MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

40I14-107
GEOCRES No.

MEMORANDUM

TO: Mr. A. P. Watt, (2)
Regional Structural Planning Engineer,
Southwestern Region,
London, Ontario.

FROM: Soil Mechanics Section
Geotechnical Office
Downsview, Ontario

ATTENTION:

DATE: December 17, 1974

OUR FILE REF.

IN REPLY

DEC 18 1974

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
London East Industrial Access Road
and
Highway 401 Interchange Bridge,
Township of Westminster, District #2,
London
W.P. - 32 - 73 - 02 Site - 19 - 515
Cont. 76-36

Attached we are forwarding to you our detailed foundation investigation report on the subsoil conditions existing at the above-mentioned site.

We believe that the factual data and recommendations contained therein will prove adequate for your design requirements. Should additional information be required, please do not hesitate to contact our office.

K. G. Selby,
Supervising Engineer

KGS:jw
cc E.J. Orr
B.R. Davis
A. Wittenberg
L.E. Walker
B.J. Giroux
J.R. Roy
G.A. Wrong
P. Lewycky

Files
Documents

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FOUNDATION INVESTIGATION REPORT

For

London East Industrial Access Road

and

Highway 401 Interchange Bridge ,

Township of Westminster, District 2, London

W.P. - 32 - 73 - 02 Site - 19 - 515

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1. INTRODUCTION:

A request for a foundation investigation for a structure at the above-mentioned site was received from Mr. A. P. Watt, Regional Structural Planning Engineer, South-Western Region, London.

A field investigation was subsequently carried out by the Soil Mechanics Section to determine the subsoil conditions existing at the site. This report contains the results of our field and laboratory investigations, together with our recommendations relating to the design of the proposed structure foundations.

2. DESCRIPTION OF THE SITE

The proposed site is located on Highway 401 approximately one mile west of the Highway 74 interchange. The surrounding area is gently rolling farm land with an occasional mixed hardwood bush.

Physiographically, the site is located in a region referred to as the Mount Elgin Ridges.

3. FIELD AND LABORATORY INVESTIGATION

A total of seven sampled boreholes and five dynamic cone penetration tests were carried out during the course of the field work. Boring was achieved by means of a continuous flight auger mounted on a bombardier.

Disturbed samples were obtained using a 2 inch O.D. split-spoon sampler driven according to the specifications for the Standard Penetration Test.

Dynamic cone penetration tests were carried out

.....2

adjacent to five boreholes. Driving energy used to advance th cones was 350 ft-lb per blow. All boreholes were surveyed in the field by personnel from London Region Engineering Surveys Section. The locations and elevations of the borings are shown on Drawing No. 327302-A which accompanies this report.

All samples were visually examined and classified at the site as well as in the laboratory. Following this inspection, laboratory tests were carried out on selected representative samples to determine the following physical properties:

Atterberg Limits
Natural Moisture Content
Grain-size Distribution

The test results are summarized on the Record of Borehole sheets contained in the Appendix of this report.

4. SUBSOIL CONDITIONS:

4.1) General:

Subsoil at the site consists of four distinct layers. The surface layer consists of a heterogeneous mixture of clayey silt, some sand and traces of gravel approximately 35 feet in thickness. This is followed by a layer of 15 to 20 feet of fine sand. Underlying this layer is a further 35 to 40 feet consisting of a heterogeneous mixture of clayey silt some sand, traces of gravel which is in turn underlain by a layer of fine to medium sand with silt. The deepest boreholes at the site were terminated in this fine to medium sand with silt layer.

The boundaries between the different deposits are shown on the attached record of Borehole sheets. The estimated stratigraphical profile shown on Drawing # 327302-A is based upon this information.

From ground level downwards, the different soil deposits are described as follows:

4.2) Clayey Silt some sand traces of gravel

This layer was found in all boreholes and extends to a depth of approximately 35 feet. It consists of a heterogeneous mixture of clayey silt some sand traces of gravel of glacial origin. Its consistancy is stiff to hard

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and has a moisture content varying from 11% to 16.5%.

Grain size analysis are plotted in an envelope form on Fig. (1).

A Plot of Plasticity Index versus Liquid Limit is shown on Fig. (2) of the appendix. The points fall within the clayey silt zone (i.e. C L) on the plasticity chart.

4.3) Fine Sand

This layer is sandwiched between two clayey silt glacial till layers and varies from 15 to 20 feet in thickness. Its density varies from dense to compact and has a moisture content of from (3% to 22%).

4.4) Clayey Silt some sand traces of gravel

This stratum consists of 30 to 35 feet of a heterogeneous mixture of clayey silt, sand and gravel of glacial origin. Its consistancy is hard and has a moisture content varying from (7.5%) to (11%).

A Plot of Plasticity Index versus liquid limit show most points to fall just above the CL - ML zone on the plasticity chart clayey silt range and are plotted on Fig.#3.

Grain size analysis are plotted in an envelope form on Fig. (4).

4.5) Fine Sand with Silt

This stratum of fine sand with silt was encountered at depths of 80 and 92 feet in the two deeper boreholes which were terminated in this layer at depths of 96 and 101 feet. It has a compact density and a moisture content of from (20.5%) to (21.5%).

4.6) Groundwater

Groundwater was encountered in the fine sand and fine sand with silt layers which rose to a level within 4 feet of the ground surface.

5. RECOMMENDATIONS:

5.1) General

It is proposed to construct an overpass structure for the London East Industrial Access Road to cross Highway 401.

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The structure may be either two or four spans. Recommendations for the design and construction of the structure foundations and approach embankments are discussed below : -

5.2) Structure Foundations

Piers

The piers may be supported on spread footing type foundations placed at or below the following elevations assuming a safe bearing pressure of 3 tons/sq. ft. for design purposes.

	Footing Elevation
North Pier	893
Center Pier	896
South Pier	895

Abutments

The abutments may be constructed within the approach fills supported on steel tube piles (12-3/4" x 1/4") driven to approximate elevation 892. A design load of 25 tons per pile should be used for design purposes. Any horizontal loading should be resisted by battered piles.

Settlements

It is anticipated that the following long term settlements will occur.

	Anticipated Settlements
Abutments	2½"
North Pier	1"
Center Pier	1½"
South Pier	1"

Any bridge design should therefore have the ability to tolerate the resulting differential settlements.

Structure on End Bearing Piles

Any or all of the above footings may be supported on steel H piles or 12-3/4" x 1/4" steel tube piles driven into the lower clayey silt layer. The maximum allowable design load for the particular section chosen may be used for design purposes. It is estimated that these piles would achieve the required design load at approximate elevation 840± .

Dewatering

The ground water level was found to be approximately

.....5

elevation 895 which is about 4 feet below the ground surface. No dewatering problems are, however, anticipated for footing excavation due to the cohesive relatively impervious nature of the upper soil stratum.

5.3) Approach Fills

No stability problems are anticipated with the required 25 foot embankment fills if two to one slopes are employed. Care, however, should be taken that no material exceeding 3" grain size is placed in the fills through which piles have to be driven.

6. MISCELLANEOUS :

The field work on the project was carried out during the period October 30 to November 8, 1974 under the supervision of Mr P. J. Stuart, Project Foundation Engineer, who also prepared this report.

The equipment used was owned and operated by Atcost Drilling.

This report was reviewed by Mr K. G. Selby, Supervising Foundation Engineer.

REGISTERED PROFESSIONAL ENGINEER
P. J. STUART
PROVINCE OF ONTARIO

Peter J. Stuart
Project Foundation Engineer

K. G. Selby
Supervising Engineer

PJS: jw
Dec 17, 1974

APPENDIX

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

ENGINEERING SERVICES BRANCH – GEOTECHNICAL OFFICE – SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 1

W.P. 32-73-02 LOCATION Co-ords. 15,605,824 N; 1,367,952 E. ORIGINATED BY PJS

DIST. 2 HWY. Local BORING DATE October 31, 1974 COMPILED BY PJS

DATUM Geodetic BOREHOLE TYPE Solid Auger and Cone Test CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES 'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	LIQUID LIMIT w_L, PLASTIC LIMIT w_P, WATER CONTENT w / WATER CONTENT % (10 20 30)	UNIT WEIGHT γ P.C.F.	REMARKS % GR SA SI CL
899.0	Ground Level									
0.0	Brown / Grey Clayey silt, some sand, traces of gravel (Glacial Till) Very Stiff to Hard		1	SS	20					
			2	SS	22					5 18 58 19
			3	SS	31					
			4	SS	29	890				
			5	SS	21					
			6	SS	20	880				2 18 49 31
			7	SS	23					
			8	SS	27	870				
863.5										
862.1	F.Sand Very Dense		9	SS	68					0 94 (6)
36.5	End of Borehole									

OFFICE REPORT ON SOIL EXPLORATION

20
15 ◇ 5 % STRAIN AT FAILURE
10

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

ENGINEERING SERVICES BRANCH – GEOTECHNICAL OFFICE – SOIL MECHANICS SECTION

RECORD OF BOREHOLE Nº 2

W.P. 32-73-02 LOCATION Co-ords. 15,605,799 N; 1,367,970 E. ORIGINATED BY PJS

DIST. 2 HWY. Local BORING DATE October 31, 1974 COMPILED BY PJS

DATUM Geodetic BOREHOLE TYPE Solid Auger & Cone Test CHECKED BY GP

SOIL PROFILE ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w (w_P — w — w_L) / WATER CONTENT % (10 20 30)	UNIT WEIGHT γ	REMARKS % GR SA SI CL
899.2	Ground Level									
0.0			1	SS	13					
			2	SS	20					
			3	SS	24	890				
	Brown / Grey		4	SS	23					
			5	SS	23					
	Clayey silt, some sand, traces of gravel (Glacial Till)		6	SS	24					1 19 54 26
			7	SS	21	880				
			8	SS	26					
	Stiff to Hard					870				
			9	SS	36					
862.8	silty clay		10	SS	20					0 0 45 55
36.4 859.2	Fine sand. Grey					860				
40.0	End of Borehole									

20 / 15 ◇ 5 / 10 % STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

ENGINEERING SERVICES BRANCH – GEOTECHNICAL OFFICE – SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 3

W.P. 32-73-02 LOCATION Co-ords. 16,605,780 N: 1,367,936 E. ORIGINATED BY PJS

DIST. 2 HWY. Local BORING DATE November 6, 1974 COMPILED BY PJS

DATUM Geodetic BOREHOLE TYPE Follow Stem Auger CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w — WATER CONTENT % (10 20 30)	UNIT WEIGHT γ	REMARKS / % GR SA SI CL
897.9	Ground Level									
0.0	Brown Grey Clayey silt, some sand, traces of gravel (Glacial Till) Stiff to Hard — clayey silt		1	SS	21	890				W.L. not established
			2	SS	23					3 15 70 12
			3	SS	29					
			4	SS	26					3 21 52 24
			5	SS	18	880				
			6	SS	20					
			7	SS	25	870				0 4 69 27
862.4			8	SS	37					
35.5	Fine Sand Dense to Compact Grey		9	SS	51	860				
			10	SS	17					0 96 (4)
847.7			11	SS	22	850				
50.2	Clayey silt, some sand, traces of gravel (Glacial Till) Hard Grey		12	SS	67					
			13	SS	95					3 24 61 12
			14	SS	105	840				
			15	SS	60	830				5 22 58 15
816.4			16	SS	103	820				
81.5	Fine to medium sand with silt. Compact Grey		17	SS	20	810				
796.4			18	SS	22	800				0 72 (28)
101.5	End of Borehole									

20
15 ◇ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

ENGINEERING SERVICES BRANCH - GEOTECHNICAL OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 4

W.P. 32-73-02 | LOCATION Co-ords. 16,605,718 N; 1,367,974 E. | ORIGINATED BY PJS

DIST. 2 | HWY. Local | BORING DATE November 6, 1974 | COMPILED BY PJS

DATUM Geodetic | BOREHOLE TYPE Hollow Stem Auger & Cone | CHECKED BY GP.

