

MEMORANDUM

TO: Mr. G. C. E. Burkhardt, (2)  
Regional Structural Planning Eng.,  
Central Region,  
90 Floral Pkwy., Downsview.

FROM: Foundations Office,  
Design Services Branch,  
West Bldg., Downsview.

ATTENTION:

DATE: February 26, 1973.

OUR FILE REF.

IN REPLY TO MAR - 1 1973

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
Jockey Club Road Bridge  
Prop. Wingwall Extensions  
District No. 6 (Toronto)  
W.O. 72-11161 - W.P. 131-71-01

CONT 73-56 site 37-176

30 M11 - 110

CONTROL NO.

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.

AGS/ao  
Atch.

cc: E. J. Orr  
B. R. Davis  
A. Rutka  
R. S. Pillar  
H. Greenland  
B. J. Giroux  
C. Mirza

G. A. Wrong  
B. A. Singh  
C. L. Parker Ltd.  
Foundations Files  
Documents

*Alfonso*  
A. G. Stermac,  
PRINCIPAL FOUNDATIONS ENGINEER.

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FOUNDATION INVESTIGATION REPORT

For

Jockey Club Road Bridge

Prop. Wingwall Extensions

District No. 6 (Toronto)

W.O. 72-11161 -- W.P. 131-71-01

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1. INTRODUCTION:

A memo requesting a foundation investigation at the location of the above project was received from Mr. G.C.E. Burkhardt, Regional Structural Planning Engineer, on January 29, 1973.

A field investigation was subsequently carried out by the Foundations Office to determine the subsoil and groundwater conditions at the site of the proposed wingwall extensions.

This report contains the results of our field and laboratory investigations, together with our recommendations pertaining to the design of foundations for the proposed wingwall extensions.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site under investigation is situated on Hwy. #27 approximately 1.2 miles north of Dixon Rd.

The topography of the surrounding area is flat to gently undulating and has been utilized for small industrial developments.

Physiographically this area is situated in the region known as the "Peel Plain". The characteristic deposit in this region is a ground moraine laid down during the Wisconsin Glacial Period.

3. FIELD AND LABORATORY INVESTIGATION:

During the course of the investigation, four sampled

boreholes and four adjacent dynamic cone penetration tests were carried out. All holes were advanced using a continuous flight auger adapted for soil sampling purposes.

Disturbed samples were obtained using a 2" O.D. split-spoon sampler; the energy used for driving, conformed to the requirements of the Standard Penetration Test.

Vane tests were carried out, where possible, 12 inches below the sample depths.

Samples were visually examined in the field and subsequently in the laboratory. Following this examination, laboratory tests were carried out on selected samples to determine the following engineering properties of the overburden.

1. Natural Moisture Content
2. Atterberg Limits
3. Grain-Size Distribution

The results of field and laboratory tests are shown on the Record of Borelog sheets.

Plots of Plasticity Index vs. Liquid Limit and typical grain-size distribution curves are shown in Figs. 1 to 2 of the report Appendix.

The locations and the elevations of boreholes are given on Dwg. No. 72-11161A, which is also contained in the Appendix of this report.

#### 4. SUBSOIL CONDITIONS:

##### 4.1) General:

The subsoil at this site consists of 2.5 - 4.5 ft. of fill that can be classified as clayey silt with sand and traces of gravel followed by a deposit of clayey silt to silty clay with traces of sand and gravel extending down to a depth of some 23 feet below the top of the fill and overlying a very dense deposit of silty sand to sandy silt with traces of gravel. Detailed descriptions of the various soil types encountered in each borehole are given on the Record of Borehole sheets. The estimated stratigraphical profile of Dwg. #72-11161A, is based upon this information.

From ground level downwards, the description of the deposits is as follows:

4.2) Fill Material:

This material, identified as clayey silt with sand, was found in all four boreholes and extended to a depth of 2.5 - 4.5 feet.

"N" values ranged from 10 blows/ft. to 66 blows/ft.

4.3) Clayey Silt to Silty Clay with Traces of Sand & Gravel:

This deposit extends from beneath the fill for an average depth of about 20 ft.

Physical properties of the material in the deposit, as determined from laboratory tests, are summarized as follows:

Moisture Content %	9.5 to 34
Liquid Limit %	16 to 47
Plastic Limit %	11 to 23

Vane tests throughout the whole deposit gave undrained shear strength values ranging from 1000 p.s.f. to over 2000 p.s.f., and sensitivity values from 2.1 to 3.1, indicating a firm to very stiff consistency.

