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G.I.-30 SEPT. 1976

GEOCRES No. 31G5-121

W.P. No. _____

CONT. No. _____

W. O. No. _____

STR. SITE No. _____

HWY. No. _____

LOCATION RETAINING WALLS,
ALONG ROUTE OF D.Q.W.

STA. 296+00 TO 309+00

=====

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. NONE

REMARKS: This GEOCRES N° includes 2 REPORTS

BA 927

3165-121

REPORT ON SOILS INVESTIGATION

FOR

PROPOSED RETAINING WALLS

ALONG ROUTE OF OTTAWA QUEENSWAY

FROM STATION 296 + 00 TO 309 + 00

TO

DE LEUW CATHER & COMPANY OF CANADA.LTD.



Report No. SF-434

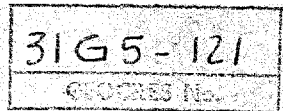
July 31st, 1959.

McROSTIE & ASSOCIATES
CONSULTING ENGINEERS
OTTAWA CANADA

MCROSTIE & ASSOCIATES

CONSULTING ENGINEERS AND SURVEYORS

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OTTAWA QUEENSWAY

RETAINING WALLS

STATION 296 + 00 TO 309 + 00

1. TERMS OF REFERENCE

We were requested by De Leuw Cather & Company of Canada Limited to carry out subsurface investigations for proposed retaining walls along the route of the Ottawa Queensway from Station 296 + 00 to 309 + 00.

2. CONCLUSIONS AND RECOMMENDATIONS

General

The following conclusions and recommendations are based on the findings at the locations examined, and it is felt that sufficient boreholes were made to describe in general, the soils of the area. However, should large variations be encountered between the boreholes at the time of construction, the Engineer should be consulted in order to take the necessary actions.

2.1 Safety against Sliding

It is assumed that consideration will be given to the design of the retaining walls with respect to sliding. The recommended coefficient of friction between the wall base and the soils encountered is 0.45, and it is suggested that the factor of safety against sliding be at least 1.5.

2.2 Settlement

The consolidation settlement of structures when on a compressible soil should always be investigated. The soils encountered here are basically granular and hence consolidation settlements on undisturbed material are not to be expected.

2.3 Foundation Type

Where soils to be used for support are likely to be disturbed during construction, and the structure is a flexible type capable of withstanding movements of several inches, a footing type of foundation is recommended. Where the structure is a rigid type and soil bearing capacity likely to be disturbed during construction, pile or pier type of foundation is recommended. Soil bearing capacity is likely to be disturbed during construction around Stations 308 + 00 and 309 + 00. Should piles or piers be used, payment clauses in the construction contract should be sufficiently flexible to allow for variations that might exist between the boreholes.

In areas where soil bearing capacities are not likely to be disturbed or foundation on bedrock, footing type of foundation would of course be adequate for most type of structures.

2.4 Soil Strengths

The recommended soil bearing capacities of the areas investigated are as follows:

2.4.1 296 + 00, 82' Left

Around elevation 222

8,000 POUNDS PER SQUARE
FOOT with groundwater
control.

2.4.2 297 + 00, 80' Left

Around elevation 218

4,000 POUNDS PER SQUARE
FOOT

2.4.3 298 + 00, 72' Left

Around elevation 216

4,000 POUNDS PER SQUARE
FOOT with groundwater
control

2.4.4 299 + 00, 67' Left

Around elevation 216

4,000 POUNDS PER SQUARE
FOOT with groundwater
control

- 2.4.5 300 ± 00, 58' Left
Around elevation 216 4,000 POUNDS PER SQUARE
FOOT with groundwater
control
- 2.4.6 301 ± 00, 77' Left
Around elevation 214 Rock below fill -
20,000 POUNDS PER SQUARE
FOOT
- 2.4.7 302 ± 35, 72' Right
Around elevation 228 Rock below fill -
20,000 POUNDS PER SQUARE
FOOT
- 2.4.8 304 ± 35, 63' Right
Rock was encountered at around elevation 239.
In our report No. SF-422, dated May 6, 1959, it
was recommended that a revision in grade be con-
sidered to economise on excavation costs.
Retaining walls are not required here with
sloping of the rock cut on a ¼ to 1 slope and
2 to 1 in the overburden.
- 2.4.9 305 ± 00, 53' Right
Rock encountered at around elevation 240. Re-
commendations for 304 ± 35, 63' Right apply here.
- 2.4.10 306 ± 00, 77' Right and 60' Left
Bedrock encountered at around elevation 244. Re-
commendations for 304 ± 35, 63' Right apply here.
- 2.4.11 307 ± 00, 76' Right
Below elevation 229 Rock - 20,000 POUNDS PER
SQUARE FOOT
- 2.4.12 308 ± 00, 64' Right and 309 ± 00, 71' Right
Around elevation 224 2,000 POUNDS PER SQUARE
FOOT WITH AS MUCH GROUND-
WATER CONTROL AS POSSIBLE.
SETTLEMENT OF SEVERAL
INCHES TO BE EXPECTED.

