

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

74-64
30M11-137

To: Mr. G.C.E. Burkhardt, (4)
Regional Structural Planning Eng.,
Central Region,
90 Floral Pkwy.,

FROM:

Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

ATTENTION: Downsview.

DATE:

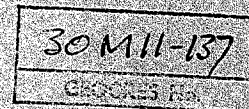
June 5, 1972.

OUR FILE REF.

IN REPLY TO

JUN 8 1972

SUBJECT:



FOUNDATION INVESTIGATION REPORT
For

Proposed Retaining Wall No. 20
Kipling Ave. Easterly to Hwy. #401
Belfield Expressway (Hwy. #409)
Borough of Etobicoke, Metropolitan Toronto
District #6 (Toronto)

W.O. 72-11040 -- W.P. 218-65-05

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
Attch.

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

cc: D. W. Farren
B. R. Davis
A. Rutka
P. J. Harvey
H. Greenland
B. J. Giroux
T. J. Kovich
G. A. Wrong
B. A. Singh

Foundations Files
Documents

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FOUNDATION INVESTIGATION REPORT
For
Proposed Retaining Wall No. 20
Kipling Ave. Easterly to Hwy. #401
Belfield Expressway (Hwy. #409)
Borough of Etobicoke Metropolitan Toronto
District #6 (Toronto)
W.O. 72-11040 -- W.P. 218-65-05

1. INTRODUCTION:

A memo requesting a foundation investigation at the location of the above structure, was received from Mr. G.C.E. Burkhardt, Regional Bridge Planning Engineer, Central Region, on February 16, 1972.

A field investigation was subsequently carried out by the Foundations Office in order to determine the subsoil and groundwater conditions at the site.

This report contains the results of our field and laboratory investigations, together with our recommendations pertaining to the design of foundations for the proposed retaining structure, as well as related considerations such as the expected earth pressure behind the wall and the dewatering measures required for the excavations.

2. DESCRIPTION OF THE SITE:

The site is located immediately south of Belfield Rd., between Kipling Ave., easterly to Hwy. #401, in the Borough of Etobicoke, Metropolitan Toronto. The site is flat to gently undulating in relief. Fill, however, has been placed to form the existing Belfield Rd. roadway, whose profile grade increases in an easterly direction. West of Kipling Ave the area has been developed for light industry; many one and two storey buildings are present here. Elsewhere, the terrain has not been developed.

The area is located in the physiographic region known as the "Peel Plain". The characteristic deposit in this region is a ground moraine laid down during the Wisconsin Glacial Age. In the vicinity of the area under investigation, the moraine is primarily composed of a basically cohesive, glacial till underlain by grey shale bedrock of the Meaford-Dundas formation, Ordovician Period.

3. FIELD AND LABORATORY WORK:

During the course of the investigation, six boreholes, five of which were accompanied by a dynamic cone penetration test, were carried out. The boreholes and the cone penetration tests were advanced by means of a continuous flight auger machine (Penn Drill) adapted for soil sampling purposes. In addition, a boring, put down during a previous investigation (B.H. #7, originally B.H. #3, Report W.O. 71-11034, dated September 20, 1971), is incorporated in this report because of its close proximity to the proposed structure.

Samples were obtained, at required depths, using a 2" O.D. split-spoon sampler; the energy used for driving, conformed to the requirements of the Standard Penetration Test. The same method was used to advance the dynamic cone penetration tests. Groundwater level observations were carried out, during the period of the investigation, in open boreholes.

The soil and groundwater conditions, encountered at those borings put down at the site, are presented on the Record of Borelog sheets appended to this report. The location and elevation of the boreholes were provided by personnel from the Central Region Engineering Surveys Section. The elevations in this report are referenced to a Geodetic datum.

The location and elevation of all borings put down are given on Drawing No. 72-11040A. A stratigraphical profile across the site, inferred from the boring data, is also presented on this drawing.

All samples were visually identified in the field and then sent to the laboratory where further tests were carried out to determine, on selected representative samples, the following engineering properties of the overburden:

Natural Moisture Content

Atterberg Limits

Grain-Size Distribution

The results of these tests are plotted on the Record of Borelog sheets and summarized on Figures No. 1 to 3, inclusive, all contained in Appendix 1 of this report.

4. SUBSOIL CONDITIONS:

4.1) General:

The predominant stratum across the site is a competent cohesive glacial till extending to at least 75 feet below existing ground surface. In the eastern portion of the area under investigation fill material composed of clayey silt with some sand and gravel; the fill was up to 14 feet thick.

The subsoil conditions, as determined at the various borehole locations, are shown on the accompanying Borelog sheets. The stratigraphical sections, shown on Drawing No. W.O. 72-11040A have been inferred from this data.

4.2) Fill Material:

A fill composed of a clayey silt with some sand and gravel was found in all boreholes, except B.H.'s 1 and 7. The thickness of the fill varies from 9 to 14 feet in depth; it increases in thickness in an easterly direction. Standard penetration testing, carried out within this deposit gave 'N' values which range from 6 blows/foot to 41 blows/foot. Based on these results it is estimated that the fill has been compacted to a degree ranging from moderate to high.

4.3) Glacial Till (Heterogeneous Mixture of Clayey Silt, Sand & Gravel):

The fill, where it is present, or a thin topsoil cover elsewhere, is underlain by the predominant stratum across the site which is a cohesive glacial till composed of a heterogeneous mixture of clayey silt, sand and gravel. In boreholes 5 and 7, however, the lower portion of the glacial till is granular in nature being composed of a heterogeneous mixture of silt, sand and gravel with a trace of clay. In addition, isolated layers of sandy silt with some gravel, up to 4 feet thick were found in boreholes 1 and 2. Grain-size distribution curves, for samples obtained within the two zones, are plotted in envelope form on the figures listed below.

Figure No. 1 - Cohesive Glacial Till

Figure No. 2 - Granular Glacial Till

These figures are located in Appendix 1 of this report.

Atterberg limit tests which are plotted on the Borelog sheets and are summarized on the plasticity chart, Figure No. 3, were carried out on the samples obtained from the cohesive zones within the glacial till. The results are tabularized below:

			<u>Range</u>	<u>Average</u>
Liquid Limit	%	(W _L)	15-33	24
Plastic Limit	%	(W _P)	11-18	14.5
Natural Moisture Content	%	(W)	8-21	14.5

Based on these values it is estimated that the matrix of the cohesive glacial till has a plasticity in the low range.

Standard penetration testing was performed within the stratum; the values are plotted on the Borelog sheets. In the cohesive glacial till the "N" values range from 9 blows/ft., generally increasing with depth to as many as 100 blows for 2 inches. Based on these results it is estimated that the consistency ranges from stiff, in the upper portion of the stratum, increasing to hard with depth. The "N" values in the lower granular zone of the glacial till varied between 130 blows/ft. and 300 blows for 3 inches, indicating that this zone has a very dense relative density.

5. GROUNDWATER CONDITIONS:

Groundwater level observations have been carried out, during the period of this investigation, in the open boreholes. The results are shown on the Record of Borelog sheets and summarized on Drawing No. 72-11040A. These observations indicate that the groundwater level varies between 1 and 8 feet below ground surface - i.e., between Elevations 509.5 and 527, in general the groundwater level increases in elevation in an easterly direction.