4.4) Silty Sand to Sandy Silt with Traces of Gravel:

Underlying the cohesive stratum is a layer of a very dense silty sand to sandy silt with traces of gravel.

This deposit was encountered in all four boreholes at approximate elevation 509.5, and all boreholes were terminated in this stratum.

Physical properties as determined from laboratory tests are as follows:

Grain-Size Distribution

Gravel %	5 to 9
Sand %	26 to 43
Silt %	48 to 63
Clay %	2 to 6
Moisture Content %	7 to 18

Typical grain-size distribution curves are given in the Appendix of this report in Fig. #2.

The relative density of the deposit, based on the results of the Standard Penetration Tests, is estimated to be very dense, with the "N" values varying from 54 blows/ft. to more than 100 blows/2 inches and generally increasing with depth.

#### 5. GROUNDWATER CONDITIONS:

Groundwater levels in the boreholes observed at the close of operations, were found to be as follows:

B.H. #1	531.4	B.H. #3	530.0
B.H. #2	530.9	B.H. #4	Not Observed

It must be noted that the above groundwater levels may not represent the true groundwater conditions due to melting snow, the relatively impermeable nature of the subsoil and the short duration of the field work.

#### 6. DISCUSSION AND RECOMMENDATIONS:

##### 6.1) General:

In conjunction with the proposed reconstruction of the C.N.R. Subway it is proposed to lower the grade of the existing Hwy. #27 to obtain increased clearance for the new C.N.R. structure. Due to the proximity of the adjacent Jockey Club structure which is some 200 ft. north of the C.N.R. structure a 3 ft. drop in grade will be necessary here. It will, therefore, be necessary to extend the existing wingwalls of the existing Jockey Club Road bridge by some 10 ft.

It is known that the wingwalls are supported on piles while the remainder of the structure is supported on spread footings. The length of the piles under the wingwalls are not known.

Recommendations concerning the foundations for the proposed wingwall extensions are as follows:

The new extensions to the wingwalls should be founded on piles end bearing within the very dense silty sand to sandy

silt stratum. For this purpose steel 'E' piles would be the most practical and should achieve the maximum allowable capacity for the particular steel section adopted if driven to approximate elevation 505.0. Piles should be driven in accordance with Standard BD 82-7. It would be advisable to construct a vertical expansion joint between the existing and new portions of the wall. Pile caps should be constructed so as to provide at least 4 ft. of earth cover for frost protection. No dewatering problems are anticipated for excavations carried out within the relatively impermeable clayey silt stratum.

7. MISCELLANEOUS:

The field work, performed during the period from February 5 to 8, 1973, together with preparation of this report was undertaken by Mr. H. Szymanski.

Equipment used was owned and operated by Canadian Longyear Ltd.

The report was reviewed by Mr. K. G. Selby, Supervising Foundations Engineer.

  
H. Szymanski



K. G. Selby, P. Eng.

HS/ao

Feb. 23, 1973.

APPENDIX I



DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

## RECORD OF BOREHOLE NO 1

JOB 72-11161

LOCATION Station 370+23, 44' RT. 7 Hwy. 27

ORIGINATED BY H.S.

W.P. 131-71-01

BORING DATE February 5, 1973

COMPILED BY H.S.

DATUM Geodetic

BOREHOLE TYPE Pendrill

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100	LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$ $w_p$ — $w$ — $w_L$	WATER CONTENT % 20 40 60	BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT						
533.0	Ground Level										
529.5	Clayey Silt with Traces of Gravel		1	SS	66	530					GR. SA. SILT CL.
529.5	Clayey Silt to Silty Clay with Traces of Sand and Gravel		2	SS	24						
			3	SS	12						
			4	SS	15						
	Very Stiff - Grey		5	SS	20						
509.5			6	SS	14	510					
509.5	Silty Sand to Sand		7	SS	100	6"					9 29 57 5
502.5	Silt with Traces of Gravel										
502.5	Very Dense. Grey		8	SS	100	6"					
500.5	End of Borehole					500					

DESIGN SERVICES BRANCH

## RECORD OF BOREHOLE NO2

FOUNDATIONS OFFICE

JOB 72-11161

LOCATION Station 369+20. 42.5' RT. of Hwy. 27

ORIGINATED BY J.L.S.