The depth to footing level and the slightly pervious nature of the till encountered around 308 + 00 and 309 + 00 would render groundwater control difficult to achieve. It is expected that during construction, groundwater will not be adequately controlled with the resulting disturbance of the natural bearing capacity of the till. It is recommended that a flexible type retaining wall be considered for this area, which would be capable of withstanding movements of several inches.

The foregoing elevations were based on assuming that the base of the retaining wall footings would be approximately 6 feet below the finished grade to allow for frost protection.

2.5 Backfill Pressures.

Estimation of backfill pressures can be obtained by the following formulae $P_v = \frac{1}{2}k_v H^2$ and $P_h = \frac{1}{2}k_h H^2$, where H is the height of a vertical section passing through the heel of the wall, extending from the bottom of the base to the surface of the backfill, k_v and k_h are constants for given values of slope angle and types of backfill material, P_h is the total horizontal force per lineal foot against the above described section, and P_v is the total vertical force. Recommended values of k_v and k_h are shown on Plate 28 for various types of soil backfill and values of slope angles.

The following are soil types to be used in conjunction with the chart:

TYPE

DESCRIPTION OF MATERIAL

1. Coarse-grained soil without admixture of fine soil particles, very permeable (clean sand or gravel).

2. Coarse-grained soil of low permeability due to admixture of particles of silt size.
3. Residual soil with stones, fine silty sand, and granular materials with conspicuous clay content.

We recommend that types 1 or 2 be used for the backfill material and that the surcharge slope angle be 2:1.

2.6 Construction Precautions

Groundwater coming up through the bottom of the excavation can destroy the natural density of the tills to be used for support. Groundwater control should be enforced to prevent this occurrence, and can normally be accomplished by well points, pits or trenches outside and below the excavation with continuous pumping. Normally, groundwater control can also be achieved by ditching from the excavation to any nearby storm sewer or surface ditch found lower than the excavation.

3. FIELD WORK

The sampling operation was carried out by drill rigs from J. B. Dufresne & Company Ltd. Recorders from our own staff were supplied with each drill rig to enforce the Engineer's instructions and to record the field observations. A Soils Engineer made daily visits to the site. Wherever possible, boreholes were made at the location of the proposed retaining walls, however, in some places where access was difficult, a borehole was made as close as possible to the preferred location. In soils, the investigation was carried to at least 15 feet below proposed support level to ensure that the material below was continuously adequate.

Sampling in soil was made by 2 inch split barrel samplers, with standard penetration tests simultaneously carried out. Overnight water levels were recorded wherever possible.

Where it was felt that bedrock was encountered, the material was core drilled for confirmation, and AXT cores recovered for examination.

The samples were field identified, logged, and brought into the laboratory for final classification.

4. OBSERVATIONS

4.1 Soil Types

The soils encountered are described in detail on the soil profile summaries but generally are as follows:

Most of the areas investigated showed fill from the original railroad construction, the depth of which ranged from 2 feet to 8 feet below the surface. Till of varying densities underlies the fill, and at some locations, rock in various degree of disintegration and weathering was encountered below the till at depths ranging from 2 to 29 feet below the surface.