6. DISCUSSIONS AND RECOMMENDATIONS:

6.1) General:

It is proposed to construct an east-west expressway in the vicinity of Belfield Road which will connect Hwy. #401 with the Toronto International Airport. This project, which is known as the Belfield Expressway (Hwy. #409), will necessitate the construction of a number of structures and retaining walls. This discussion deals with Wall #20 which will retain fill extending from Kipling Ave. easterly to Hwy. #401. Details for the

retaining wall #20 are listed below:

Approx. Length	Proposed Profile Grade of Belfield Rd.	Clear Height of Wall (Range)	Location (Refer to Drawing No.)
950 ft.	El. 538.5-541	10-25 ft.	72-11040A

The predominant stratum across the site is an extensive deposit of competent glacial till extending to at least 75 feet below existing ground surface. This deposit is covered, in certain areas, by fill composed of a clayey silt with some sand and gravel; the fill is up to 14 feet thick.

Recommendations pertaining to the foundation design of the proposed retaining wall, as well as related considerations will be discussed in the sub-sections to follow.

6.2) Retaining Wall Foundations:

The higher most westerly portion of the wall (from the west end easterly 580 feet) will be located within the competent cohesive glacial till. This portion, therefore, can be supported on a spread footing located at or below Elevation 510. This portion of the footing could be designed using an allowable bearing value of up to 4 t.s.f.. The remaining east portion of the footing could be founded on a spread footing located in the existing cohesive fill. The base of this portion of the foundation will increase from elevation 510 to elevation 520 at the east end of the wall. This portion of the footing could be designed using an allowable bearing value of 2.5 t.s.f. in design. In order to satisfy the frost protection requirements in the area it is recommended that at least 4 feet of earth cover be provided above the underside of the footing.

The footing excavations will extend below the prevailing ground-water level. Since the excavations will be carried out within the relatively impervious upper cohesive zone of the glacial till and within cohesive fill no major dewatering problems are envisaged. Occasional water bearing sand and silt seams and layers are present within the glacial till deposit. If these are encountered some seepage may occur in the excavation. Such seepage or any surface run-off could be handled using conventional techniques such as pumping from sumps.

The cohesive foundation materials will settle due to the imposed footing loading. Both the fill and parent glacial till are pre-consolidated in relation to the existing overburden pressure. This being the case, the settlement will be of a recompression nature - i.e., take place during or immediately following the construction period. Based on the computations carried out, it is estimated that the differential settlement between that portion of the wall founded on glacial till and that on fill, will not exceed $\frac{1}{2}$ inch, provided the subsoil is not softened by groundwater seepage or surface run-off. The possibility of softening could be prevented by placing a lean concrete working slab at the footing formation level immediately after the completion of the excavation. In order to allow for the magnitude of differential settlement expected it is recommended that a construction joint be provided between that portion of the footing founded in the glacial till and that in the fill.

6.3) Related Considerations:

The wall will be inherently stable with respect to a deep-seated rotational type of failure within foundation subsoil.

In computing the sliding resistance between the base of the footing and the cohesive foundation subsoil an adhesion value of 2,500 p.s.f. should be used.

In designing the retaining wall a coefficient of active earth pressure of 0.33 should be assumed for the granular fill material placed behind the wall. In using this value the assumption is made that some movement of the top of the wall will occur.

In order to relieve the build-up of excess hydrostatic pressure behind the retaining wall, suitable drainage measures should be provided. Backfill behind the wall should be carried out in accordance with current M.T.C. practices, specifically Standard #S.D. 4-58.

7. MISCELLANEOUS:

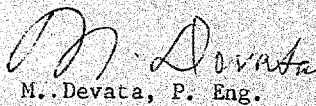
The field work, performed during the period from March 22 to March 28, 1972, together with preparation of this report was undertaken by Mr. H. Szymanski.

Equipment was owned and operated by Master Soil Investigation Limited, Toronto.

The investigation was carried out under the general supervision of Mr. M. Devata, Supervising Foundations Engineer, who also reviewed this report.


H. Szymanski

HS/ht


M. Devata, P. Eng.

May 30, 1972

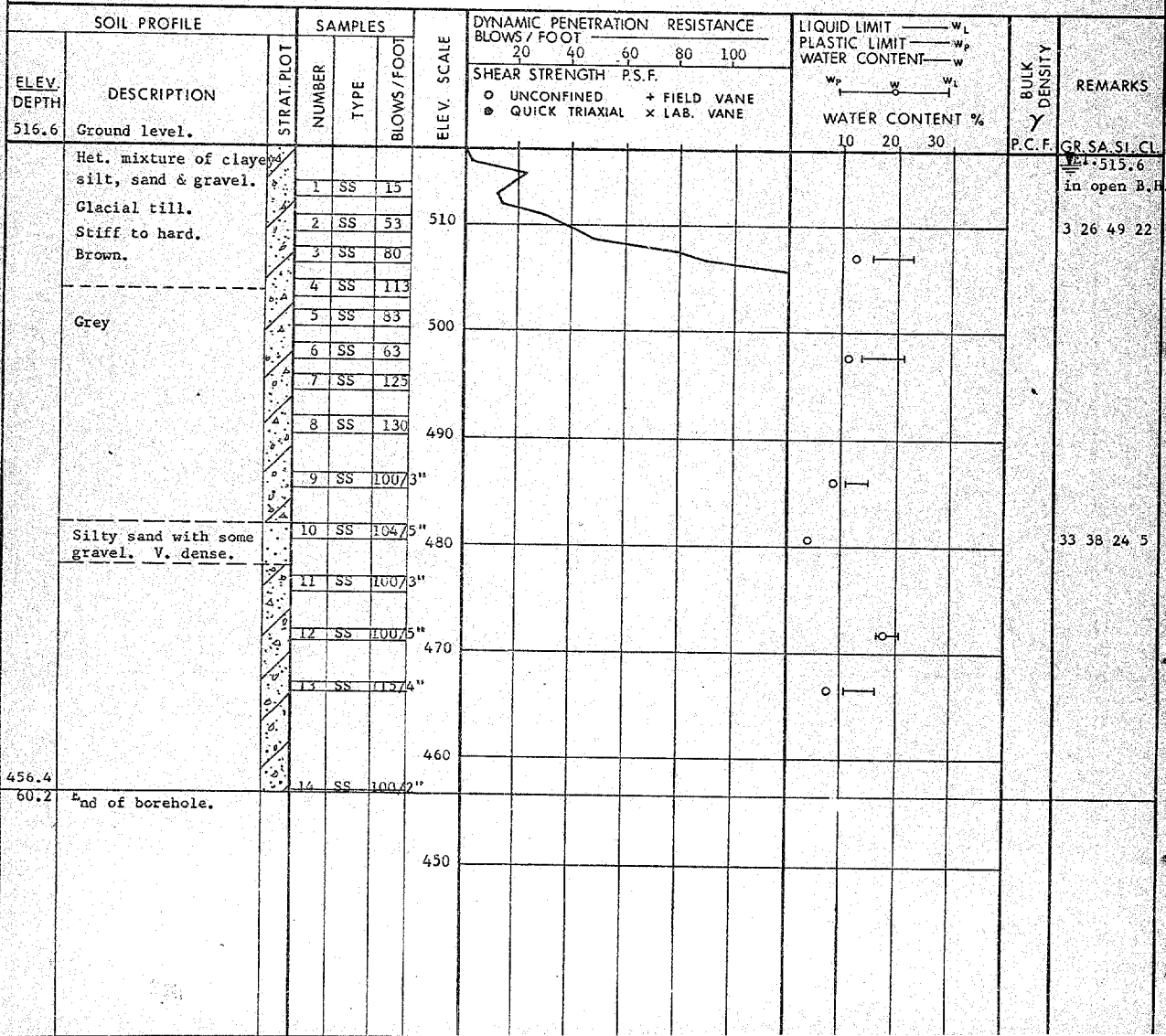
APPENDIX I

FOUNDATION SECTION

ORIGINATED BY H.S.

COMPILED BY H.S.