ELEV. / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES N VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w (w_P — w — w_L) / WATER CONTENT % (10 20 30)	UNIT WEIGHT γ	REMARKS % GR SA SI CL
901.7	Ground Level									
0.0	Clayey silt, some sand, traces of gravel (Glacial Till) Very Stiff to Hard Brown silty sand : Grey		1	SS	28	900				5 21 58 16
			2	SS	18					
			3	SS	25					
			4	SS	26	890				
			5	SS	22					3 57 31 9
			6	SS	28	880				
			7	SS	34					1 21 47 31
870.2			8	SS	32					
31.5	End of Borehole Note: Water level not established.									

20
15 ◇ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

ENGINEERING SERVICES BRANCH – GEOTECHNICAL OFFICE – SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 5

W.P. 32-73-02 LOCATION Co-ords. 15,605,644 N; 1,367,970 E. ORIGINATED BY PJS

DIST. 2 HWY. Local BORING DATE November 4, 1974 COMPILED BY PJS

DATUM Geodetic BOREHOLE TYPE Solid Auger and Cone CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES 'N' VALUES	GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w (w_P w w_L) / WATER CONTENT % (10 20 30)	UNIT WEIGHT γ	REMARKS % GR SA SI CL
900.1	Ground Level									
0.0	Brown / Grey Clayey silt, some sand, traces of gravel (Glacial Till) Stiff to Hard		1	SS	13					
			2	SS	26					
			3	SS	12					0 18 56 26
			4	SS	18	890				
			5	SS	26					0 16 68 16
			6	SS	19					
			7	SS	31	880				
			8	SS	25					6 19 60 15
868.6			9	SS	35	870				
31.5	End of Borehole									

20
15 ◇ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY O TRANSPORTATION AND COMMUNICATIONS – ONTARIO

ENGINEERING SERVICES BRANCH - GEOTECHNICAL OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE Nº 6

W.P. 32-73-02 LOCATION Co-ords. 16,605,655N: 1,368,002 E. ORIGINATED BY PJS

DIST 2 HWY. Local BORING DATE November 5, 1974 COMPILED BY PJS

DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100; SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	LIQUID LIMIT w_L, PLASTIC LIMIT w_P, WATER CONTENT w; w_P w w_L; WATER CONTENT % 10 20 30	UNIT WEIGHT γ	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES	ELEV.				% GR SA SI CL
901.2	Ground Level									
0.0						900				
			1	SS	23					
			2	SS	32					
	Brown / Grey		3	SS	34	890				2 18 50 30
	Clayey silt, some sand, traces of gravel (Glacial Till)		4	SS	41					
			5	SS	24					
			6	SS	32	880				1 15 59 25
	Very Stiff to Hard		7	SS	28					
869.7			8	SS	40	870				
31.5	End of Borehole									

OFFICE REPORT ON SOIL EXPLORATION

15 20 10 5 % STRAIN AT FAILURE

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

ENGINEERING SERVICES BRANCH – GEOTECHNICAL OFFICE – SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 7

W.P. 32-73-02 LOCATION Co-ords. 16,605,610 N; 1,367,995 E. ORIGINATED BY PJS

DIST. 2 HWY. Local BORING DATE November 1, 1974 COMPILED BY PJS

DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger and Cone CHECKED BY EP.

ELEV / DEPTH	SOIL PROFILE: DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_p / WATER CONTENT w (w_p w w_L) / WATER CONTENT % (10 20 30)	UNIT WEIGHT γ	REMARKS % GR SA SI CL
902.6	Ground Level									
0.0	Brown / Grey Clayey silt, some sand, traces of gravel (Glacial Till) Stiff to Hard		1	SS	7	900				
			2	SS	20					
			3	SS	29					1 18 58 23
			4	SS	29					
			5	SS	23	890				
			6	SS	20					
			7	SS	26					
			8	SS	33	880				
			9	SS	35					4 11 58 27
866.6			10	SS	50	870				
36.0	Fine Sand Dense to Compact Grey		11	SS	34					
			12	SS	23	860				1 98 (1)
			13	SS	12					
846.6						850				
56.0	Clayey silt, some sand, traces of gravel (Glacial Till) Hard Grey		14	SS	98					
			15	SS	97	840				1 19 59 21
			16	SS	100/5"					
			17	SS	57	830				3 16 61 20
			18	SS	115					
			19	SS	56	820				
810.6										
92.0	Fine sand with silt Compact		20	SS	12	810				0 79 (21)
806.1										
96.5	End of Borehole Note: Water level not established.									