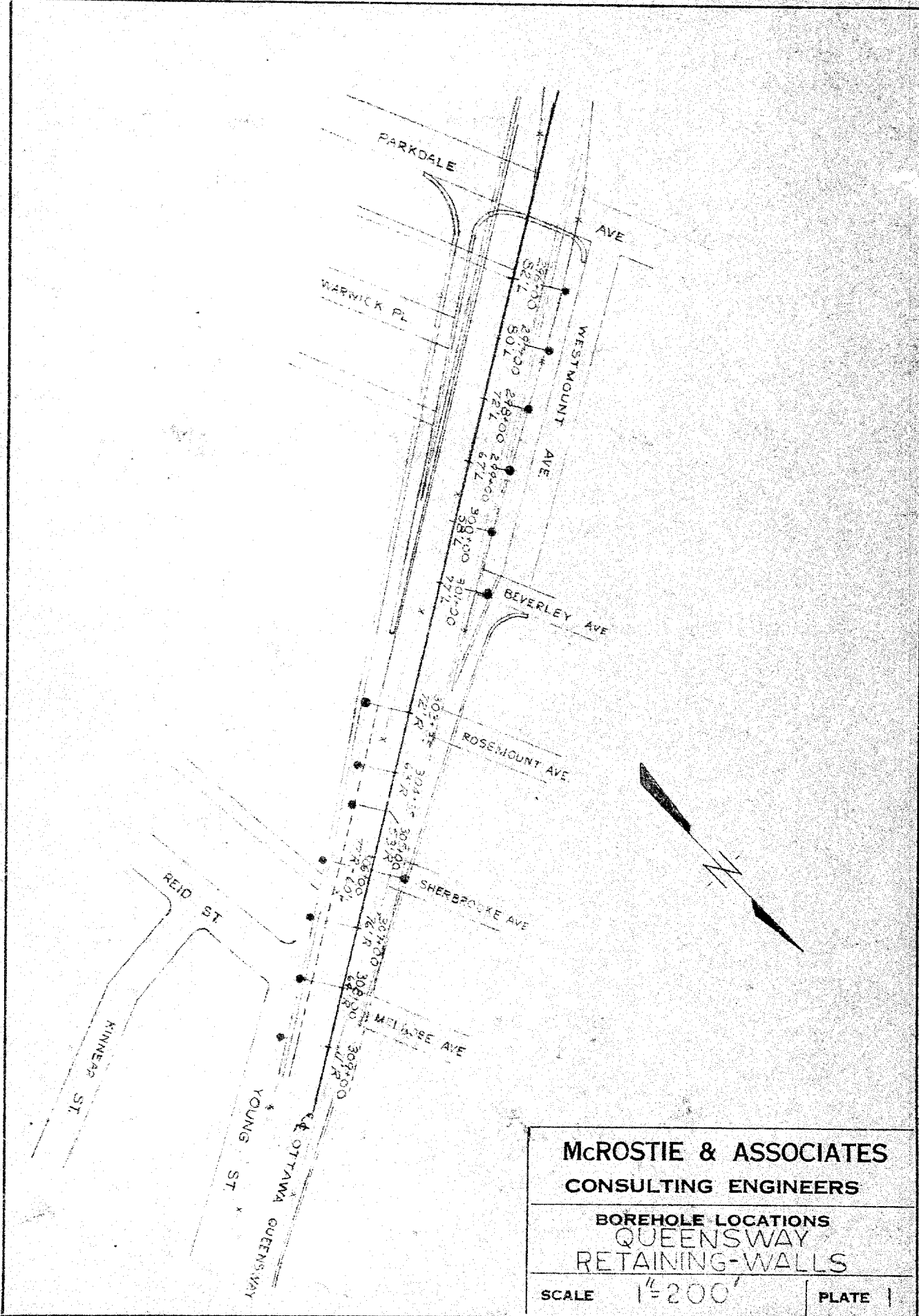
Where natural soil was at the surface, the material was usually till of varying densities, with rock encountered beneath at depths ranging from 2 feet to 15 feet below the surface.

The groundwater levels varied from non-existent in some holes to near the surface in others. Groundwater levels vary seasonally being normally highest in spring and autumn, and lowest in summer and mid-winter. These observations would be considered at the seasonal high.

4.2 Laboratory

Sieve analysis tests were made on three representative samples to confirm field classifications of borderline soils.

SOIL PROFILE SHEETS



McROSTIE & ASSOCIATES
CONSULTING ENGINEERS

BOREHOLE LOCATIONS
QUEENSWAY
RETAINING-WALLS

SCALE 1"=200'

PLATE 1

McROSTIE & ASSOCIATES

CONSULTING ENGINEERS

OTTAWA CANADA

SOIL PROFILE AND SUMMARY OF FIELD AND LABORATORY TESTS

OTTAWA QUEENSWAY

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 228.1' DATE 18/4/59REMARKS Elevations referred to Geodetic Datum. Near nor-
therly limit of abandoned C.N.R. Right-Of-WayHOLE No.
296 + 00
82' Left

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PROBING OR VANE TEST				
							LB. HAMMER		NO CASING		
							INCH DROP		INCH DIA. ROD		
							BLOWS PER FOOT OR SHEAR STRENGTH IN KIPS PER FT. ²				
				GROUND SURFACE	0'	228.1'					
					1'	-----	Overnight water level				
				Medium							
				Dense							
				To	5'	223.1					
		53	X X X X X	Dense							
				Sandy							
				Till							
					10'	218.1					
		92	X X 2X X X	Dense							
				Sandy							
				Till							
					15'	213.1					
				Hole Continued			% WATER CONTENT NATURAL ○ LIQUID LIMIT □ PLASTIC LIMIT Δ				PLATE 2

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OTTAWA CANADA

SOIL PROFILE AND SUMMARY OF FIELD AND LABORATORY TESTS

OTTAWA QUEENSWAY

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 228.2 DATE 21/4/59

REMARKS See Plate 2. See Plate 25 for sieve analysis of
Sample No. 1HOLE No.
298 + 00
72' Left

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PROBING OR VANE TEST					
							.....LB. HAMMER			NO CASING		
							.....INCH DROP			.....INCH DIA. ROD		
							BLOWS PER FOOT OR			SHEAR STRENGTH IN KIPS PER FT. ²		
				GROUND SURFACE	0'	228.2						
				Sandy								
				Fill								
					5'	223.2						
		17	1		5.7		Overnight water level					
				Medium								
				Dense								
		28	2		10'	218.2						
				Till								
					13.7	214.5						
				Hole Continued								
							% WATER CONTENT					PLATE 6
							NATURAL ○					
							LIQUID LIMIT □					
							PLASTIC LIMIT △					

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OTTAWA CANADA

SOIL PROFILE AND SUMMARY OF FIELD AND LABORATORY TESTS

OTTAWA QUEENSWAY

 ELEVATION OF GROUND SURFACE (ZERO DEPTH) 222.8 DATE 22/4/59
 REMARKS See Plate 2.