W.P. 131-71-01

BORING DATE February 6, 1973

COMPILED BY H.S.

DATUM Geodetic

BOREHOLE TYPE Pendrill

CHECKED BY C.S.

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE			LIQUID LIMIT — W <sub>L</sub>			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	BLOWS/FOOT	20 40 60 80 100	PLASTIC LIMIT — W <sub>P</sub>	WATER CONTENT — W	W <sub>P</sub> — W — W <sub>L</sub>		
532.5	Ground Level												
530.0	5' Gravel Fills Nat.												
529.0	Clayey Silt with Traces of Sand and Gravel Very Stiff-Grey		1	SS	22	530							
			2	SS	21								
			3	SS	11								
			4	SS	14	520							
			5	SS	9								
			6	SS	40								
509.0	Silty Sand to Sand					510							
508.5	Silt with Traces of Gravel		7	SS	139	511"							9 36 50 5
502.0	Very Dense - Grey		8	SS	100	5"							
500.0	End of borehole					500							

RECORD OF BOREHOLE No 3

JCE 72-11161

LOCATION: Station 370+67 c/s 41' LT. @ Hwy. 27

ORIGINATED BY H.S.

W.P. 131-71-01

BOOKING DATE February 5 1973

COMPILED BY H.S.

DATUM Generic

BOREHOLE TYPE      Pendrill

CHECKED BY \_\_\_\_\_

15  $\pm$  5 % STRAIN AT FAILURE

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

## RECORD OF BOREHOLE NO 4

JOB 72-11161

LOCATION Station 369+46, 42.5 Lt. &amp; Hwy. 27

ORIGINATED BY H.S.

W.P. 131-71-01

BORING DATE February 8, 1973

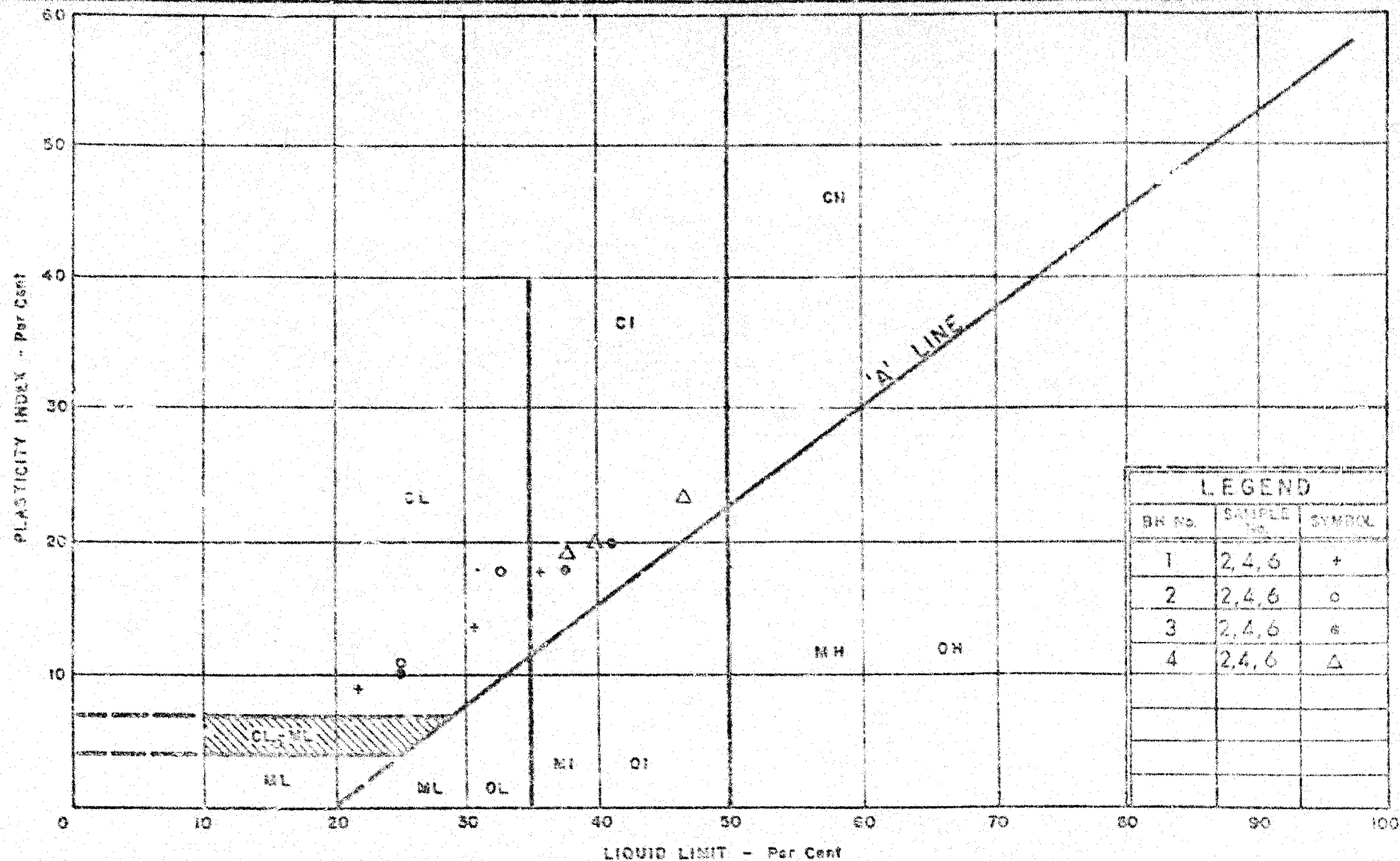
COMPILED BY H.S.