15 20/10 5 % STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

GRAIN SIZE DISTRIBUTION

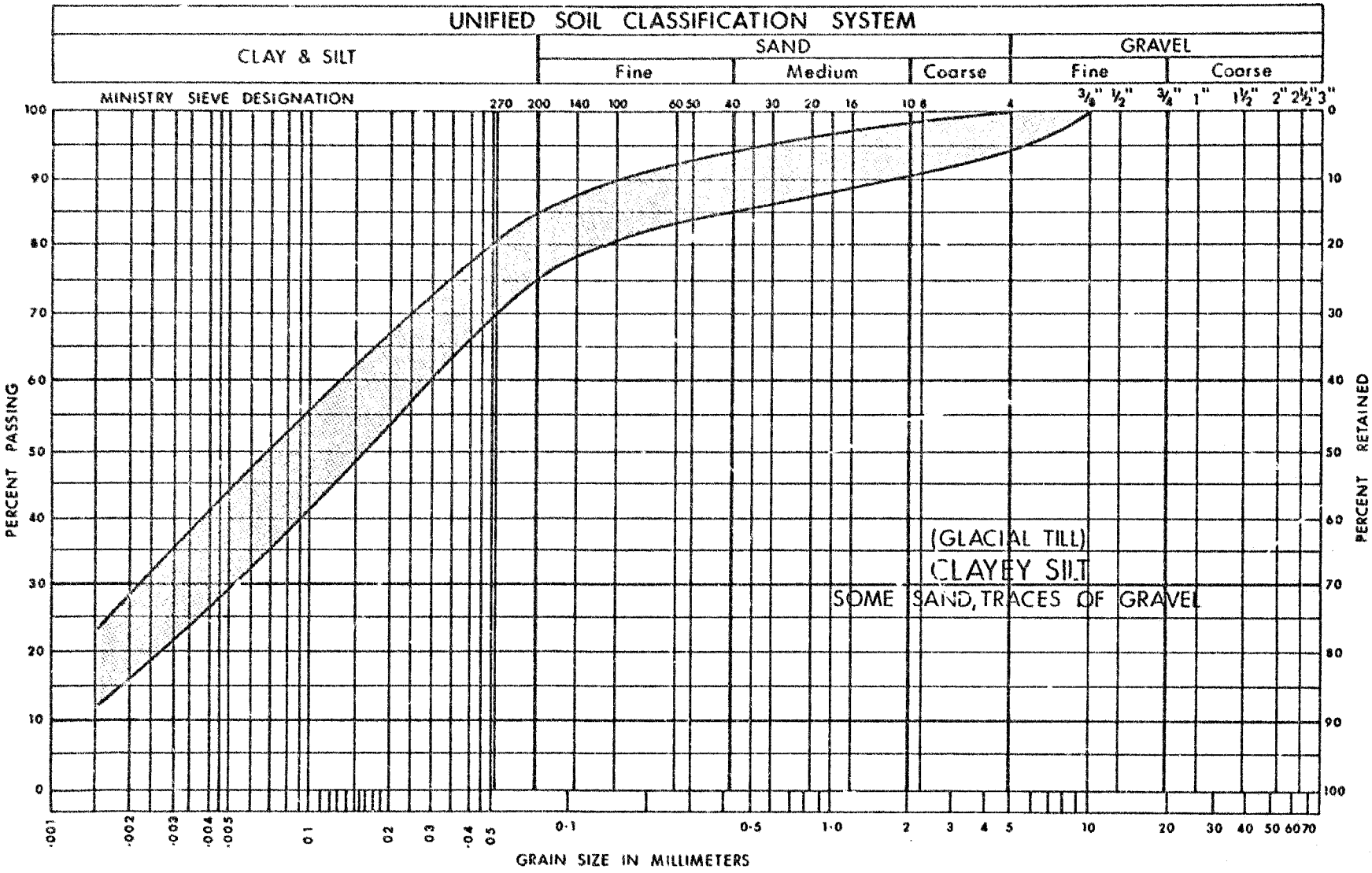


FIG. 1

W.P. 32-73-02

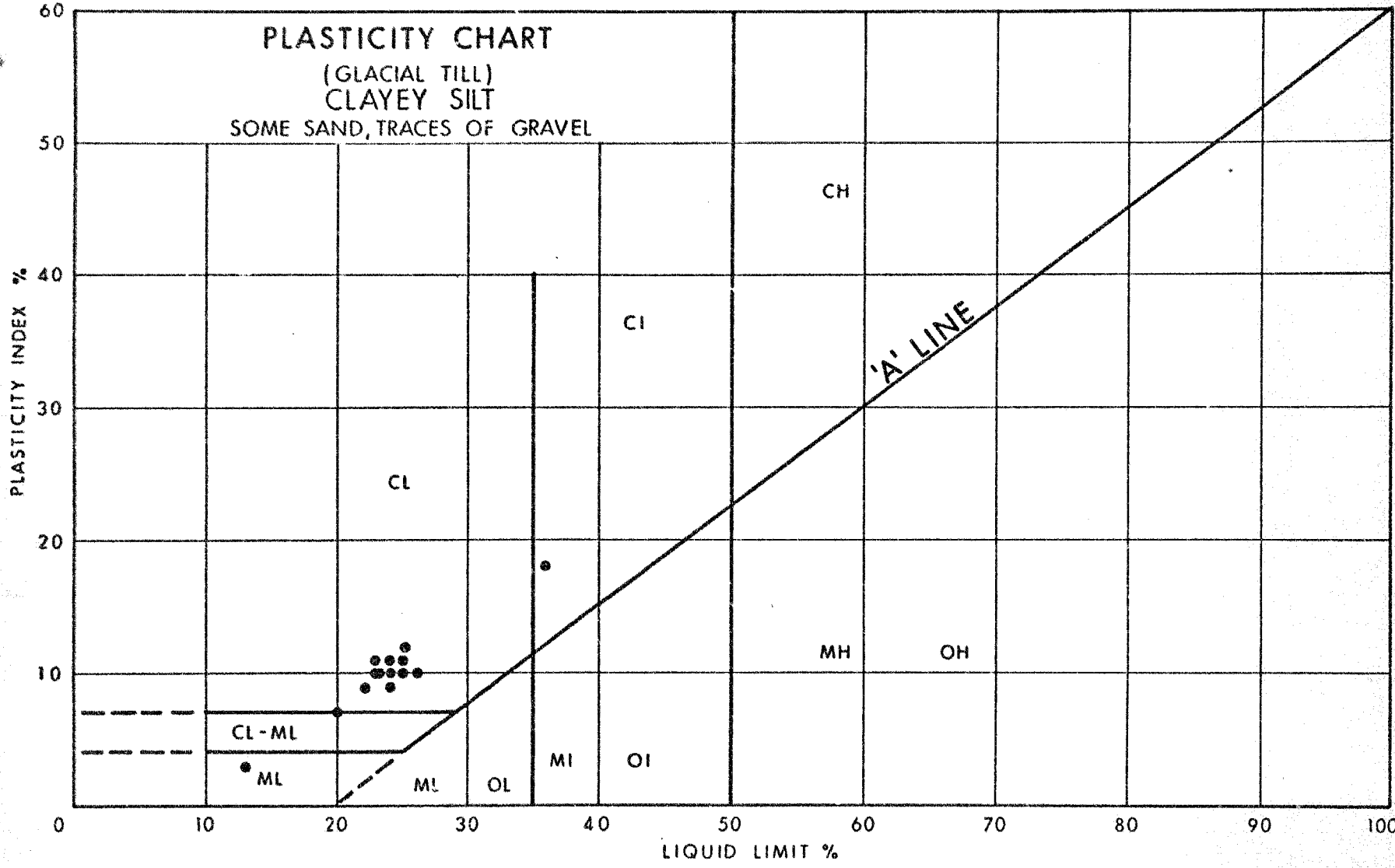


FIG. 2

W.P. 32-73-02

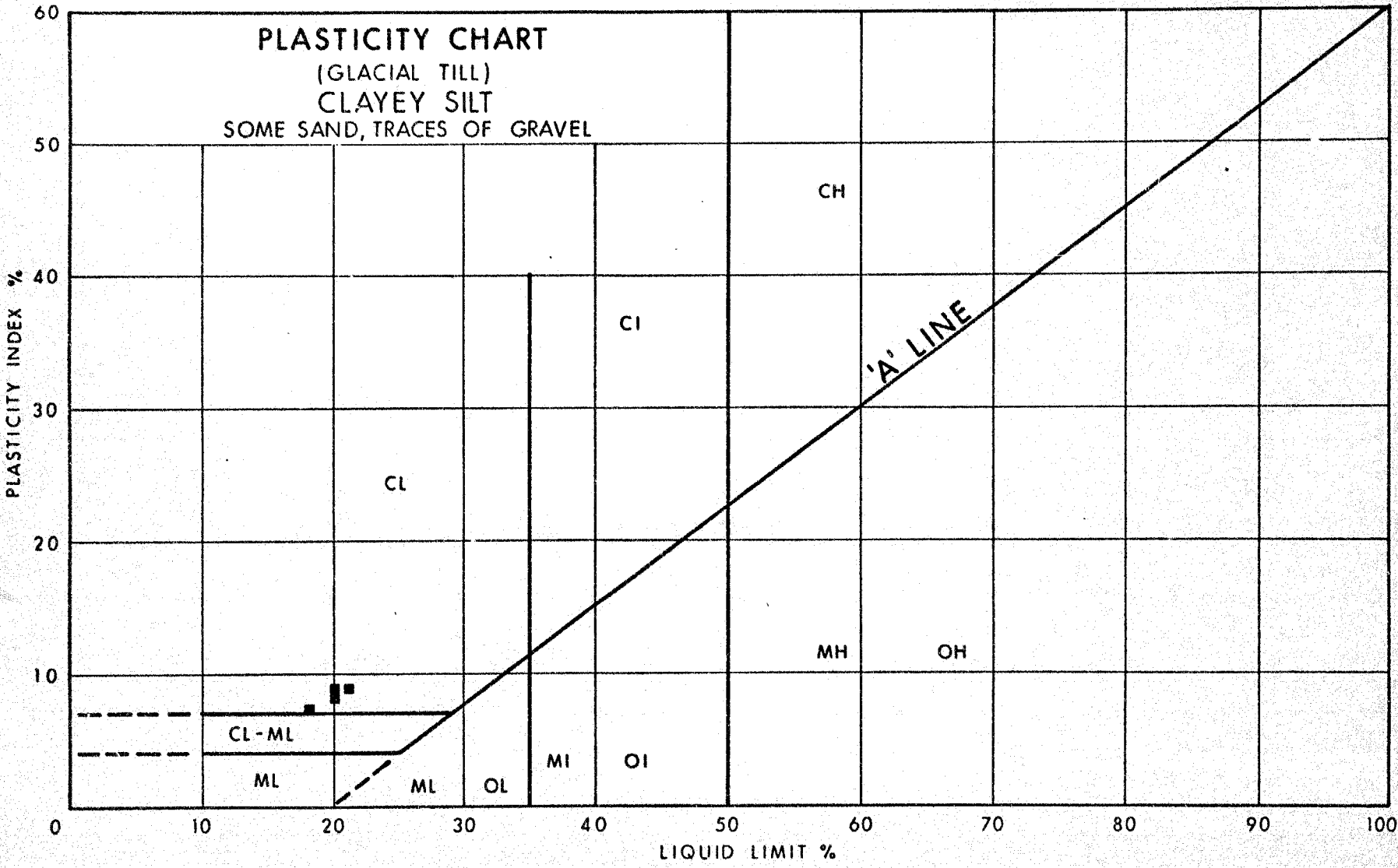


FIG. 3

W.P. 32-73-02

GRAIN SIZE DISTRIBUTION

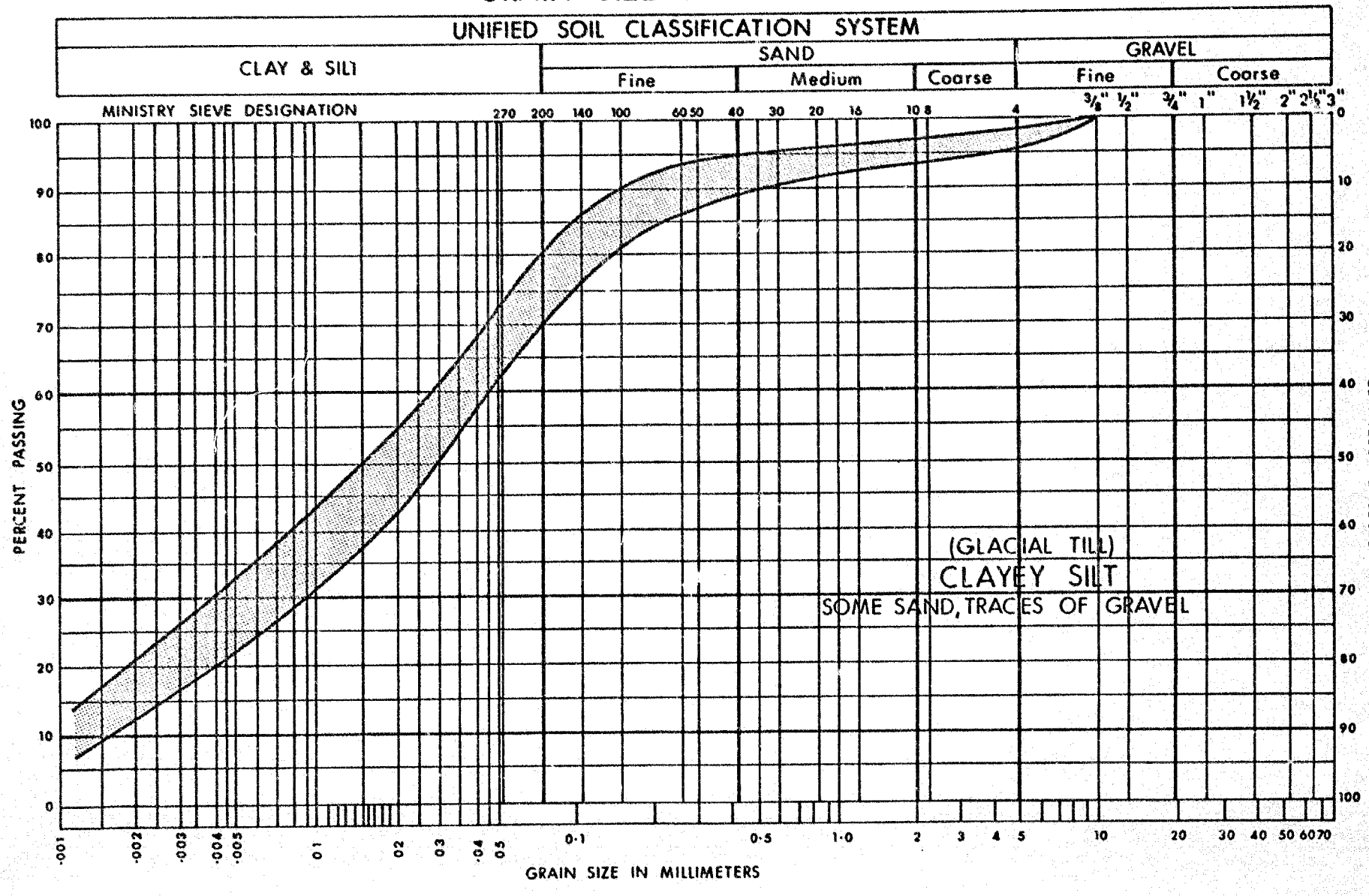


FIG. 4

W.P. 32-73-02

ED-9a (Rev Jan.

ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

PENETRATION RESISTANCE

'N'-STANDARD PENETRATION RESISTANCE :- THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE :- THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS :-

CONSISTENCY	c LB./SQ.FT.	DENSENESS	'N' BLOWS / FT.
VERY SOFT	0 - 250	VERY LOOSE	0 - 4
SOFT	250 - 500	LOOSE	4 - 10
FIRM	500 - 1000	COMPACT	10 - 30
STIFF	1000 - 2000	DENSE	30 - 50
VERY STIFF	2000 - 4000	VERY DENSE	> 50
HARD	> 4000		

TERMS TO BE USED IN DESCRIBING SOILS:-

TRACE < 10% , SOME 10-25% , WITH 25-40% , > 40% SILTY, SANDY, GRAVELLY, CLAYEY ETC.