 HOLE NO.
301 + 00
77' Left

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PROBING OR VANE TEST				
							LB. HAMMER		NO CASING		
							INCH DROP		INCH DIA. ROD		
							BLOWS PER FOOT OR SHEAR STRENGTH IN KIPS PER FT. ²				
				GROUND SURFACE	0'	222.8					
				Fill							
				(Sand							
				&	3'	-----	Overnight water level				
				Gravel)	4'	218.8					
		24	1								
					6.5	216.3					
				Silt & Sand							
					8.8	214.0					
				Rock							
				Shaley Limestone							
				& Limer Shale.							
				Near Horizontal							
				Bedding, (Core							
				Recovery 80%)							
					13.5	209.3					
				Bottom of Hole							
							% WATER CONTENT NATURAL <input type="checkbox"/> LIQUID LIMIT <input type="checkbox"/> PLASTIC LIMIT <input type="checkbox"/>				PLATE 12

McROSTIE & ASSOCIATES

CONSULTING ENGINEERS

OTTAWA CANADA

SOIL PROFILE AND SUMMARY

OF FIELD AND LABORATORY TESTS

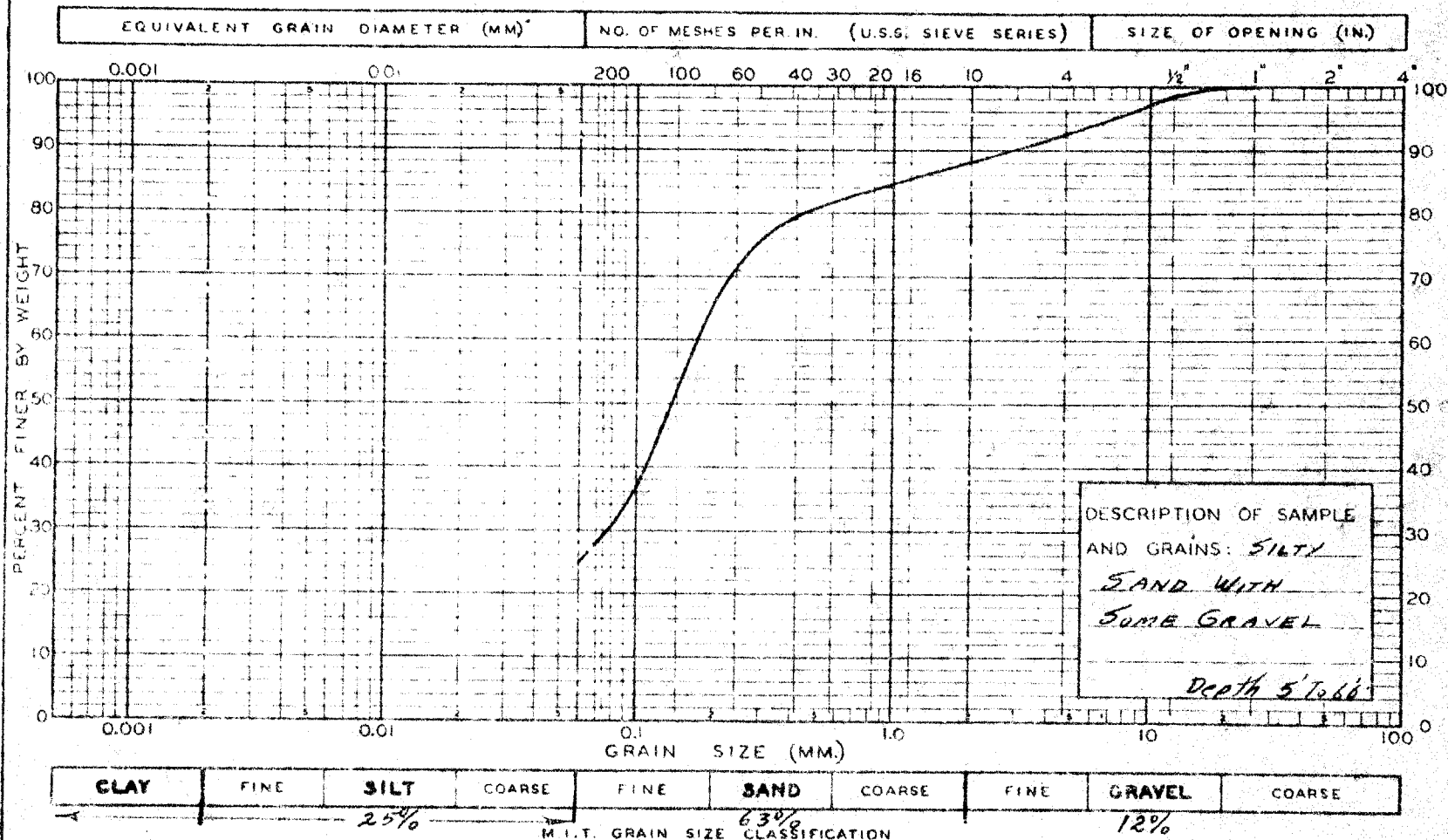
OTTAWA QUEENSWAY

 ELEVATION OF GROUND SURFACE (ZERO DEPTH) 243.4 DATE 15/4/59
 REMARKS _____

 HOLE NO.