CHECKED BY *SR.*



DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 72-11040

LOCATION Co-ords. 880,442 N. 983,573 E.

ORIGINATED BY H.S.

W.P. 218-65-05

BORING DATE March 22, 1972.

COMPILED BY H.S.

DATUM Geodetic

BOREHOLE TYPE Penn Drill

CHECKED BY S.P.

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH		P.S.F.		WATER CONTENT %				
							\circ UNCONFINED \bullet QUICK TRIAXIAL	+ FIELD VANE x LAB. VANE	w_p	w	w_L				
522.0	Ground level.														
512.0 10.0	Clayey silt with some sand & gravel - Brown. Stiff to very stiff. (Fill)		1	SS	28	520								GR SA SI CL Elev. 514.0 in open B.H. 	

Elev. 514.0
in open B.H.

29.37 29.5

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 72-11040

LOCATION Co-ords. 880,499N.

983,846 E.

ORIGINATED BY H.S.

W.P. 218-65-05

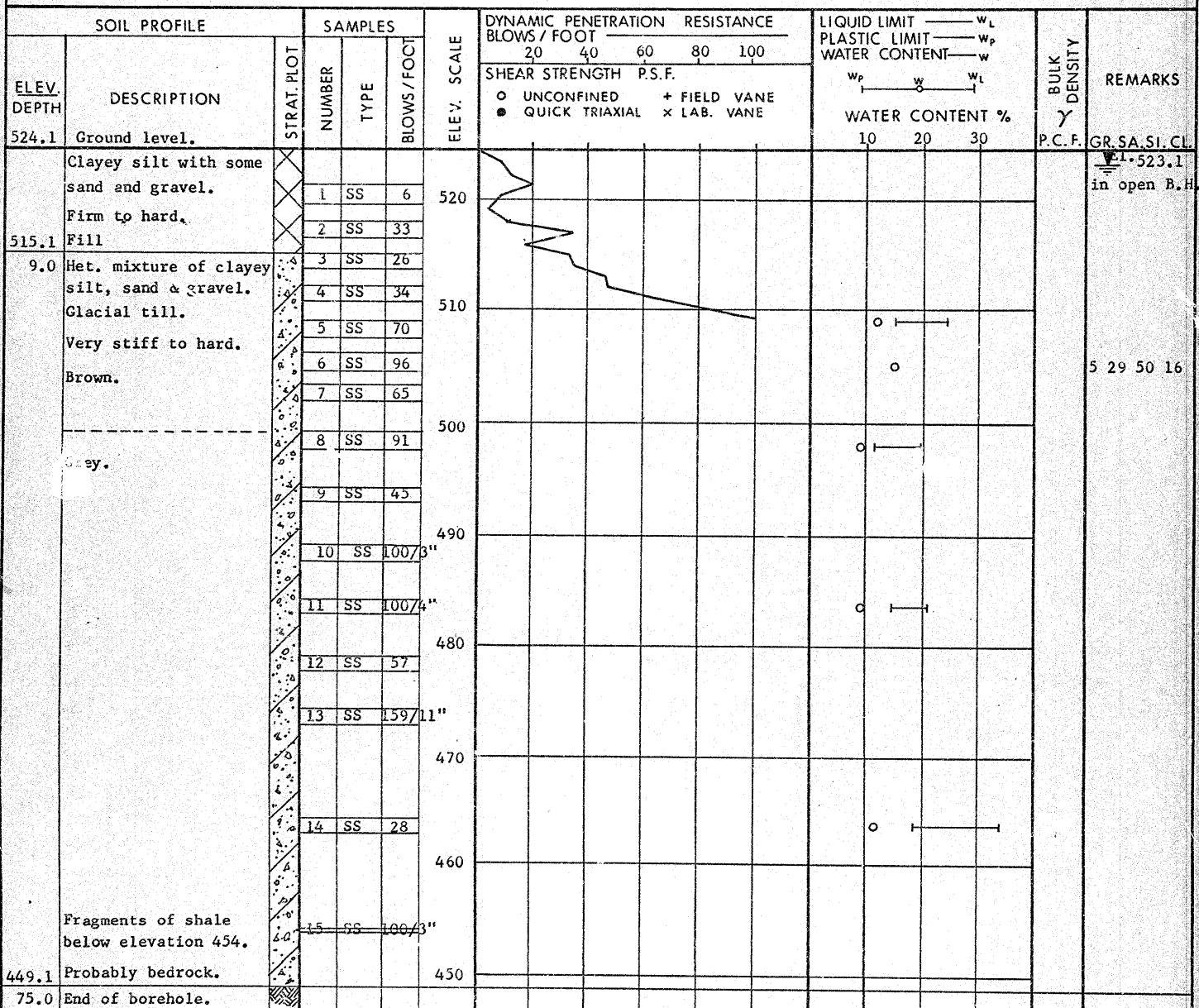
BORING DATE March 24, 1972.

COMPILED BY H.S.

DATUM Geodetic

BOREHOLE TYPE Penn Drill

CHECKED BY SR.



DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 72-11040

LOCATION Co-ords. 880,565 N. 983,981 E.

ORIGINATED BY H.S.

W.P. 218-65-05

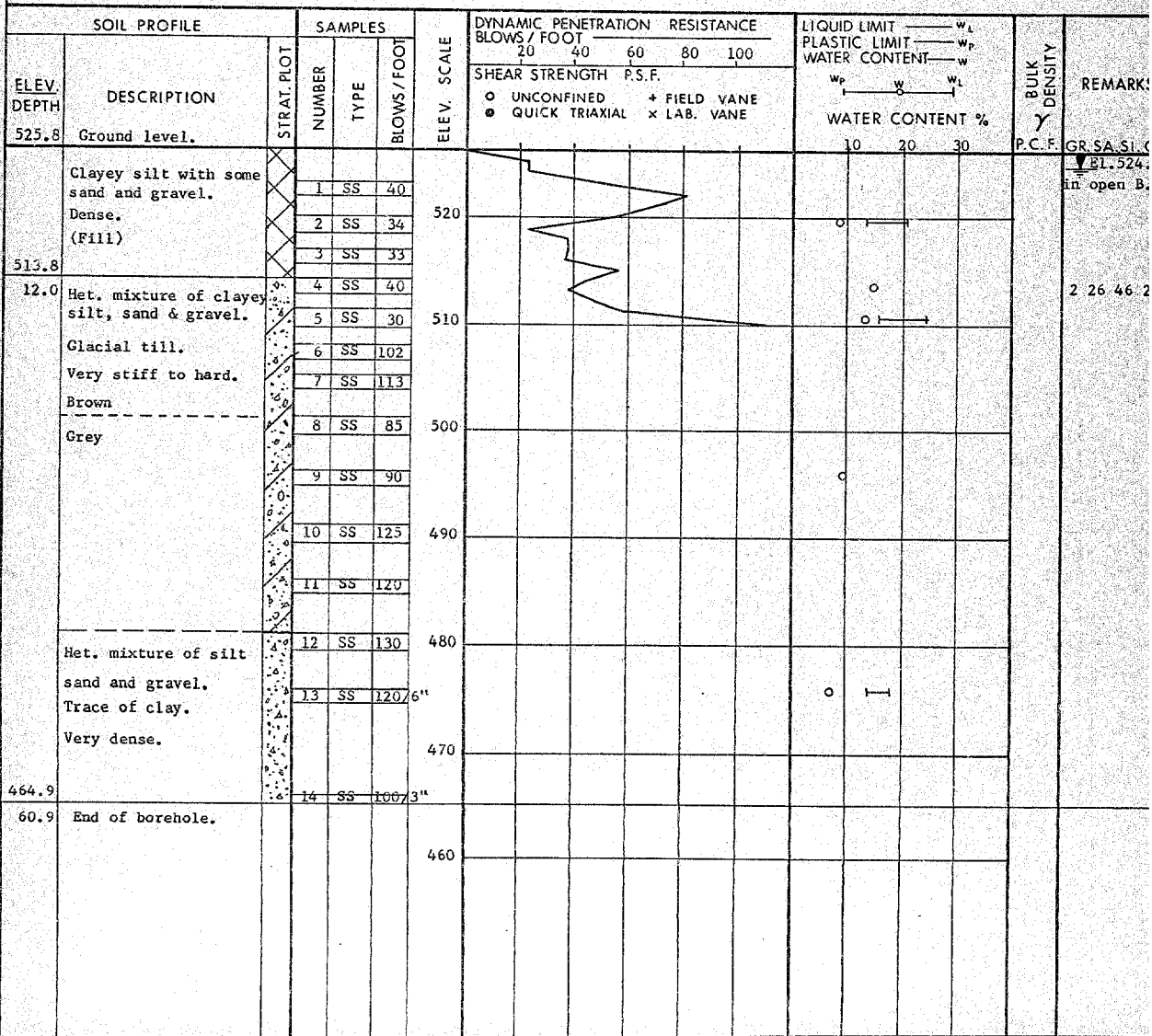
BORING DATE March 24, 1972.