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.T.	SLOTTED TUBE SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE

P.H. SAMPLE ADVANCED HYDRAULICALLY

P.M. SAMPLE ADVANCED MANUALLY

SOIL TESTS

U	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
UU	UNCONSOLIDATED UNDRAINED TRIAXIAL	F.V.	FIELD VANE
CIU	CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL	C	CONSOLIDATION
CID	" " DRAINED "	S	SENSITIVITY
CAU	" ANISOTROPIC UNDRAINED "		
CAD	" " DRAINED "		

FD-9b (Rev. Jan. 73)

ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

SOIL PROPERTIES

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	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_p	PLASTIC LIMIT
I_p	PLASTICITY INDEX
w_s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX $= \frac{w - w_p}{I_p}$
I_C	CONSISTENCY INDEX $= \frac{w_L - w}{I_p}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX $= \frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
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
m_v	COEFFICIENT OF VOLUME CHANGE $= \frac{-\Delta e}{(1+e)\Delta \sigma'}$
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX $= \frac{\Delta e}{\Delta \log_{10} \sigma}$
T_v	TIME FACTOR $= \frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF EFFECTIVE STRESS $\tau_f = c' + \sigma' \tan \phi'$
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF TOTAL STRESS $\tau_f = c_u + \sigma \tan \phi$
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	= 3·1416
e	BASE OF NATURAL LOGARITHMS 2·7183
$\log_e \sigma$ OR $\ln \sigma$	NATURAL LOGARITHM OF σ
$\log_{10} \sigma$ OR $\log \sigma$	LOGARITHM OF σ TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ε	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNGS MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

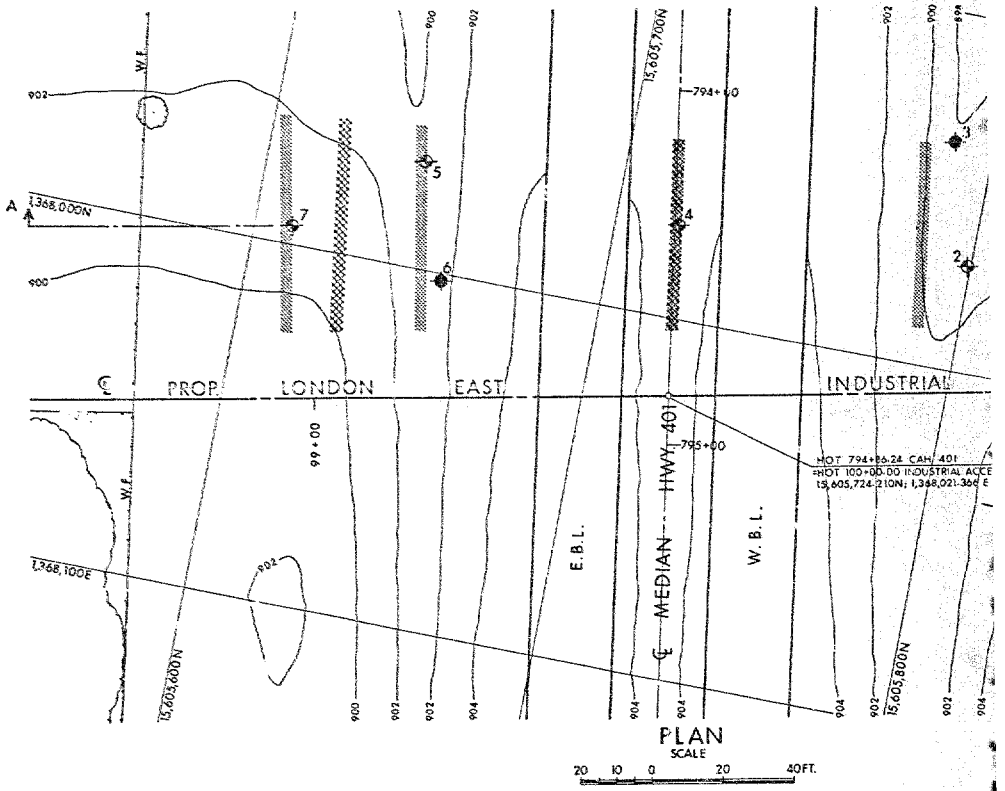
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_o	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

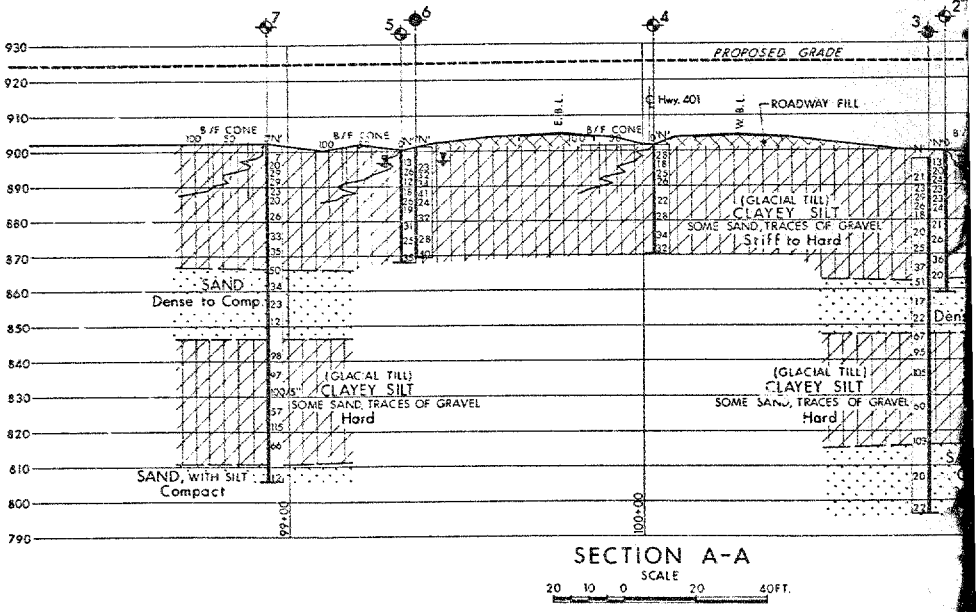
B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY. DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



PLAN
SCALE
20 10 0 20 40FT.



SECTION A-A
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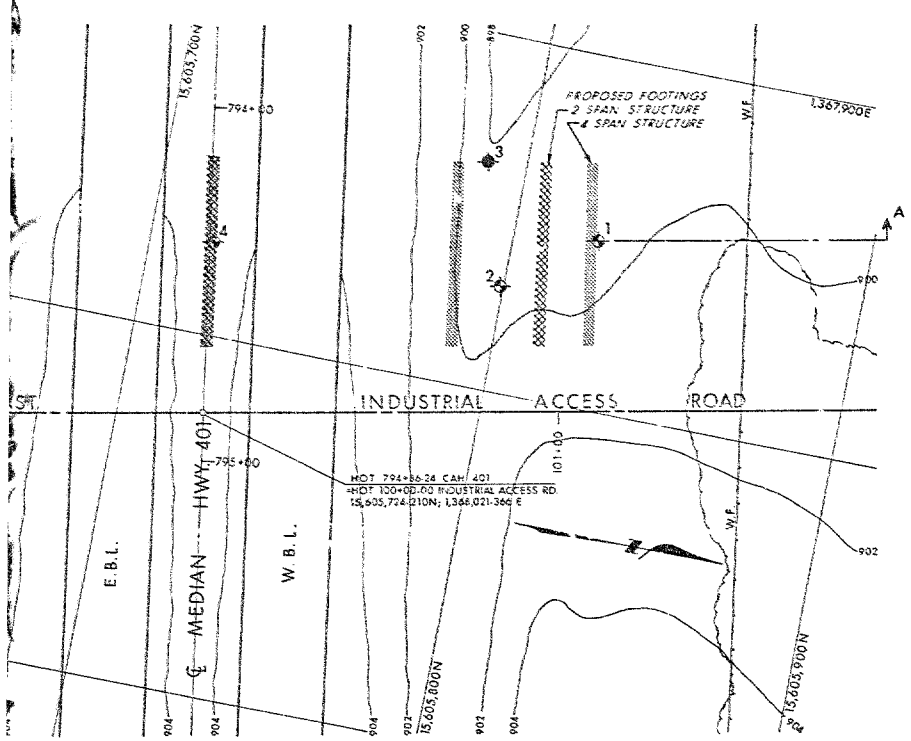

PLAN

SCALE

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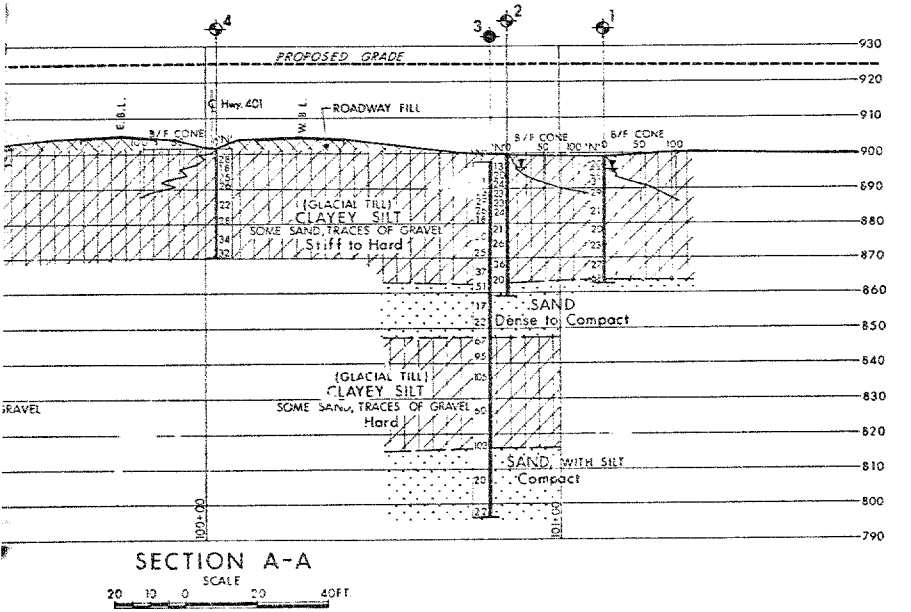

SECTION A-A

SCALE

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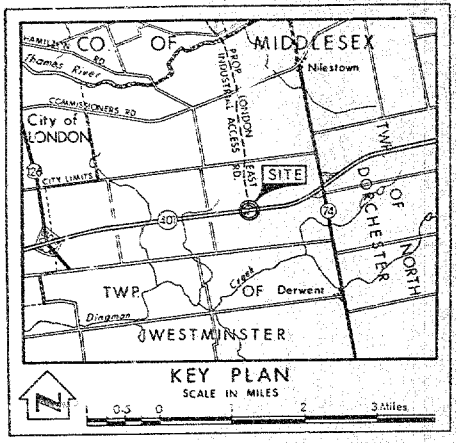


LEGEND

- Bore Hole
- Cone Penetration Test
- Bore Hole & Cone Test
- Water Levels established at time of field investigation. Nov. 1974 Water Levels in B.H. 3, 4 and 7 not established.