309 + 00
71' Right

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PROBING OR VANE TEST				
							.....LB. HAMMER		NO. CASING		
							.....INCH DROP		.....INCH DIA. ROD		
							BLOWS PER FOOT OR SHEAR STRENGTH IN KIPS PER FT. ²				
				GROUND SURFACE							
				Hole Continued							
		16	4	-----	15'	228.4					
			X	Medium							
			X								
			X								
			X								
			X								
			-	Dense							
			-								
			-	Till							
			-								
			-								
			X	-----	20	223.4					
		8	5	Loose Sandy Till							
			X								
			X								
			X								
			X								
			-								
		5 for 6"	X								
		21	6	-----	23	220.4					
			X	Medium Dense Sandy Till							
			X								
			X								
			-								
			X	-----	25'	218.4					
		48	7	Dense Sandy Till							
			X								
			X								
			-								
			-	Boulders							
			-								
			-								
			-	-----	28.1	215.3					
			-	Bottom of Hole							
			-								
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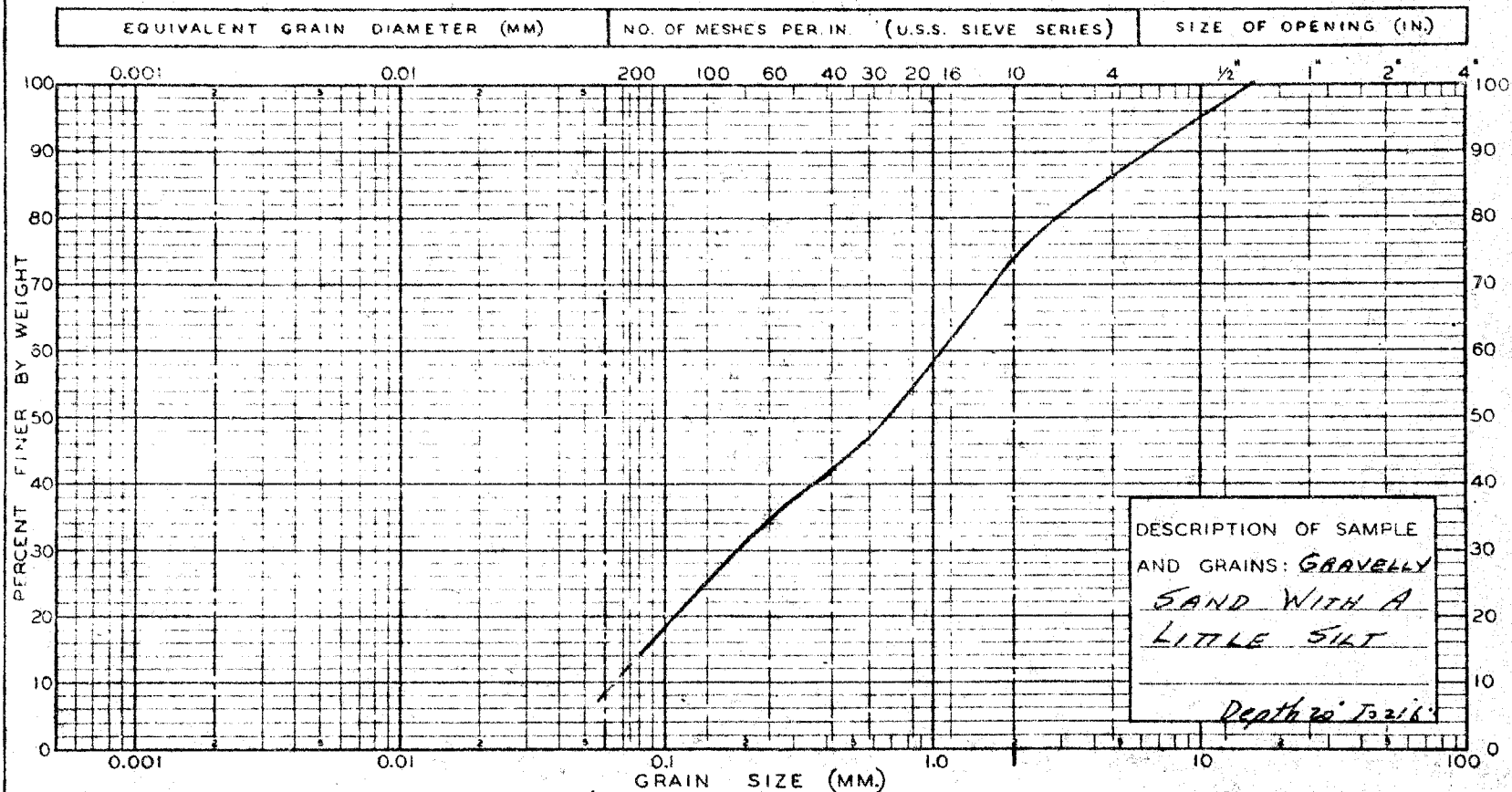
MECHANICAL ANALYSIS OF SOILS