COMPILED BY H.S.

DATUM Geodetic

BOREHOLE TYPE Penn Drill

CHECKED BY SP.



DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 7 (B.H. 3, 71-11034) FOUNDATION SECTION

JOB 72-11040

LOCATION Co-ords. 880,228 N. 983,279 E.

ORIGINATED BY V.K.

W.P. 218-65-05

BORING DATE June 22, 1971.

COMPILED BY V.K.

DATUM Geodetic

BOREHOLE TYPE Auger & Sample with Pendrill

CHECKED BY S.R.

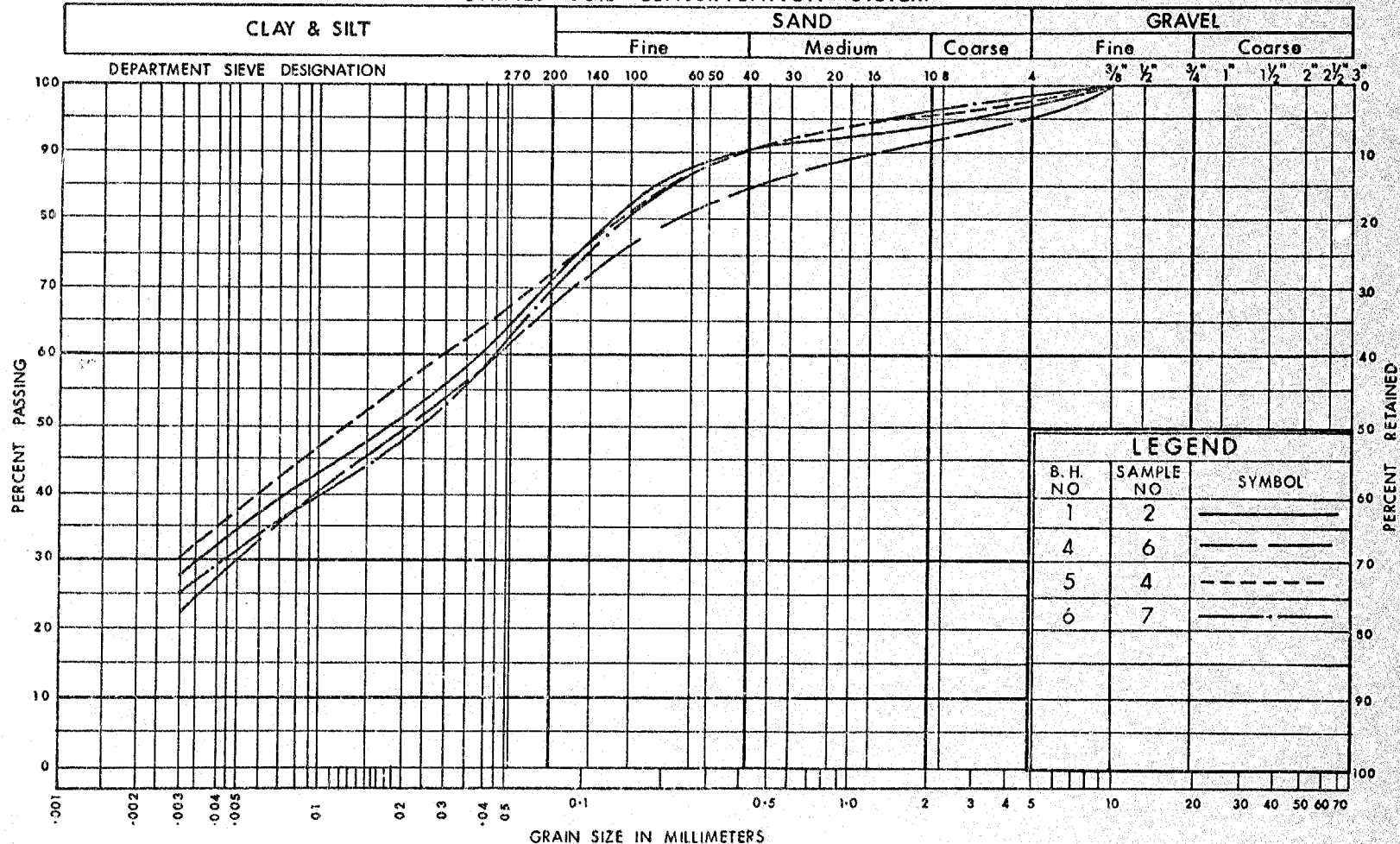
SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	w_p	w	w_L		
516.2	Ground level.														
	Het. mixture of clayey silt sand and gravel.	1	SS	9	510										
	Stiff to Hard.	2	SS	40											
	Brown changing to grey below El. 499.	3	SS	61											
	Glacial till.	4	SS	72											
		5	SS	54	500										
		6	SS	55											
		7	SS	55											
		8	SS	119	490										
	Het. mixture of silt, sand and gravel, trace of clay.	9	SS	162											
	Very dense.	10	SS	200											
	Grey.	11	SS	250											
		12	SS	157	470										
		13	SS	300											
		14	SS	300											
455.7		15	SS	170	460										
60.5	End of borehole.														
					450										

1 509.4
25 47 27

26 46 (28)