DATUM Geodetic

BOREHOLE TYPE Pendrill

CHECKED BY

SOIL PROFILE			SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$			BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE		20	40	60	80	100	$w_p$	$w$	$w_L$		
533.0	Ground Level														
530.5	Clayey Silt with traces of gravel		1	SS	20										
			2	SS	19										
			3	SS	15										
			4	SS	14										
			5	SS	11										
			6	SS	10										
509.5	Silty Sand to Sand		7	SS	65										
502.5	Silt with traces of gravel, V. dense Grey		8	SS	100										
500.0	End of Borehole														



LEGEND		
BR No.	SAMPLE No.	SYMBOL
1	2, 4, 6	+
2	2, 4, 6	o
3	2, 4, 6	*
4	2, 4, 6	Δ

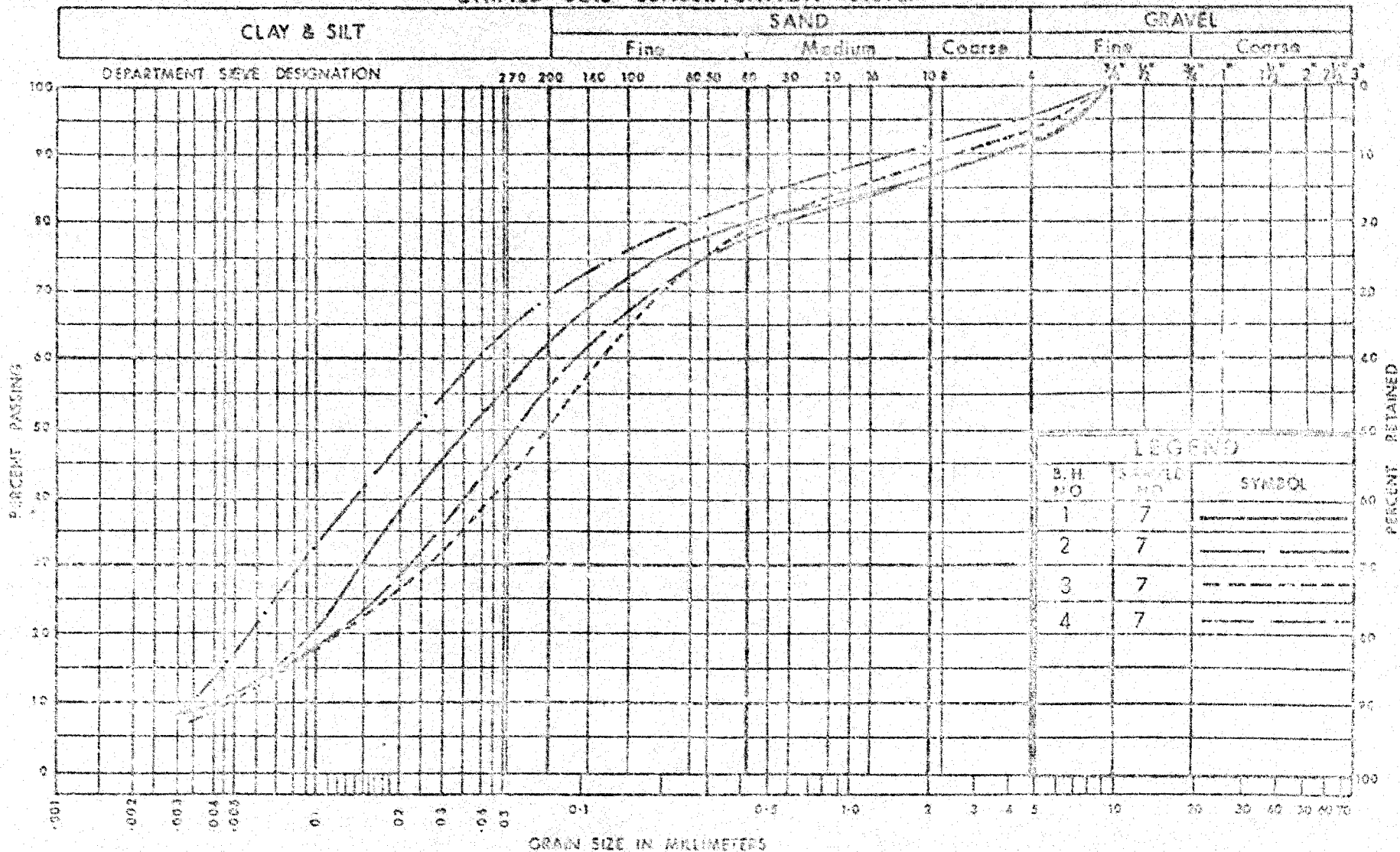


DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

# PLASTICITY CHART CLAYEY SILT TO SILTY CLAY WITH TRACES OF SAND & GRAVEL

MR No. 131-71-01  
JOB No. 72-11161  
FIG. No. 1

# UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT  
OF  
TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES  
BRANCH

GRAIN SIZE DISTRIBUTION  
SANDY SILT  
WITH TRACES OF GRAVEL

REF. 131-71-01  
JOB NO. 72-11161  
FIG. No. 2





AND ASSOCIATES

72-F-161 **AGS**  
C. C. PARKER AND ASSOCIATES LIMITED  
CONSULTING PROFESSIONAL ENGINEERS  
688 QUEENSDALE AVE. E., HAMILTON  
(416) 385-3234

L8V 1M1

April 26, 1973.

Mr. K. G. Selby,  