PROJECT: <u>Qty Retaining Walls E-34B</u>		SAMPLE NO. #1 <u>298+00 722</u>
PLOTTED: <u>J.H.</u>	DATE: <u>15-7-59</u>	REMARKS: <u>0.02 To .105 Size About 38%</u>
CHECKED: <u>D.M.</u>	DATE: <u>15-7-59</u>	

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MECHANICAL ANALYSIS OF SOILS



DESCRIPTION OF SAMPLE
AND GRAINS: GRAVELLY
SAND WITH A
LITTLE SILT

Depth 20' To 21 1/2'

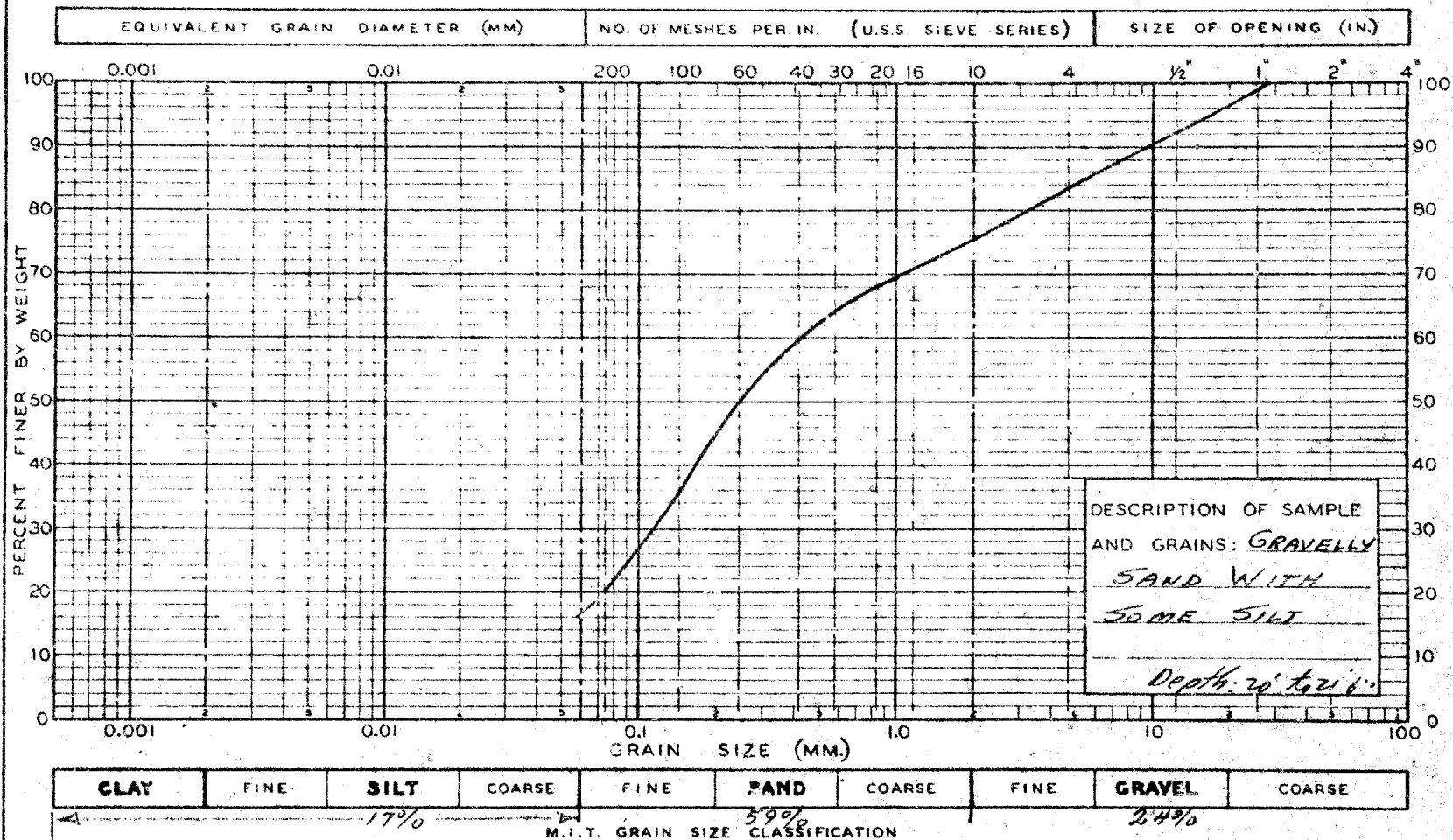
CLAY	FINE	SILT	COARSE	FINE	SAND	COARSE	FINE	GRAVEL	COARSE
		8%			66%			26%	

M.I.T. GRAIN SIZE CLASSIFICATION

PROJECT: QWY RETAINING WALL E-348 SAMPLE NO. 4-308100 64'R
 PLOTTED: 9.8 DATE: 15-7-52 REMARKS: 0.02 To .105 mm 19%
 CHECKED: D.M. DATE: 15-7-59

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MECHANICAL ANALYSIS OF SOILS