1 38 54 7

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS



DESIGN SERVICES
BRANCH

GRAIN SIZE DISTRIBUTION

GLACIAL TILL - COHESIVE

W.P. No. 218-65-05

JOB No. 72-11040

FIG. 1

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT

SAND

GRAVEL

Fine

Medium

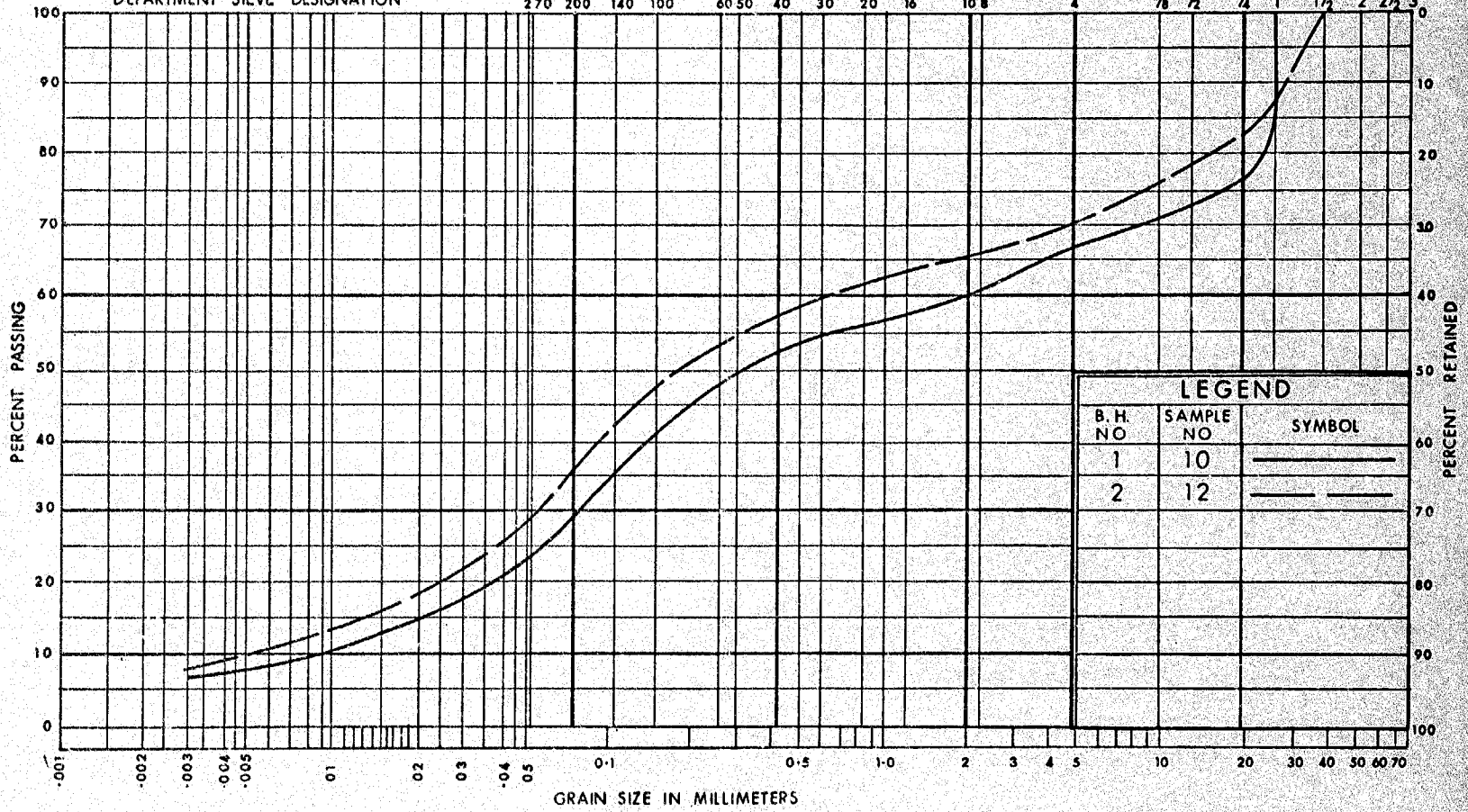
Coarse

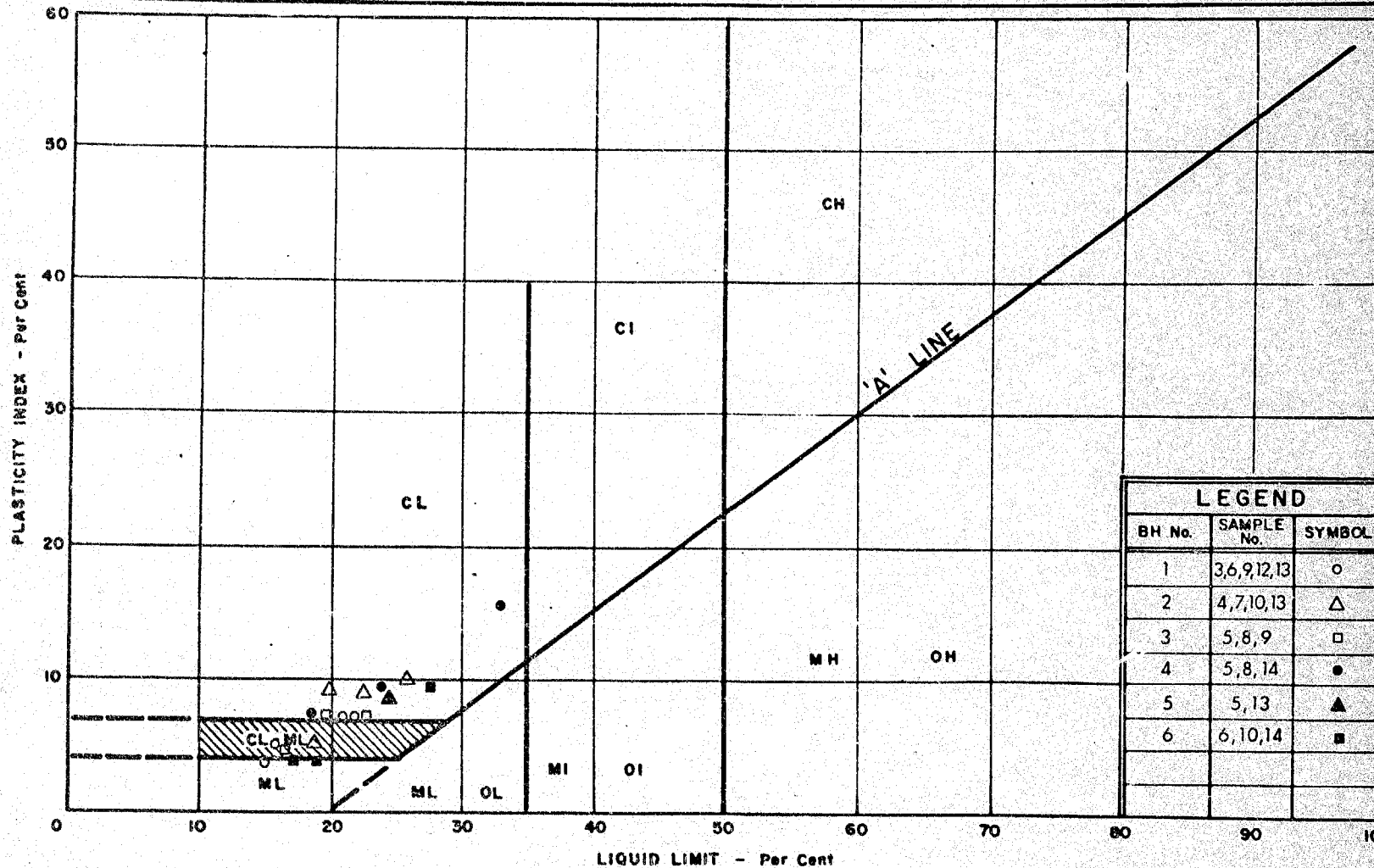
Fine

Coarse

DEPARTMENT SIEVE DESIGNATION

270 200 140 100 60 50 40 30 20 16 10 8 4 3/8 1/2 3/4 1 1 1/2 2 2 1/2 3





DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART GLACIAL TILL

WP. No. 218-65-05

JOB No. 72-11040

FIG. 2

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - 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 :-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

SOIL TESTS

Q _u	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q _{cu}	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q _d	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS 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
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_t	SHEAR STRENGTH
c'	EFFECTIVE COHESION
	INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF EFFECTIVE STRESS $\tau_t = c' + \sigma' \tan \phi'$
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF TOTAL STRESS $\tau_t = c_u + \sigma \tan \phi$
μ	COEFFICIENT OF FRICTION
S_f	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 (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