Supervising Foundations Engineer,  
Foundations Office,  
Ministry of Transportation & Communications,  
West Building,  
Downsview, Ontario.

Dear Sir:

Re: C.N.R. Subway Highway 27

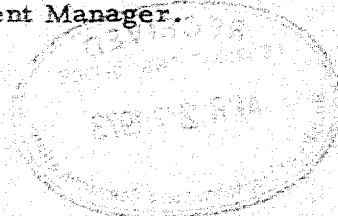
As I agreed at the Contract Review Meeting on April 13, 1973, I am sending you herewith one print each of sheets 12 and 13. These sheets show the insulation and frost protection at the abutments of the Jockey Club Bridge and the new retaining walls.

Yours truly,

C. C. PARKER & ASSOCIATES LIMITED

D. C. Cramm, P. Eng.,  
Bridge Department Manager.

DCC/jw  
Encl.



LONDON

OTTAWA

PORT OF SPAIN, TRINIDAD.

MEMORANDUM

72-11161 ✓

TO: FILE .

FROM: I. Weinberg,  
Co-Ordinator.

ATTENTION:

DATE: March 19, 1973.

OUR FILE REF.

IN REPLY TO

SUBJECT:

RE: W.P. 131-71-01,  
Highway 27, at C.N.R. Subway.

Minutes of Meeting - Thursday March 15, 1973,  
C.C. Parker, Hamilton Office.

In Attendance:	C.C. Parker:	R. Lewis,
		D. Cramm,
		E. Wilson,
	M.T.C.:	G. Burkhardt,
		K. Selby,
		I. Tremain,
		D. Taylor,
		D. Bye,
		I. Weinberg.

O.J.C. Structure

The O.J.C. structure is not a rigid frame as previously suspected, but is built on footings on piles and its thrust is outward. Thus, excavation in front of the west side footing for sewer installation can be done without fear of structure movement.