PROJECT: QWY RETAINING WALL - E-348 SAMPLE NO. 5- 302+00 71' R

PLOTTED: Q.H. DATE: 15-7-59 REMARKS: 0.02 to .105 ≈ 28%

CHECKED: D.M. DATE: 15-7-59

McROSTIE & ASSOCIATES
CONSULTING ENGINEERS

FORM 58

SAMPLE NO. 302+00 70' R

PLATE No 27

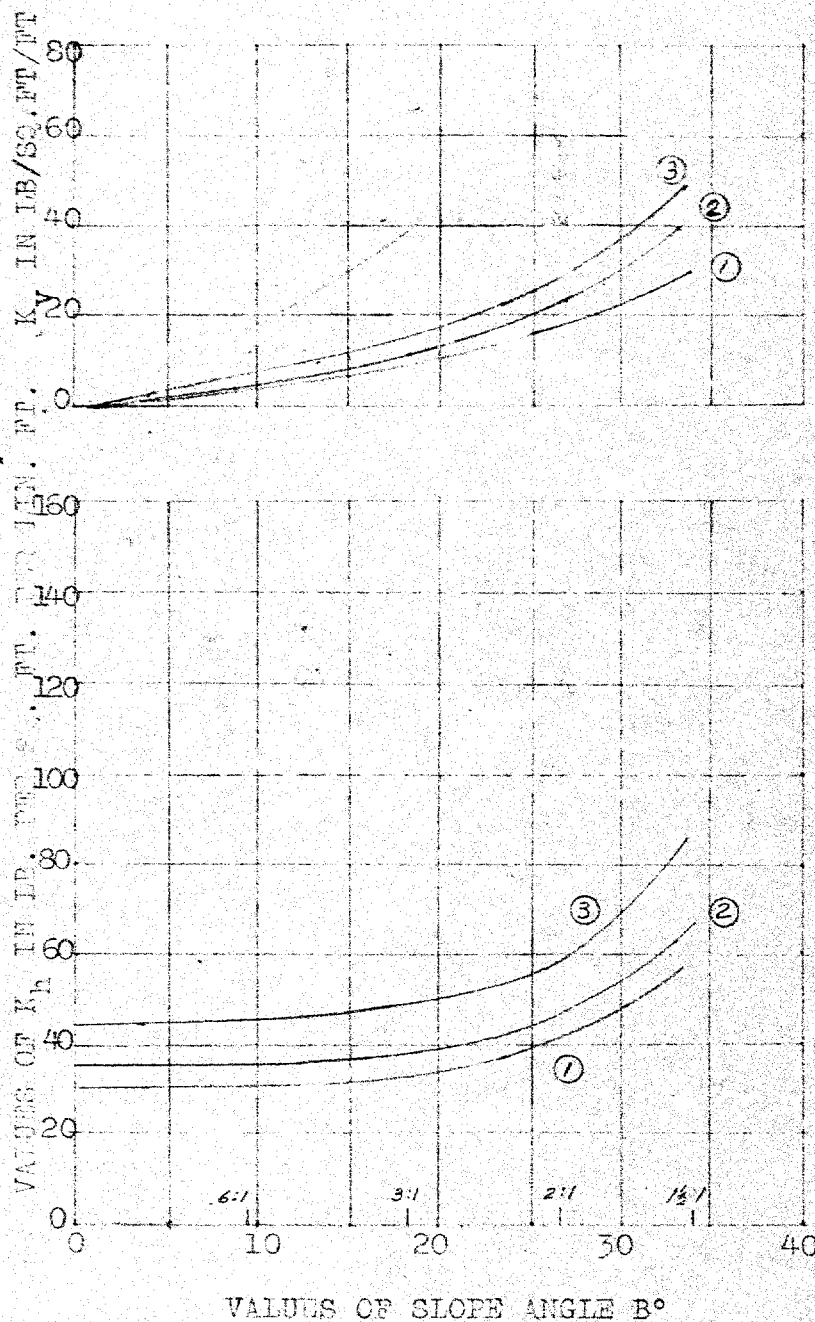


CHART FOR ESTIMATING PRECURE OF BACK-FILL AGAINST RETAINING WALLS SUPPORTING BACKFILLS WITH PLANE SURFACE

NOTES:

1. Numerals on curves indicate soil types.
2. From Terzaghi & Peck - soil mechanics in Engineering Practice.

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CONSULTING ENGINEERS

SCALE

PLATE 28

BA 927A

3165-121

REPORT NO. 2 ON SOILS INVESTIGATION

FOR

PROPOSED RETAINING WALLS

ALONG ROUTE OF OTTAWA QUEENSWAY

TO

DE LEUW CATHER & COMPANY OF CANADA LTD.

February 10, 1960.

Addendum to Soil
Report No. SF-434.



McROSTIE & ASSOCIATES LTD.
CONSULTING ENGINEERS
OTTAWA CANADA

MCROSTIE & ASSOCIATES LTD.

CONSULTING ENGINEERS

OTTAWA 1

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31G5-121

GEOCREP No.

393 BELL STREET
TELEPHONE CE. 2-5334

OTTAWA QUEENSWAY

RETAINING WALLS NO. 2

1. TERMS OF REFERENCE

We were requested by De Leuw Cather & Company of Canada Limited to carry out a soils investigation for certain proposed retaining walls along the route of the Ottawa Queensway. This report is to be an addendum to our previous Report No. SF-434 dated July 31, 1959.

2. CONCLUSIONS AND RECOMMENDATIONS

General

The general statements in section 2 as well as clauses 2.1 Safety Against Sliding, 2.2 Settlement, and 2.5 Backfill Pressures, of our previous Report No. SF-434, apply in this addendum.

2.1 Foundation Type

Footing type of foundation resting on the tills would be suitable for most of the locations covered in this investigation. The success of this however, depends on adequate groundwater control to preserve the natural strength of the tills. Our previous Report No. SF-434 indicated that at 309+ 00, 71' right, if a flexible type of retaining wall were not possible, pier or pile type of foundation should be used. Our findings at the 309 + 75, 62' right (east end of south retaining wall) show that a change of material exists and footing type of foundation is possible. With the backfill pressures and groundwater problem increasing westerly from this point, we can only assume that footing type of foundation would be adequate for only 10 feet west