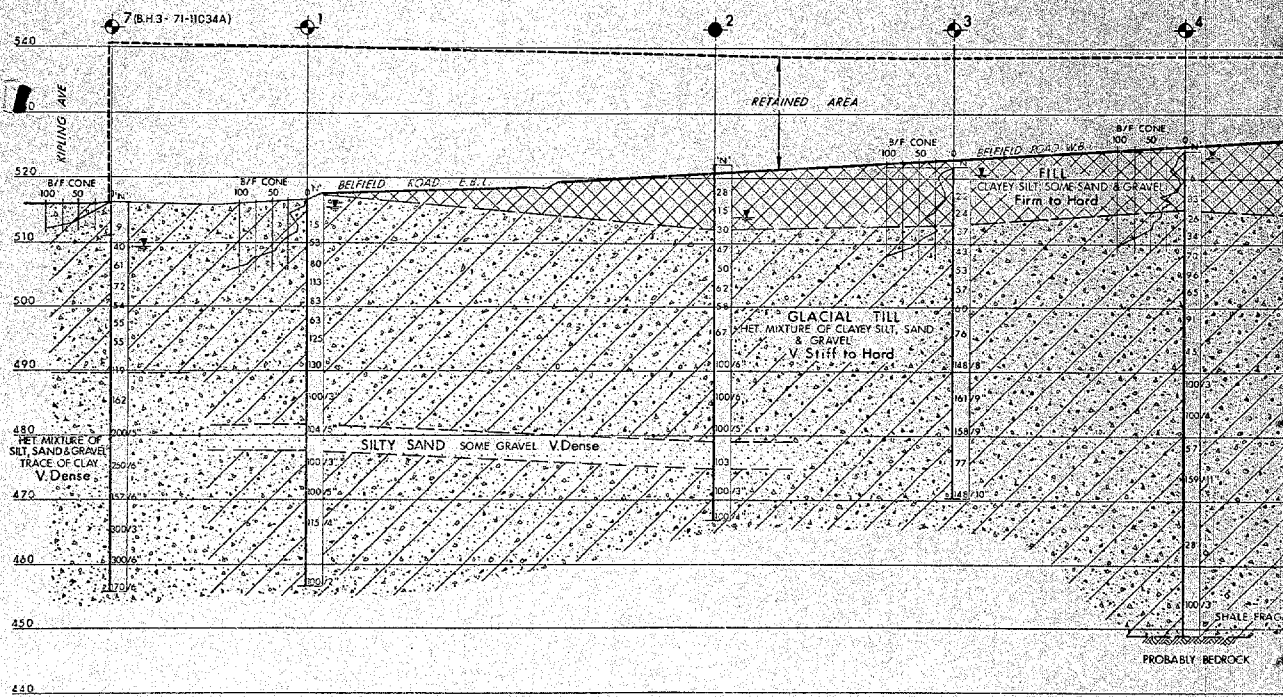
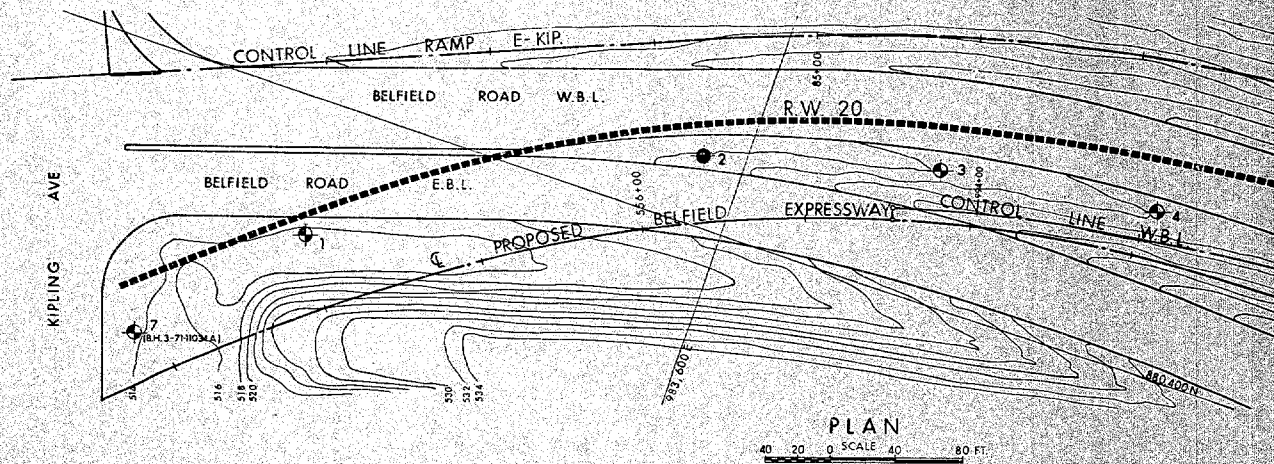
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

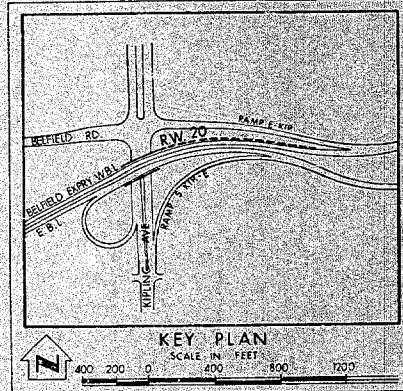
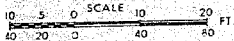
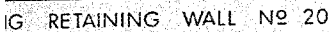
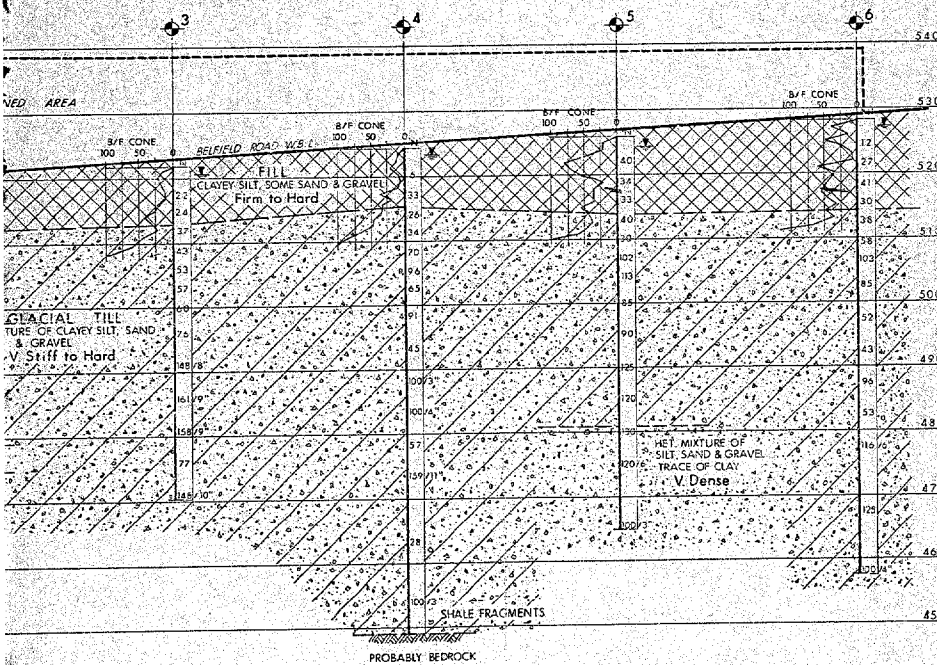
FOUNDATIONS





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





LEGEND			
	Bore Hole		
	Cone Penetration Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation		
JUNE 1971 & MAR. 1972			

NO.	ELEVATION	CO-ORDINATES	
		NORTH	EAST
1	516.6	880.519	983.560
2	522.0	880.442	983.573
3	521.7	880.480	983.714
4	524.1	880.490	983.846
5	525.8	880.565	983.981
6	528.1	880.563	984.127
7	516.2	880.228	983.179

— 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.