Widening Under O.J.C. Structure

As much additional widening as possible beyond the 2 lanes on the east side under the O.J.C. structure is desirable to serve as deceleration area for the O.J.C. exit ramp. The elevation of the existing O.J.C. structure footings will be about the same elevation of the road widening thus resulting in very little coverage over the footing and protection from frost. It was decided that two alternatives are possible:

- (a) use of styrofoam,
- (b) adding of concrete under the existing footing to build the footing depth up to an acceptable dimension. Mr. Selby stated that frost penetrates about 4' and the footing (according to the O.J.C. structure drawings) is 2.5 feet. Mr. Selby is to arrange to have the footing depth (both west and east side) measured and then recommend whether (a) or (b) above should be followed.

C.C. Parker is to proceed on basis of widening under the structure on east side up to face of footing as either (a) or (b) above will permit the widening.

con't...



### Median Treatment

I. Weinberg to check on use of Fitch barrels at new pier considering the barrels will be placed on the median. I. Weinberg also to check on whether construction drawings being prepared should show conduit location for "keep right" illuminated signs at median ends. (Illumination Section to be contacted.)

### Addition to O.J.C. Structure Retaining Wall (East Side)

- due to road widening as stated above in "Widening under O.J.C. structure", existing retaining wall on east side will have to be lengthened to retain fill. Existing wall is on piles. Question of having "addition" on piles as well was discussed.
- pile driving equipment even for the few piles involved, about \$20,000.
- possible restricted vertical clearance due to existing hydro line.
- spread footings to be investigated by K. Selby considering that soil bearing ability is poor but that perhaps extra wide footings could accomplish requirement.

### Miscellaneous

- specifications to indicate that precast manholes to be used on east and west side of highway under new structure to keep installation time to a minimum.
- R. Lewis to send suitable prints of east service road turnaround ("removal" and "new construction") to I. Weinberg for forwarding to Etobicoke.
- Consultants to meet with Etobicoke Hydro to consider temporary power shut-off while cranes are working in area for deck erection.
- I. Weinberg to contact Etobicoke re: night work and anti-noise by-law.
- I. Weinberg to contact M.T.C. Head Office Scrutiny and Regional Audit to alert them regarding the project and the tight schedule being followed. Purpose is to ascertain if any information can be delivered to these offices in advance of Reviews to head-off any possible issues that could cause delays or re-design.
- I. Weinberg to advise R. Lewis as to number of prints of Contract drawings required for Reviews. Also to alert district and regional offices of short time interval between receiving of plans and Review date.
- "special provisions" will have to include ones that C.N.R. want even though they are not exactly like M.T.C. specials.
- "special provisions" to have clause that Contractor be responsible to C.N.R. for 1 year re: maintenance, even after District Engineer accepts contract as completed.
- special provision needed for deck removal (night work operation).
- special provision needed for protection during removal of existing pier and construction of new pier (reference to use of "posts" rather than "barrels" to be stated in provisions).

con't...

- reference to "construction sequence" to be made in specifications.
- sodding is to be done as area is small and seeding presents problems (timing and maintenance).
- District will look after speed zoning in construction area. Also "night lights" for night work (deck removal) and for illumination around construction under structures for night time traffic.
- I. Weinberg to arrange for contact with C.T.C. to (a) see what is required to expedite Order (b) arrange for site meeting.

Next Meeting

Thursday March 22, 1973,  
9:00 a.m., C.C. Parker Office, Hamilton.

IW/fd

*I. Weinberg*  
I. Weinberg,  
Co-Ordinator.

c.c. R. Lewis, C.C. Parker;  
G. Burkhardt,  
K. Selby (Foundations);  
H. Greenland ( Att'n: I. Tremain);  
R. Fitzgibbon,  
R. Shannon.

811 - 325 3234

C.C. PARKER

72-11-161  
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. K.G. Selby  
Supervising Foundations  
Engineer

FROM: Engineering Research & Development  
Branch

ATTENTION:

DATE: March 7, 1973

OUR FILE REF.

IN REPLY TO

SUBJECT: Frost Penetration - Structure at Jockey Club Road and Hwy. 27

A frost penetration gauge was installed February 27, 1973, at your direction, just adjacent to the abutment of the structure at Jockey Club Road and Hwy. 27.