NO.	ELEVATION	CO-ORDINATES NORTH	CO-ORDINATES EAST
1	899.0	15,605,824	1,367,952
2	899.2	15,605,799	1,367,970
3	897.9	15,605,789	1,367,936
4	901.7	15,605,718	1,367,974
5	900.1	15,605,644	1,367,970
6	901.2	15,605,655	1,368,002
7	902.6	15,605,610	1,367,995

NOTE: FOR CONTRACT DOCUMENT
The complete foundation investigation report for this structure may be examined at the Structural Office and Foundations Office, Downsview, and at the LONDON District Office.

— NOTE —
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO
ENGINEERING SERVICES BRANCH - GEOTECHNICAL OFFICE

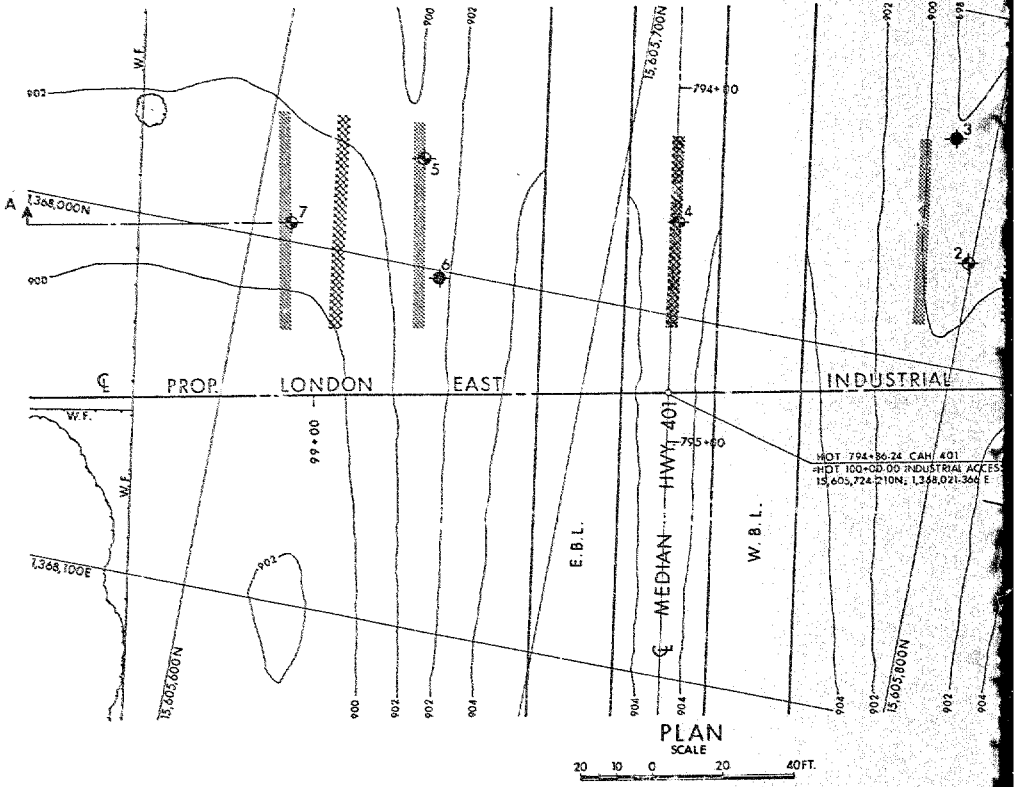
HIGHWAY 401
LONDON EAST INDUSTRIAL ACCESS ROAD

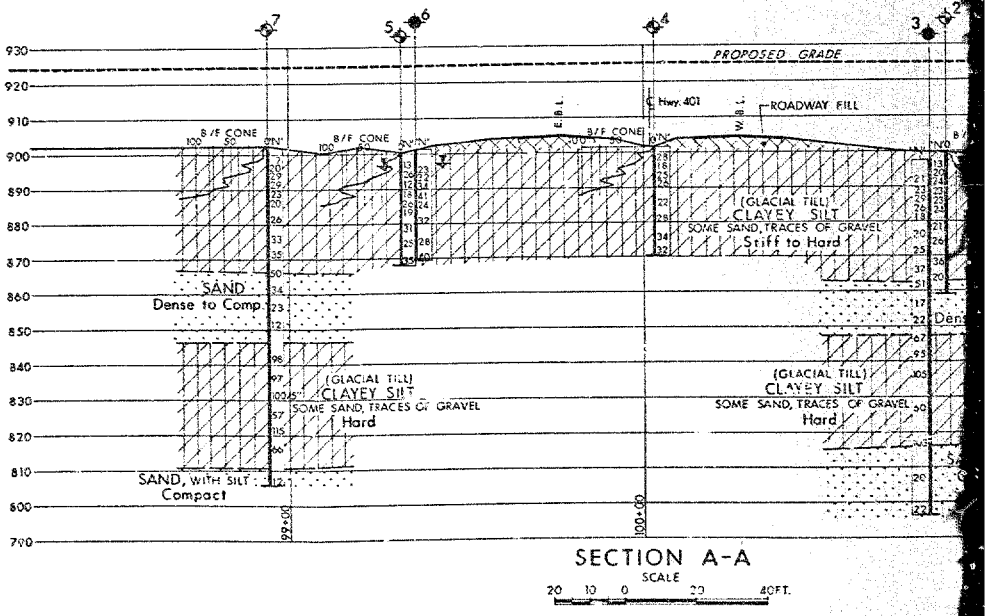
HIGHWAY NO. LOCAL DIST. NO. 2
CO. MIDDLESEX
TWP. WESTMINSTER LOT 5 CON II

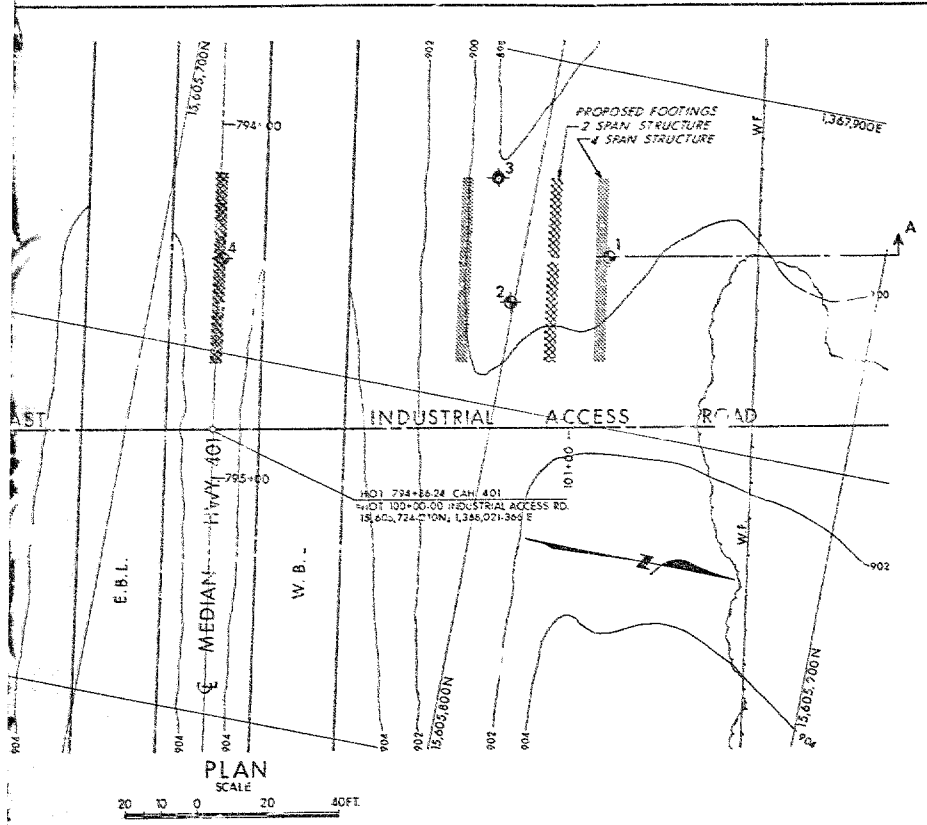
BORE HOLE LOCATIONS & SOIL STRATA

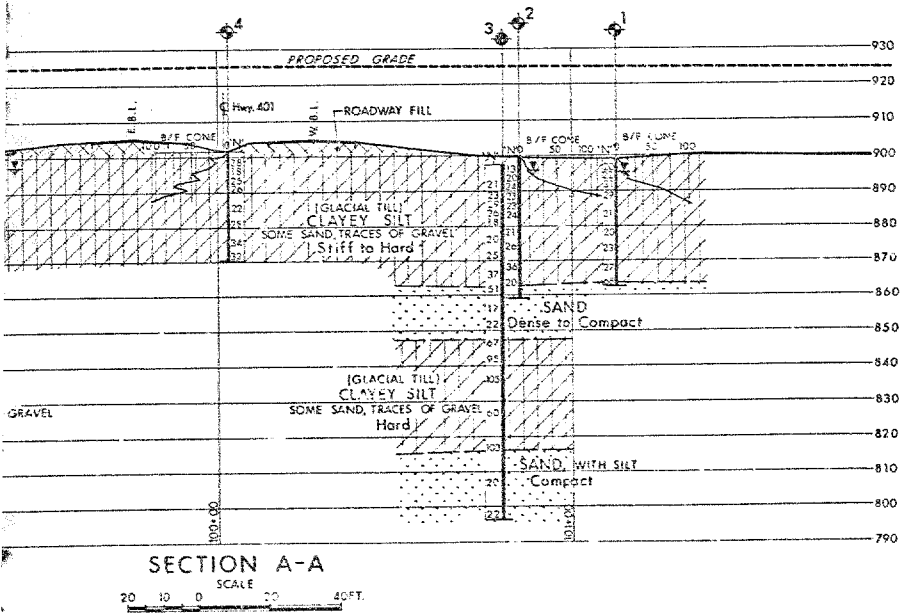
SUBMD. P.S.	CHECKED	W.P. NO. 32-73-02	DRAWING NO. 327302-A
DR. IN	CHECKED	W.O. NO.	
DATE Dec. 12, 1974		SITE NO. 19-515	BRIDGE DRAWING NO.
APPROVED		CONT. NO.	

