believe that they will be sufficient for your further work.

Should there be any additional information that you would require, please feel free to call on our Office.

AGS/Mief
Attach.

cc: Messrs. A. M. Toye (2) ✓
H. A. Tregaskes
H. D. McMillan
A. Gater
F. C. Brown
J. Roy
A. Watt

A. G. Sternac
A. G. Sternac,
PRINCIPAL FOUNDATION ENGINEER

Foundations Office
Gen. Files

Mr. S. McCombie,
Bridge Planning Engr.,
Bridge Division.

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

Attention: Mr. G. Scott

September 30, 1964

Proposed Crossing at Highway #401
and County Road #7 Interchange,
Sandwich S/Maidstone Townline -
W.P. 130-64 -- District #1

The Regional Soil Engineer's crew carried out additional shallow borings at the site of the above-mentioned interchange. Their findings were discussed and the following conclusion has been reached:

Although some organic admixtures were found, the consistency of the material is such that a subexcavation and replacement is not necessary. All that is recommended is to remove the upper one or two feet of topsoil. However, the possibility of encountering areas of soft and unacceptable material cannot be excluded. The decision whether to excavate or not will have to be reached if and when such a situation arises.

AGS/MdeF

A. G. Sternac
A. G. Sternac,
PRINCIPAL FOUNDATION ENGINEER

cc: Mr. J. Forster

Foundations Office /
Gen. Files

Department of Highways Ontario

Copy for the information of
Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Bldg.

Mr. A. Gater,
Sr. Project Design Engineer,
LONDON Regional Office,
Ontario.

file 6127
Bridge Division,
Downsview, Ontario.

October 1, 1964.

W.P. 130-64 Bridge Site #6-230,
Essex County Road #7 Interchange,
Hwy. #401 Dist. #1.

Attached herewith please find a copy of memorandum dated September 30th, from Mr. A. G. Stermac concerning approach embankments for the above structure.

As discussed with you at the Regional Office we believe that information concerning the approach roadway embankment should appear on the Road Design drawings rather than the Bridge Design drawings.

We will be pleased to have you make the necessary arrangements to include this work in your design drawings.

GS:go
c.c. S. McCombie
J. Keen
A. Stermac

G. Scott,
Regional Bridge Location Engineer.

Bridge Division,
Downsview, Ontario,
November 1, 1965.

MEMORANDUM:

To File

RE: Proposed structures on Hwy. 401,
located 0.6 miles to 0.9 miles
East of Hwy. 90,
District No. 1, Chatham.
U.F. 127-04, 128-04, 129-04,
131-04, 132-04, 309-04, 310-04,
659-04 and 670-04.

At a meeting between Mr. H. Bevets of Foundations Branch
and K. Bassi of Bridge Division, concerning the above structures
held on October 23, 1965 at the Bridge Office, it was
agreed that:

1. The spread footings for all the piers can be designed for
a bearing capacity of $2\frac{1}{2}$ tons/sq. ft.
2. The abutment piles for all the structures if driven in
accordance with the recommendations given in the indi-
vidual Foundation Reports, can be designed to carry
30 Tons/pile.
3. The structures should be designed to tolerate a maximum
differential settlement between the abutments and shoulder
piers in the order of 1 to $1\frac{1}{2}$ inches.

HMB/eg
c.c. K. G. Starnes ✓
G. Scott.