REVISIONS			
	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION & COMMUNICATIONS
DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RETAINING WALL No 20

HIGHWAY NO. BELFIELD EXPRESSWAY DIST. NO. 6
CO. YORK
TWP. ETOBICOKE LOT 1 CON 1

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. H.S.	CHECKED <i>[initials]</i>	W.P. NO. 218-65-05	DRAWING NO.
DRAWN S.O.	CHECKED <i>[initials]</i>	JOB NO. 72-11040	72-11040A
DATE 11 MAY 1972	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <i>[Signature]</i>	CONT. NO.		

NOTE

Proposed Retaining Wall #R-3 Extension Near the
Crossing of Belfield Expressway (Hwy. #409) and
Martingrove Rd. District #6

W.O. 71-11035 --- W.P. 218-65-05 (270-65)

Memos for the above filed under 71-11035 W.P. 270-65
although the W.P. 218-65-05 is the one for this Wall #R3.

As per M. Devata - Jan. 3/73

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: A. Stermac,
Principal Foundation Engineer,
Room 107, West Building.

FROM: Structural Office,
West Bldg., Downsview.

ATTENTION: DATE: February 28th, 1973.

OUR FILE REF. IN REPLY TO

SUBJECT: Retaining Walls,
W.P.#218-65-05, Site #37,
Hwy. #409, District #6.
Wall #'s 1A, 1B, 9, 11A, 11B, & 20.

SACU

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.



CSG:dp
Attach.

cc. Foundation Office.

A handwritten signature in cursive script, appearing to read "C.S. Grebski".

C.S. Grebski,
Structural Design Engineer.

Mr. C. S. Grebski,
Structural Design Engineer,
Design Services Branch,
West Bldg., Downsview.

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

March 6, 1973.

Retaining Walls

W.P. #218-65-05, Site #37, W.O. 7#-11122
Hwy. #409, District #6, Toronto,
Wall Nos. 1A, 1B, 9, 11A, 11B, & 20

We have reviewed the final structural drawings (dated February 28, 1973) and submit the following comment.

The structural drawings for Retaining Wall Nos. 1A, 1B, 9, 11A, 11B comply with our foundation recommendations. It is our recommendation that the founding elevation for Retaining Wall #20 between Sta. 8+87 to Sta. 9+00.57 should be at elevation 510.00 as recommended in our foundation report.

We believe that you will make the necessary revisions with regard to Retaining Wall #20.

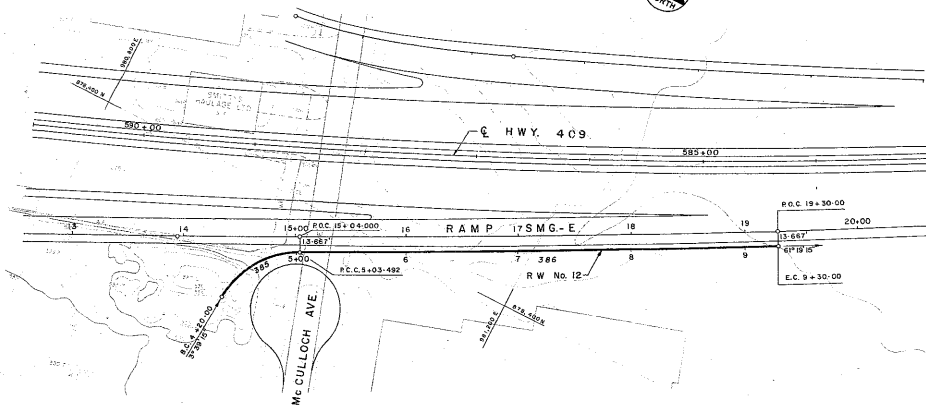
Should you require further clarification to our comments, please do not hesitate to contact this Office.

JTB/ao

cc: Foundations Files ✓ For:
Documents

J. T. Bangs

J. T. Bangs,
Project Foundations Engineer,
M. Devata,
Supervising Foundations Engineer.



STATION	TOP OF WALL	BOX END LINE
R.W. No. 12 - ELEVATIONS		
+ 4 + 70	530.00	528.00
+ 50	30.00	22.30
+ 52	30.00	19.48
+ 5 + 10	30.00	18.55
+ 80	29.83	18.95
+ 70	29.36	18.60
+ 0	26.65	18.68
+ 30	27.90	18.78
+ 65	27.15	18.06
+ 90	26.40	18.95
+ 7 + 20	25.65	19.06
+ 50	24.90	19.17
+ 80	24.15	19.28
+ 6 + 70	23.60	19.39
+ 63	22.65	19.52
+ 70	21.90	19.64
+ 9 + 00	21.15	19.78
+ 30	20.40	519.90

LIST OF DRAWINGS :

- 37-1 ALIGNMENT DETAILS
-2 REINFORCING DETAILS
-3 STANDARD DETAILS

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30M11-137
GEOCRE No.

[illegible]

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

De Leuw, Cather consulting engineers

RETAINING WALL No. 12

KING'S HIGHWAY No. 409 DIST. No. 6

CO. YORK
TWP. ETOBICOKE LOT CON.

ALIGNMENT DETAILS		
	SITE No. 37	W.P. No. 21B-66-03

APPROVED _____				CONTRACT	
STRUCTURAL ENGINEER				No.	
DESIGN		CHECK			

DRAWING		CHECK		DRAWING	37-1
DATE	FEB 13	LOADING	-	No.	

37-R12-1

Drug 71-11122C

COORDINATES			CURVE		CURVE DATA					
NORTH EAST			No.		A	B	T	L	E	
RETAINING WALL No.12										
B.C.	4+20.00	878.242.000	980.965.950							
P.L.	4+64.00	878.337.305	980.972.900	385	59° 47' 48"	71.37' 31"	80.000	56.000	83.482	31.280
P.C.	5+03.482	878.338.465	981.045.072							
P.L.	7+14.777	878.453.794	980.200.855	386	2° 07' 48"	9° 28' 58"	1402.823	213.299	426.508	1.980
E.C.	9+30.000	978.556.147	981.931.679							
P.C.	10+30.000	978.556.177	981.930.620							
P.L.	11+30.000	978.556.199	981.930.642							

[illegible]

NOTE: FOR GRANULE BACKFILL SEE ROAD GRADING CONTRACT DRAWINGS

3' 6" HD-CORRUG. PIPE @ 10'-0" C/C

2' x 2' x 2' CRUSHED STONE

6" DIA. SUB-DRAIN

EXISTING GROUND

FOR RUSTICATION DETAILS SEE SD 41- (DWG. 97-9)

BOULEVARD LINE

SHOULDER

TYPICAL SECTION
(LOOKING WEST)
N. T. S.