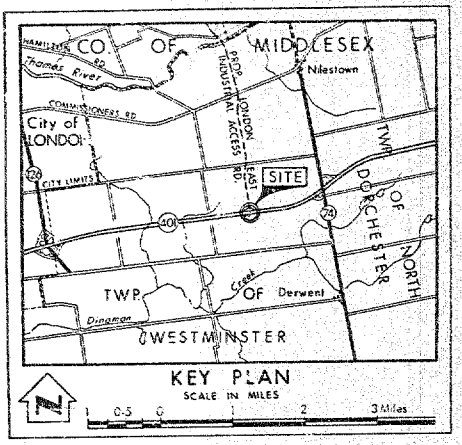
RSF. NO. E-5352-1 June 1974


W.F.
902
900
A
1,368,000N
7
6
5
4
3
2
℄ PROP. LONDON EAST INDUSTRIAL
W.F.
W.F.
99+00
794+80
795+60
15,605,700N
15,605,600N
15,605,800N
1,368,100E
902
900
E.B.L.
W.B.L.
℄ MEDIAN HWY. 401
MOT 794+86.24 CAH 401
MOT 100+00.00 INDUSTRIAL ACCESS
15,605,724.210N; 1,368,021.366 E
PLAN
SCALE
20 10 0 20 40FT.


PROPOSED GRADE
℄ Hwy. 401
E.B.L.
W.B.L.
ROADWAY FILL
B/F CONE
(GLACIAL TILL)
CLAYEY SILT
SOME SAND, TRACES OF GRAVEL
Stiff to Hard
SAND
Dense to Comp.
(GLACIAL TILL)
CLAYEY SILT
SOME SAND, TRACES OF GRAVEL
Hard
SAND, WITH SILT
Compact
930
920
910
900
890
880
870
860
850
840
830
820
810
800
790
99+00
100+00
SECTION A-A
SCALE
20 10 0 20 40FT.







LEGEND

- Bore Hole
- Cone Penetration Test
- Bore Hole & Cone Test
- Water Levels established at time of Field investigation. Nov. 1974. Water Levels in B.H. 3, 4 and 7 not established.

NO.	ELEVATION	CO-ORDINATES NORTH	CO-ORDINATES EAST
1	899.0	15,605,824	1,367,952
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3	897.9	15,605,789	1,367,936
4	901.1	15,605,716	1,367,974
5	900.1	15,605,644	1,367,970
6	901.2	15,605,655	1,368,002
7	902.6	15,605,610	1,367,995

NOTE: FOR CONTRACT DOCUMENT
The complete foundation investigation report for this structure may be examined at the Structural Office and Foundation Office, Downsview, and at the LONDON District Office.

— NOTE —
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS			
DATE	BY	DESCRIPTION	

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO
ENGINEERING SERVICES BRANCH - GEOTECHNICAL OFFICE

HIGHWAY 401
LONDON EAST INDUSTRIAL ACCESS ROAD

HIGHWAY NO. LOCAL DIST. NO. 2
CO. MIDDLESEX
TWP. WESTMINSTER LOT 5 CON. II

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD P.C.	CHECKED	W.P. NO. 32-73-02	DRAWING NO. 327302-A
DRAWN	CHECKED	W.O. NO.	
DATE Dec. 12, 1974	SITE NO. 19-515		BRIDGE DRAWING NO.
APPROVED	CONT. NO.		

REF. NO. E-5352-1 June 1974

Ministry of Transportation and Communications
Ontario

ENGINEERING SERVICES BRANCH
GEOTECHNICAL OFFICE

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 2 CONTRACT NO. 76-36 STRUCTURE W. P. NO. 32-73-02

CONTRACTOR BIRMINGHAM DESIGN LOAD OF PILE 25 TON / PILE

HAMMER DETAILS: TYPE BIRMINGHAM B22S WEIGHT 3000 LBS HEIGHT OF FALL OR ENERGY 9'

TYPE OF ANVIL OR CAP _____ WEIGHT OF ANVIL OR CAP 1100 LBS

PILE DETAILS STEEL TUBE PILES 12¾" X 1/4" BATTER: VERTICAL

PILE NO. 32 LOCATION NORTH ABUTMENT DATE DRIVEN AUG 16/76

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
25	1			26			51			76	
	2			27			52			77	
	3	6		28			53			78	
	4	9		29			54			79	
	5	9		30			55			80	
	6	10		31			56			81	
	7	11		32			57			82	
	8	11		33			58			83	
	9	14		34			59			84	
	10	16		35			60			85	
	11	16		36			61			86	
	12	16		37			62			87	
	13	19		38			63			88	
	14	18		39			64			89	
	15	19		40			65			90	
	16	20		41			66			91	
	17	20		42			67			92	
	18	22		43			68			93	
	19	22		44			69			94	
	20	28		45			70			95	
	21	26		46			71			96	
	22	26		47			72			97	
	23	28		48			73			98	
	24			49			74			99	
	25			50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	2	2	2	3	3	4
MEASURED REBOUND IN INCHES	1/4	1/4	1/4	1/4"	1/4"	3/8"

FINAL LENGTH OF PILE 25'6" FINAL CUT OFF ELEVATION 913.50

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED R J Warner
NAME (PRINT) R J WARNER
DATE AUG 16/76
ATTACH SKETCH OF PILE NUMBERING SYSTEM

GI-9 4-74
OB-MT-285 4-74

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 3/4" O.D. steel tube x 0.251" @ 33 lbs. per foot vertical. 12 3/4" x 1/2" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

Ontario Ministry of Transportation and Communications

ENGINEERING SERVICES BRANCH
GEOTECHNICAL OFFICE

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 2 CONTRACT NO. 76-36 STRUCTURE W.P. NO. 32-73-02

CONTRACTOR BURNING HAM DESIGN LOAD OF PILE 25 TON / PILE

HAMMER DETAILS: TYPE BURNING HAMMER B225 WEIGHT 3200 LBS HEIGHT OF FALL OR ENERGY 9'

TYPE OF ANVIL OR CAP _____ WEIGHT OF ANVIL OR CAP 1100 LBS

PILE DETAILS STEEL TUBE PILE 12 3/4" x 1/4" BATTER: VERTICAL

PILE NO. 14 LOCATION SOUTH ABUTMENT DATE DRIVEN AUG 17/76

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
25	1			26			51			76	
	2			27			52			77	
	3			28			53			78	
	4	4		29			54			79	
	5	5		30			55			80	
	6	5		31			56			81	
	7	8		32			57			82	
	8	9		33			58			83	
	9	10		34			59			84	
	10	13		35			60			85	
	11	14		36			61			86	
	12	14		37			62			87	
	13	21		38			63			88	
	14	25		39			64			89	
	15	24		40			65			90	
	16	25		41			56			91	
	17	24		42			67			92	
	18	24		43			68			93	
	19	24		44			69			94	
	20	24		45			70			95	
	21	22		46			71			96	
	22	27		47			72			97	
	23			48			73			98	
	24			49			74			99	
	25			50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	2	2	3	3	4	4
MEASURED REBOUND IN INCHES	1/4	1/4	1/4	1/4	3/8"	3/8"

FINAL LENGTH OF PILE 22' 9" FINAL CUT OFF ELEVATION 913.50

REPORT TO BE SENT TO:-

GEOTECHNICAL OFFICE
ATTENTION: PRODUCT & PROCESS IMPROVEMENT SECTION,
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS,
DOWNSVIEW, ONTARIO

SIGNED R J Wakner
NAME (PRINT) R J WAKNER
DATE AUG 17/76
ATTACH SKETCH OF PILE NUMBERING SYSTEM

01-9 4-74

4-74

OB-MT-285

NOTES:

In general this form should be completed for every tenth pile in a group, but at least one is required for every piet and abutment.

Piles driven vertically should be selected where possible.

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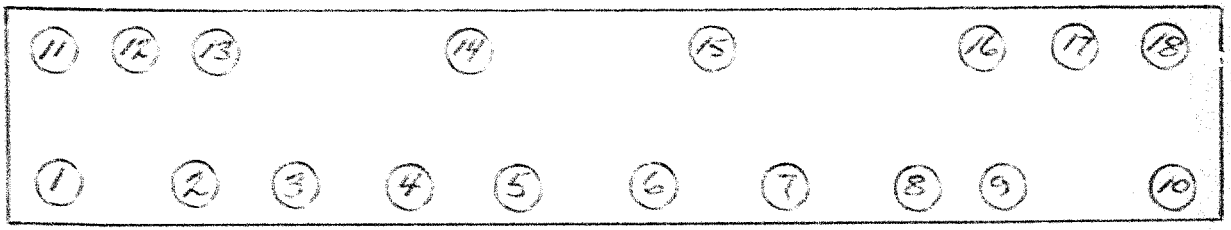
Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

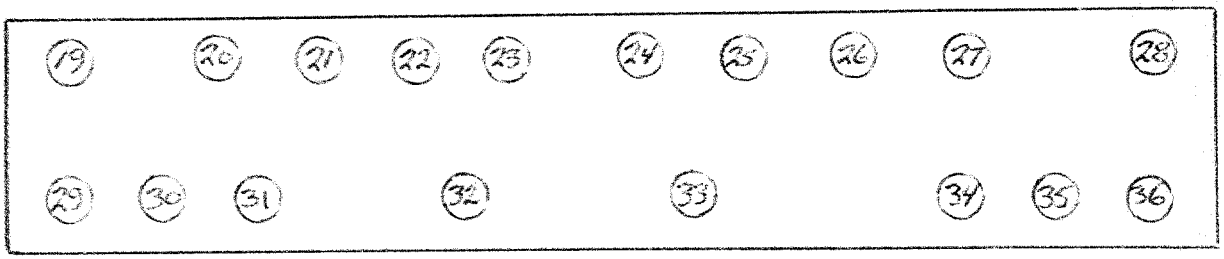
Measured rebounds recor_ d on this form must be the average for each individual inch for the final six inches of penetration.

SOUTH ABUTMENT



Hwy 401 EAST BOUND

Hwy 401 WEST BOUND



NORTH ABUTMENT

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. K. G. Selby, Supvrg. Eng.
Soil Mechanics Section
Geotechnical Office
West Bldg., Downsview

FROM: Structural Planning Office
Southwestern Region

ATTENTION:

DATE: September 11, 1974

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 32-73-02, Bridge Site 19-515
Highway 401 Interchange
London East Industrial Access Road
District 2, London

Would you kindly arrange to have a foundation investigation conducted at the above site.

I have enclosed two copies of the bridge site plan E-5352-1 with the probable footing locations marked in red.

S. Jants

S. Jants
Structural Planning Supervisor

SJ:sm
Enc.

cc A. Crowley

c.c. J. Anderson

RECEIVED
GEOTECHNICAL OFFICE
SEP 12 1974
SOIL MECHANICS
MINISTRY OF TRANSPORTATION & COMMUNICATIONS

Please send copy of this memo to J. Anderson.

Telephone:(416) 248-3282

Soil Mechanics Section,
Geotechnical Office,
West Building,
1201 Wilson Avenue,
DOWNSVIEW, Ontario. M3M 1J8

October 29th, 1974.