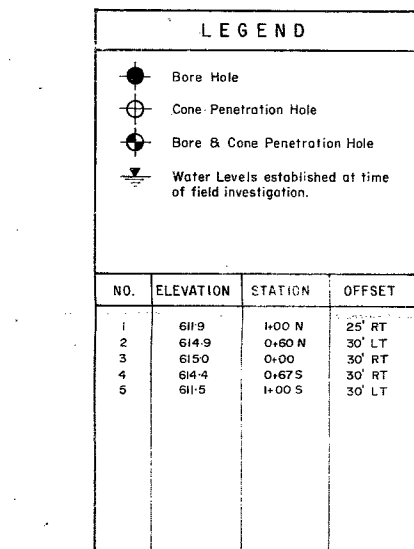
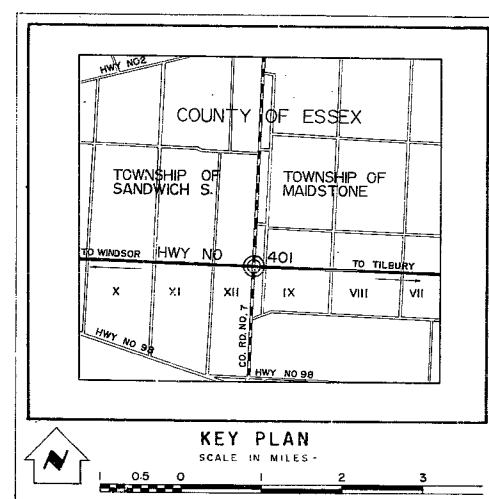
K. G. Bassi,
Bridge Project Engineer.

#64-F-202-C

W.P. # 130-64

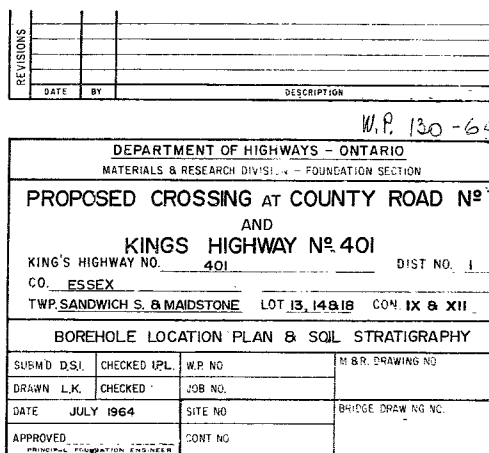
Hwy. # 401 E

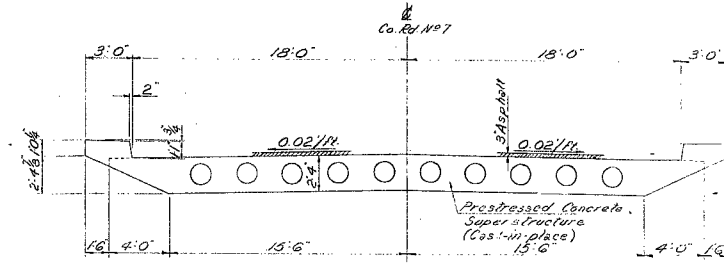
City. Rd. # 7



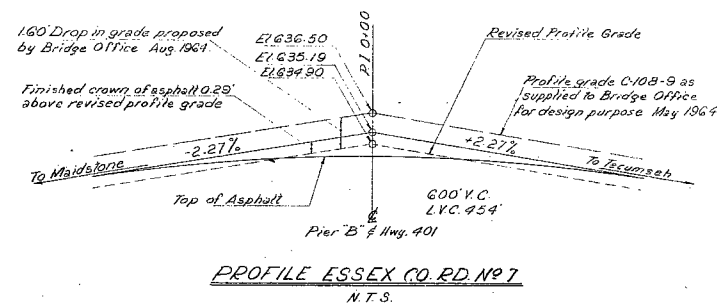
-- NOTE --

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

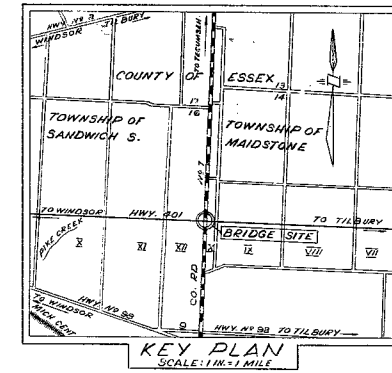




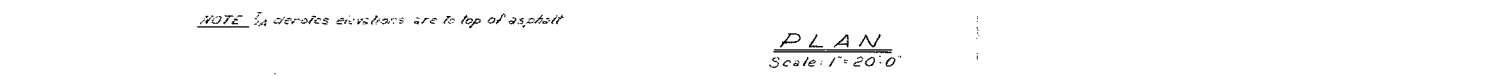
TYPICAL DECK SECTION (MID SPAN)
Scale: $\frac{3}{16}'' = 1'-0''$