N. T. S.

SCALE

FOR REDUCED PLAN

USE SCALE BELOW

0 1 2 3

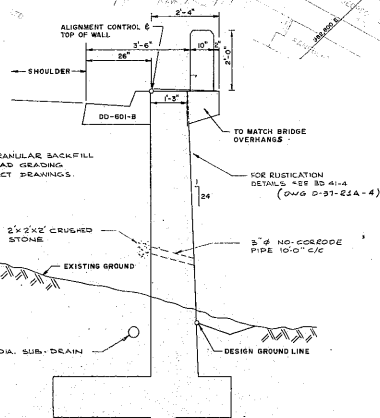
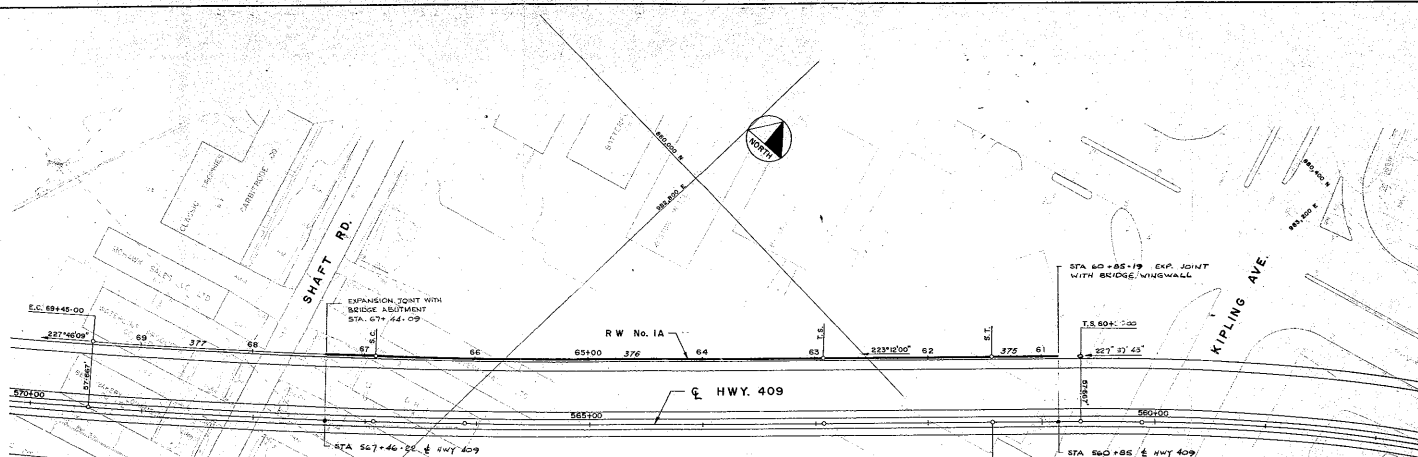
3 INCHES ON ORIGINAL PLAN

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 30M11-137DIST. 6 REGION CENTRALW. P. No. 218-65-05CONT. No. 74-64W. O. No. 72-11040

STR. SITE No. _____

HWY. No. 409 BELFIELD EXPRESSWAYLOCATION RETAINING WALL NO. 20, KIDLING
AVE. EASTBOUND TO HWY#401OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. ☒ 1REMARKS: @documents to be unfoliated before
microfilmed



STATION		CO-ORDINATES		CURVE No.	CURVE DATA					
NORTH	EAST				A	B	C	T	L	P
RETAINING WALL No. 1A & 1B										
S.T. 345-045-000	890.788-074	903.181-571								
S.C. 49-05-000	880.178-072	901.189-080		375		OFFSET	SPIRAL			
S.T. 441-049-000	901.007-570	903.079-855								
S.T. 62-05-000	879 572.937	902.078-002		376		OFFSET	SPIRAL			
S.C. 60-06-078	879.686-074	902.788-007								
P.T. 567-049-000	979.596-597	902.687-850		377	2° 34' 09"	1° 00' 37"	567.911	127.182	258.322	1.426
S.C. 49-05-000	879 510.971	902.510-000								
S.T. 567-049-000	879.488-216	902.572-390								

STAT Q	TOP OF JULE	DESIGN GROUND LINE
R.W. NO. 1A - ELEVATIONS		
60+55	540.55	518.30
61+00	539.80	518.00
61+05	539.05	517.80
61+35	539.82	518.00
61+65	539.25	517.80
61+95	539.67	517.85
62+00	539.36	517.05
62+15	539.05	517.00
62+85	537.56	516.20
63+15	537.06	516.08
63+45	536.56	515.67
63+75	536.08	515.44
64+05	535.58	515.23
64+35	535.27	515.00
64+65	534.86	514.60
64+95	534.60	514.38
65+25	533.97	514.38
65+55	533.37	514.16
65+85	533.18	513.93
66+15	532.82	513.80
66+45	532.47	513.59
66+75	532.26	513.50
67+05	531.87	513.38
67+35	531.52	513.08
(C)+44.69	531.44	512.80

LIST OF DRAWINGS:

D-37-21A-1 ALIGNMENT DETAILS
-2 REINFORCING DETAILS
-3 STANDARD STEEL PARAPET RAIL
-4 STANDARD DETAILS

[illegible]

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

De Leuw, Cather consulting engineers

RETAINING WALL No. 1A

KING'S HIGHWAY No. 409 DIST. No. 1

CO. YORK
TWP. ETABICOKE LOT CON.

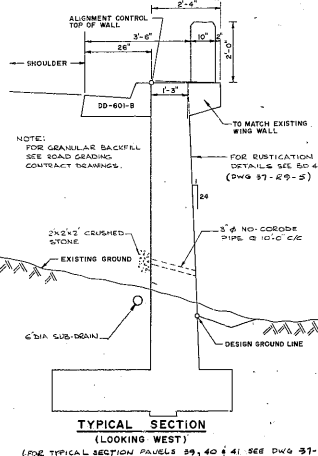
ALIGNMENT DETAILS

ALIGNMENT DETAILS

APPROVED _____	37	218-65
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DESIGN				CHECK				CONTRACT No.	
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DRAWING	CHECK	DRAWING No.	D-37-R1A
DATE	LOADING		

[illegible]

STATION	TOP OF WALL	DESIGN BROW LINE
R.W. NO. 9 - ELEVATIONS		
2 + 52.69	535.70	535.30
2 + 52.69	55.89	55.49
3 + 15	54.04	53.70
3 + 45	56.31	55.96
3 + 50	56.74	56.40
3 + 75	56.34	56.00
3 + 85		55.80
4 + 40.05	56.53	55.30
4 + 75	56.48	55.10
4 + 85	56.79	55.45
4 + 95	56.82	55.50
5 + 25	56.82	54.80
5 + 55	56.82	54.20
5 + 85	56.82	53.90
5 + 95	56.53	53.60
6 + 45	56.37	53.30
6 + 75	56.20	53.00
7 + 05	56.02	52.65
7 + 35	55.88	52.25
7 + 65	55.73	52.05
7 + 95	55.68	51.75
8 + 25	55.47	51.45
8 + 55	55.31	51.15
8 + 85	55.13	50.85
9 + 15	54.95	50.55
9 + 45	54.63	50.25

STATION	TOP OF HILL	DESIGN BOUNDARY LINE
9 + 75	34.31	19.93
9 + 100	33.92	19.55
10 + 35	33.50	19.20
10 + 65	33.00	18.80
10 + 95	32.50	18.45
11 + 25	31.93	18.10
11 + 55	31.31	17.70
11 + 85	30.64	17.35
12 + 15	29.90	16.95
12 + 45	29.15	16.60
12 + 75	28.32	16.25
13 + 05	27.48	15.95
13 + 35	26.55	15.60
13 + 65	25.61	15.20
14 + 00	24.65	14.85
14 + 25	23.70	14.50
14 + 55	22.79	14.20
14 + 60	-	15.70
14 + 85	21.90	521.80

LIST OF DRAWINGS:

- 37-29-1 ALIGNMENT DETAILS
- 2 REINFORCING DETAILS
- 3 PARAPET WALL
- 4 STANDARD PARAPET RAIL
- 5 STANDARD DETAILS

TYPICAL SECTION
(LOOKING WEST)
(FOR TYPICAL SECTION PANELS 39, 40 & 41 SEE DWG 31-29-5)

30711-132
GEOCRES No.

[illegible]

SCALE

20 0 4