Atcost Drilling Inc.,
2160 Hwy. 7,
CONCORD, Ontario. L4K 1B6

Dear Sirs:

This letter confirms our request by telephone of October 28th, 1974, for the supply of an Auger Drill Machine (Item No. 5.2(c)), together with all necessary equipment, as per your Tender for Supply Contract S74-1577, at London, Ontario (London East Industrial Access Road and Hwy. 410) on October 31st, 1974.

Mobilisation will be from London, Ontario.

Our Project Number is W.P. 32-73-02.

Yours truly,

M. Devata,
Supervising Engineer.

MD/mj
c.c. W.W. Fry
(ATTN: Mrs. M. Porter)

Files
Documents

Mr. [illegible],
Regional Structural Planning Engineer,
Southwestern Region, London.

Soil Mechanics Section,
Geotechnical Office,
West Building, Downsview.

December 4th, 1974.

London East Industrial Access Road and Highway 401
Interchange Bridge, Township of Westminster,
District 22, London, W.P. 32-73-02, Site 19-515.

The Soil Mechanics Section recently completed an investigation of the abovementioned project. Due to the urgency of this project, we are sending you in summary form a brief description of the subsoil conditions at the site and our recommendations for foundation design.

It is proposed to construct a two-lane overpass for the London East Industrial Access Road to cross Highway 401. Two-span and a four-span structure are to be considered.

Soil Conditions.

Subsoil at the site consists of four distinct layers. The upper layer of about 35 feet consists of a heterogeneous mixture of clayey silt, some sand and a trace of gravel (glacial till). Its consistency is very stiff to hard. This layer is underlain by 15 to 20 feet of compact to dense fine sand which is in turn underlain by a hard layer consistency of clayey silt, some sand and a trace of gravel (glacial till.) The fourth and deepest layer penetrated consists of at least 15 feet of compact fine sand with silt.

Recommendations.

1. Four-Span Structure.

1.(a) Piers.

The piers may be supported on spread footing type foundations placed at or below the following elevations assuming a safe bearing pressure of 3 tons/sq.ft. for design purposes:

	Footing Elevation
North Pier	893
Centre Pier	896
South Pier	895

..... /2

(b) Abutments.

The abutments may be constructed within the approach fills and supported on steel tube piles (12-3/4" x 1/4") driven to approximate elevation 895. A design load of 75 tons per pile should be used for design purposes. Any horizontal loading should be resisted by battered piles.

(c) Settlements.

It is anticipated that the following longterm settlements will occur:

	Anticipated Settlement
Abutments	¾"
North Pier	1 "
Centre Pier	1½"
South Pier	1 "

Any bridge design should therefore have the ability to tolerate the resulting differential settlements.

A. Any or all of the above footings may be supported on steel H piles or 12-3/4" x 1/4" steel tube piles driven into the lower clayey silt layer. The maximum allowable design load for the particular section chosen may be used for design purposes. It is estimated that these piles would achieve the required design load at approximate elevation 840 ±.

II. Two-Span Structure.

The recommendations listed in I. for the Four-Span Structure may be applied where applicable to the Two-Span Structure. It is, however, anticipated that because of the greater load on the centre pier the total long-term settlement there may be as much as two inches.

Groundwater Conditions.

The groundwater level was found to be approximately elevation 895 which is about 4 feet below the ground surface. No dewatering problems are, however, anticipated for footing excavation due to the cohesive relatively impervious nature of the upper subsoil stratum.

...../3

Approach Fills.

No stability problems are anticipated with the required 25-foot embankment fills if two to one slopes are employed. Care, however, should be taken that no material exceeding 3-inch grain size is placed in the fills through which piles have to be driven.

The complete report will be forwarded to you as soon as possible. Please do not hesitate to call us if you have any questions on the recommendations.

Peter Stuart,
Project Engineer,
For: K.G. Selby,
Supervising Engineer.

PS/sj
c.c. . Crowley,
J. ndersen,
J. Lean,
..Wittenberg.

Ministry of Transportation and Communications
Ontario

Memorandum

To: Mr. A.P. Natt,
Reg. Structural Planning Engineer,
Structural Planning Office,
London Region.

From: Structural Office,
West Building,
Downsview, Ontario.

Attention:

Date: May 7, 1975.

Our File Ref.

In Reply to

Subject:

Highway 401 Interchange ~~Underpass~~
W.P. 32-73-02, Site 19-515
Hwy. L.E.I.A.R., District #2

Attached herewith are prints of the detailed Preliminary Bridge Plan Drawing 19-515-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is $380,000.00 which includes tender, materials, engineering, and sundry construction.

Any comments or revisions you may have should be submitted at your earliest convenience.

Walter Lin

W. Lin,
Reg. Structural Design Eng.
for: C.S. Grebski,
Structural Design Engineer.

WL/CSG/ac
Attach.

c.c. B.R. Davis
W.D. Birch
A.E. McKim
W. McFarlane
J. Keen
M. Stoyanoff
C. Mirza
J. Anderson
A. Crowley
S. Edwards

no comments
PP
May 14/75

Ministry of Transportation and Communications
Ontario

Memorandum

To: Mr. C. Mirza,
Head, Soil Mechanics Section,
West Building, Downsview.

From: Structural Office,
West Building, Downsview.

Attention:

Date: September 10th, 1975.

Our File Ref.

In Reply to

Subject:

Highway 401 Interchange O'pass,
W.P. # 32-73-02 Site # 19-515
Highway #L.E.I.A.RDistrict # 2

Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure. Kindly give us your comments at your earliest convenience.

C. S. Grebski,
Structural Design Engineer.

CSG/cf
Attch.

finalized
Sept 16/75
New LEIAR
Queensway 100

RECEIVED
SEP 10 1975
SOIL MECHANICS

NO COMMENTS!
SEP. 23/75 PP

Ontario Ministry of Transportation and Communications

Memorandum

Cont. 76-36.

To: Mr. A. Wittenberg,
Regional Manager,
Reg. Planning and Design,
London Regional Office.

Attention:

From: Structural Office,
West Building,
Downsview, Ontario.

Date: September 24, 1975.

Our File Ref.

In Reply to

Subject: W.P. 32-73-02, Site 19-515, ~~Hwy. 401~~ Hwy 401 & Hwy 100 (LGH/3)
Hwy. 401 Underpass,
Hwy. 100, District 2.

Please find enclosed four sets of prints of drawings 19-515-1, -3 to -16 for your use.

One print of drawing 19-515-1 is being forwarded to the Systems Design Project Review Section.

One set of prints is also being forwarded to the following:

Estimating Section
Regional Structural Planning
Assistant Construction Engineer (Structures)
District
Structural Maintenance Engineer

The D4 and Special Provisions were mailed to you previously.

N. Ziltay,
Structural Contract
Specifications Engineer.

NZ/ds
Encl.

C.C. J. Wear
B. Giroux
A. Watt
A.E. McKim
L.E. Walker
W. Birch
C. Mirza
A. Crowley
J. Anderson

RECEIVED
GEOTECHNICAL OFFICE
SEP 25 1975
SOIL MECHANICS
MINISTRY OF TRANSPORTATION & COMMUNICATIONS

Mr. C. S. Grebski
Structural Design Eng.
West Bldg., Downsview

Soil Mechanics Section
West Bldg., Downsview

September 24, 1975

Highway 401 Interchange U'Pass
W.P. 32-73-02; Site: 19-515
Hwy. #100 (Formerly L.E.I.A.), Dist. 2

We have reviewed the final bridge drawings (Sheet 1 and 3) for the above project. The Designer appears to have followed the recommendations contained in the Foundation Report issued on December 18, 1974.

P. Payer
Senior Engineer
For: K. G. Selby
Supervising Eng.

PP/bp

cc: Files
Record Services

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 40I-14-107

DIST. 2 REGION SOUTH WESTERN

W.P. No. 32-73-62

CONT. No. 76-36

W. O. No.

STR. SITE No. 19-515

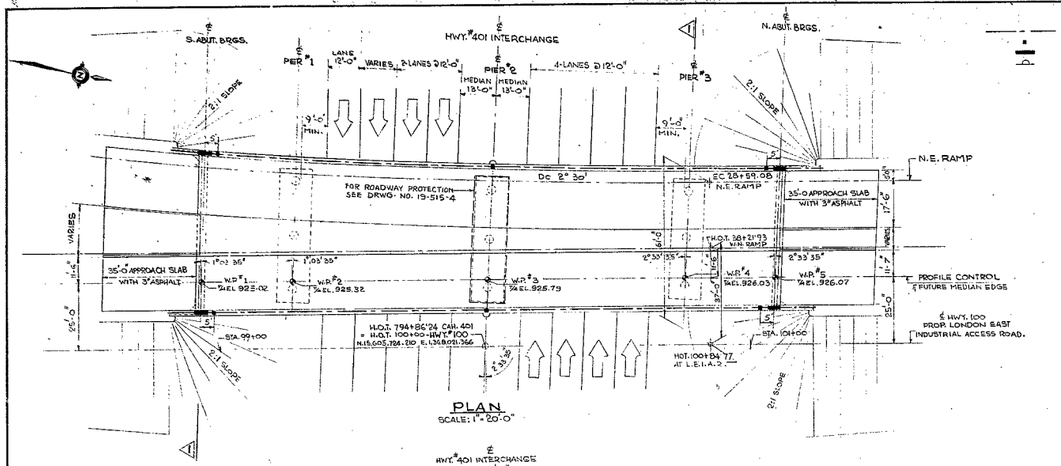
HWY. No. 401

LOCATION Hwy 401 : London East Industrial Access Road

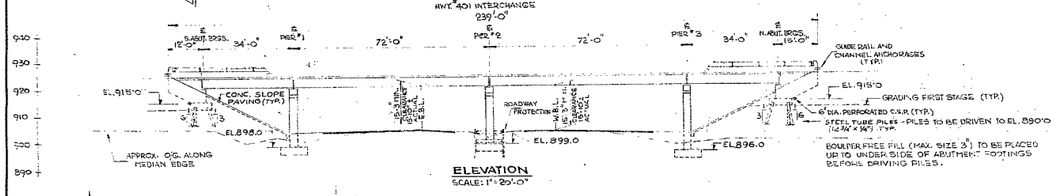
OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT 2

REMARKS: (2) documents to be unfolded before microfilming

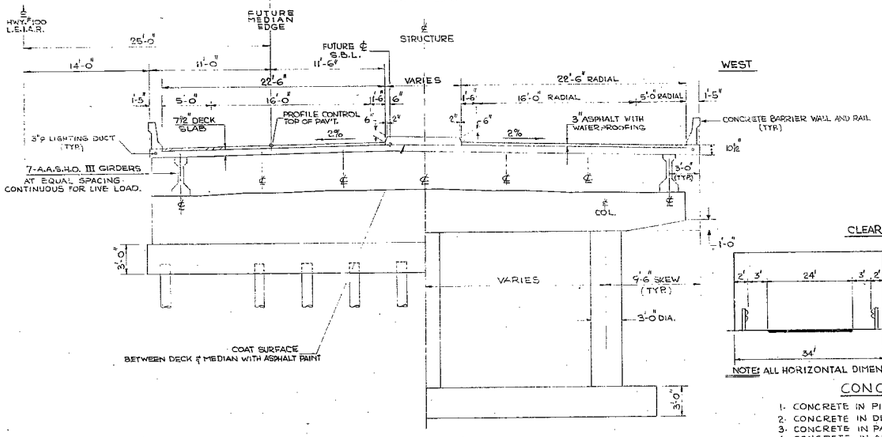
GI-20 SEPT. 1976



PLAN
SCALE: 1" = 20'-0"

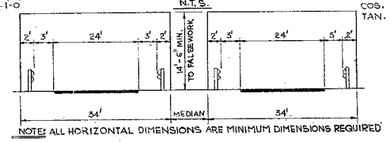


ELEVATION
SCALE: 1" = 20'-0"



SECTION ⚠ N.T.S.