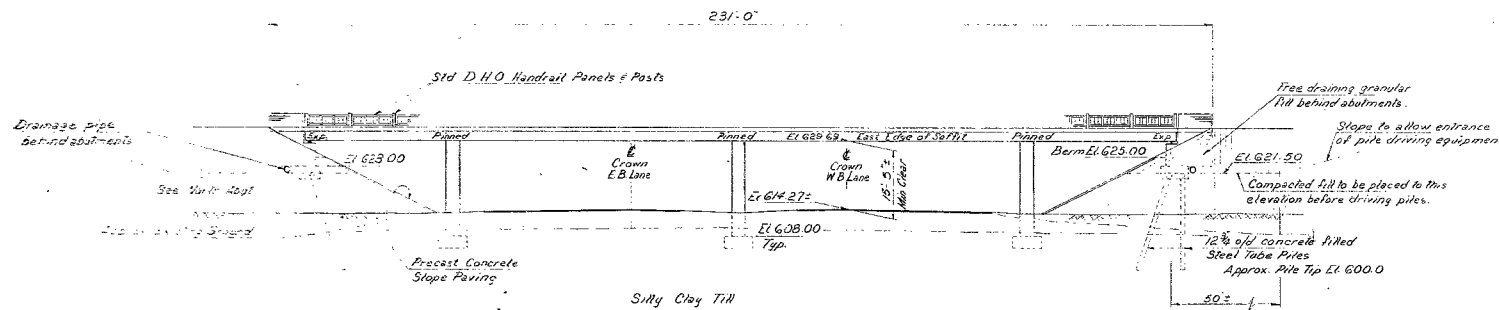
PROFILE ESSEX CO. RD. NO 7
N.T.S.



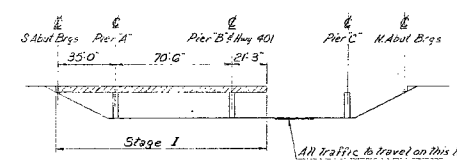
KEY PLAN
SCALE: 1 IN. = 1 MILE



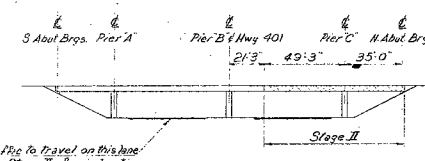
PLAN
Scale: 1" = 20'-0"



ELEVATION
Scale: 1"=20'-0"



STAGE I



STAGE 1

CONSTRUCTION SEQUENCES
Scale: 1"=50'-0"

[illegible][illegible]

DEPARTMENT OF HIGHWAYS ONTARIO
 BRIDGE DIVISION

ESSEX CO. RD. N^o 7 INTERCHANGE
22.3 Mi. West of Hwy. N^o 2

KING'S HIGHWAY No. 401

DIST. No. 1

CO. Essex

TWP. Sandwich S. & Maudslowe

LOT 12 & 13, 17 & 18 CON. 711 & X

PRELIMINARY PLAN

APPROVED _____

BRIDGE ENGINEER

DESIGN <u>K G B</u>	CHECK _____	
DRAWING <u>F J W</u>	CHECK <u>W. S. W.</u>	
DATE <u>Aug. 1964</u>	LOADING <u>1420 S.W.</u>	

SITE No. 6-230
W.P. No. 133-64

CONTRACT No. _____		
DRAWING No. <u>D-5507-P1</u>		