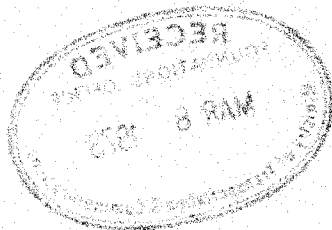
From the 10-year average frost index map, the frost index on the outskirts of Toronto is about 600 degree days. However, over the past two winters, 1331 degree days were recorded in 1970-71, and 1216 degree days in the 1971-72 winter. This 1972-73 winter has been milder than usual and frost depth measurements in nearby areas are 10" to one foot less than in the '70-'71 and '71-'72 winters.

The frost depths measured at this location were 47" on March 1/73 and 48½" on March 5/73. The frost depths predicted for '70-'71 and '71-'72 were between 45 and 46 inches. It is suggested that at this location the frost penetration in a year such as 1970-71 would have been at least 12" more, i.e. would have been 47 + 12 or 59 inches.

WAP:pb

*William A. Phang*

W.A. Phang  
Head, Pavement Research



## MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

## MEMORANDUM

TO: Mr. A. G. Stermac,  
Principal Foundation Engineer,  
West Building.

FROM: G. C. E. Burkhardt,  
Structural Planning Office,  
3501 Dufferin Street.

ATTENTION: Mr. K. Selby

DATE: January 29, 1973.

OUR FILE REF.

IN REPLY TO

SUBJECT: Proposed Reconstruction of C.N.R.  
Subway at Existing Highway 27,  
(Approx. 1.2 Miles N. of Dixon Road),  
W.P. 131-71-02, Site 37-176,  
District 6, Toronto.

This letter is to confirm our conversation of January 26, 1973 regarding the above mentioned project.

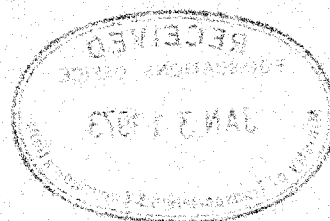
As part of this project it may be necessary to extend the retaining walls that are attached to the existing Jockey Club Structure which is located approximately 250' to the north of the C.N.R. Subway. On January 26, 1973 I left with you, detail drawings for the Jockey Club Structure and the attached Retaining Walls.

Could you please prepare a foundation investigation report for the area of the proposed retaining wall extensions.

We would appreciate very much if this foundation request could be processed as soon as possible.

DHB:lc

*D. H. Bye*  
D. H. Bye,  
STRUCTURAL PLANNING SUPERVISOR,  
for:  
G. C. E. Burkhardt,  
REG. STRUCTURAL PLANNING ENG.



## COMPUTATION SHEET

72-11161 ✓

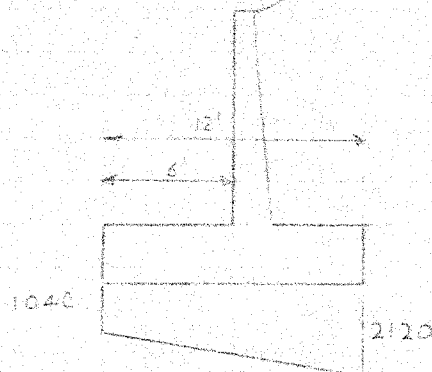
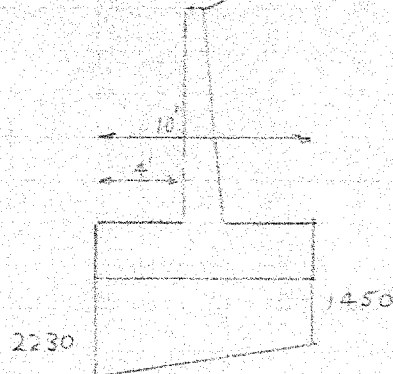
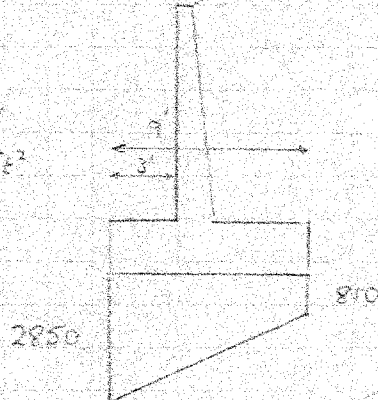
Subject \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_

Made by \_\_\_\_\_ Date \_\_\_\_\_

Chck by \_\_\_\_\_ Date \_\_\_\_\_

KEN SELBY

Theoretical soil  
pressure  $1\frac{1}{2}$  / ft<sup>2</sup>

CONT. 73-56

JOCKEY CLUB RD.

BR. WINGWALL EXT.

DIST. 6

30M11-110