CLEARANCE DIAGRAM
N.T.S.



NOTE: ALL HORIZONTAL DIMENSIONS ARE MINIMUM DIMENSIONS REQUIRED

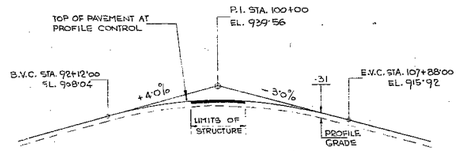
CONCRETE QUANTITIES

1. CONCRETE IN PIERS, ABUTMENTS AND WINGWALLS	—	234 CU. YD.
2. CONCRETE IN DECK AND DIAPHRAGMS	—	413 CU. YD.
3. CONCRETE IN PARAPET WALLS	—	42 CU. YD.
4. CONCRETE IN APPROACH SLABS	—	151 CU. YD.
5. CONCRETE IN PILES	—	27 CU. YD.
6. CONCRETE IN SLOPE PAVING	—	69 CU. YD.

LEGEND

- 3" DIA. ASBESTOS CEMENT TYPE I CONDUIT
- 8" x 8" x 7¼" RIGID P.V.C. JUNCTION BOX
- ASBESTOS CEMENT EXPANSION COUPLING
- POLE BASE (16" B.C.D.)

THESE DETAILS TO BE USED IN CONJUNCTION WITH DRAWING NO 19-515-16

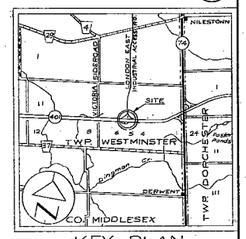


V.C. = 900
L.V.C. = 1576 FT.

PROFILE OF PROPOSED HWY.# 100
(LONDON EAST INDUSTRIAL ACCESS ROAD)
N.T.S.

B.M. 904-03

GEODETIC DATUM
N. & W. IN N.E. ROOT OF 2" ASH
639' Rt. OF STA. 98+74'0



KEY PLAN
0 5M. 0 10MI.

GENERAL NOTES:

CLASS OF CONCRETE:
AASHO. III GIRDERS ---------- 5000 P.S.I.
DECK, BARRIER WALLS AND PIERS ---------- 4000 P.S.I.
PIER FOOTINGS, ABUTMENT FOOTINGS, ABUTMENTS AND APPROACH SLABS ---------- 3000 P.S.I.

CLEAR COVER TO REINFORCING STEEL:
DECK: TOP 2" BTM. 1"
CONCRETE BARRIER WALLS: 1½"
APPROACH SLABS: 2"
REMAINDER: 3"

CONSTRUCTION NOTES:

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF ± 1/8". NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.

LIST OF DRAWINGS:

SKEW DATA - 1° 03' 35"
SIN. ·01849458
COS. ·99982896
TAN. ·01849775

SKEW DATA - 2° 33' 35"
SIN. ·04466072
COS. ·99900221
TAN. ·04470532

40 I 14-107
GEOGRES No.

REVISIONS		
DATE	BY	DESCRIPTION

PRINT RECORD		
No.	FOR	DATE

FOR REDUCED PLAN
USE SCALE BELOW
10 11 12 13
3 INCHES ON ORIGINAL PLAN

JOSEPH SERSEC — PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

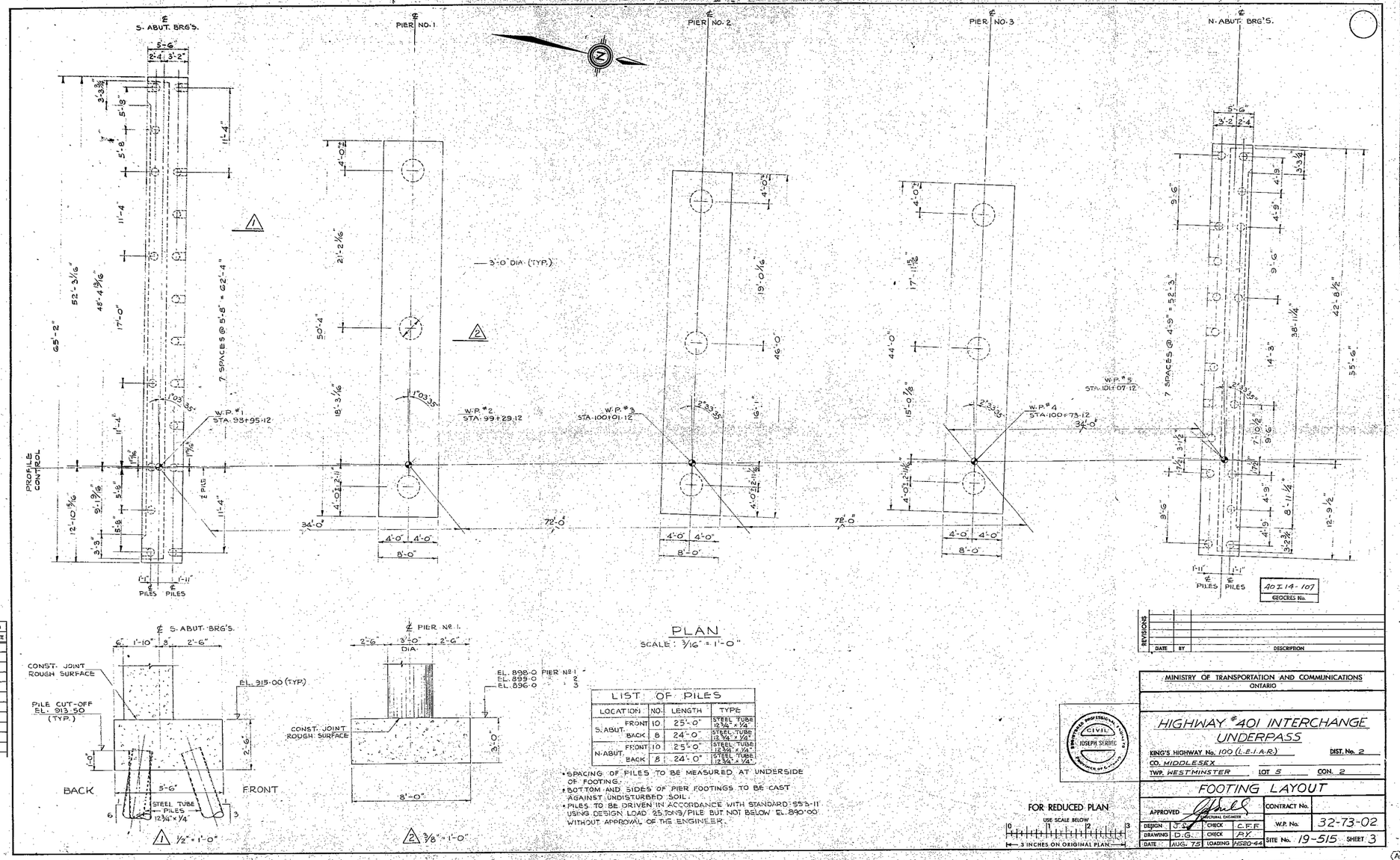
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

HIGHWAY # 401 INTERCHANGE
UNDERPASS

KING'S HIGHWAY No. 100 (L.E.I.A.R.) DIST. No. 2
CO. MIDDLESEX
TWP. WESTMINSTER LOT 5 CON. 2

GENERAL PLAN

APPROVED		CIVIL ENGINEER		CONTRACT No.	
DESIGN	J.E.	CHECK	C.F.F.	W.P. No.	32-73-02
DRAWING	A.	CHECK	J.E.		
DATE	AUG. 1975	LOADING	MS20-44	SITE No.	19-515 SHEET 1



PLAN
SCALE: 3/16" = 1'-0"

℄ S. ABUT. BRG'S.

CONST. JOINT ROUGH SURFACE
PILE CUT-OFF EL. 913.50 (TYP.)
EL. 915.00 (TYP.)
BACK
FRONT
STEEL TUBE PILES 12 3/4" x 1/4"

℄ PIER No. 1

CONST. JOINT ROUGH SURFACE
EL. 898.0 PIER No. 1
EL. 899.0 2
EL. 896.0 3
8'-0"

LIST OF PILES			
LOCATION	NO.	LENGTH	TYPE
S. ABUT. FRONT	10	25'-0"	STEEL TUBE 12 3/4" x 1/4"
S. ABUT. BACK	8	24'-0"	STEEL TUBE 12 3/4" x 1/4"
N. ABUT. FRONT	10	25'-0"	STEEL TUBE 12 3/4" x 1/4"
N. ABUT. BACK	8	24'-0"	STEEL TUBE 12 3/4" x 1/4"

- SPACING OF PILES TO BE MEASURED AT UNDERSIDE OF FOOTING.
- BOTTOM AND SIDES OF PIER FOOTINGS TO BE CAST AGAINST UNDISTURBED SOIL.
- PILES TO BE DRIVEN IN ACCORDANCE WITH STANDARD S.S.S.-11 USING DESIGN LOAD 25 TONS/PILE BUT NOT BELOW EL. 890.00 WITHOUT APPROVAL OF THE ENGINEER.

PRINT RECORD		
No.	FOR	DATE

FOR REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

PROFESSIONAL ENGINEERS ACT — CIVIL — JOSEPH SERBIS

REVISIONS		
DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

HIGHWAY #401 INTERCHANGE UNDERPASS

KING'S HIGHWAY No. 100 (L.E.I.A.R.) DIST. No. 2
CO. MIDDLESEX
TWP. WESTMINSTER LOT 5 CON. 2

FOOTING LAYOUT

APPROVED _____ STRUCTURAL ENGINEER

DESIGN	J.S.	CHECK	C.F.F.
DRAWING	D.G.	CHECK	P.Y.
DATE	AUG. 73	LOADING	HS20-44

CONTRACT No.
W.P. No. 32-73-02
SITE No. 19-515 SHEET 3

40 I 14-107
GEOCRES No.