of the end of the retaining wall; hence, pile type of foundation might be more feasible throughout this section.

2.2 Soil Strengths

The following recommended soil bearing capacities when not on rock are based on adequate groundwater control.

2.2.1 285 ± 50, 195' Right

Around elevation 218 3,000 POUNDS PER SQUARE
FOOT

2.2.2. 295 ± 00, 135' Right

Around elevation 223 2,000 POUNDS PER SQUARE
FOOT

Rock Surface
around elevation 218 20,000 POUNDS PER SQUARE
FOOT

2.2.3 294 ± 35, 255' Right

Around elevation 228 5,000 POUNDS PER SQUARE
FOOT

Rock Surface Around
elevation 226 20,000 POUNDS PER SQUARE
FOOT

2.2.4 307 ± 09, 75' Left

Around elevation 227 4,000 POUNDS PER SQUARE
FOOT

2.2.5 307 ± 91, 58' Left

Around elevation 228 2,000 POUNDS PER SQUARE
FOOT

Around elevation 225 4,000 POUNDS PER SQUARE
FOOT

2.2.6 309 ± 75, 62' Right

Around elevation 226 3,000 POUNDS PER SQUARE
FOOT

2.3 Construction Precautions

When the groundwater level is uncontrolled and is above the proposed footing elevation at the time of excavation, water coming up through the bottom of the excavation can destroy the natural density of the tills to be used for support, as well as sluffing in the sides. Groundwater control can be best accomplished by carrying out the work during the dry period of the year. The invert elevation of the proposed storm sewers have been studied and found to be at such depth that it would aid groundwater control considerably. We recommend that the storm sewers be installed prior to the retaining walls.

3. FIELD WORK

The drilling and sampling operations were carried out by our own drill rig, with one of our Soils Engineers making daily visits to the site.

Sampling in soils was by split barrel sampler with standard penetration tests carried out simultaneously. Where rock was encountered, it was core drilled to confirm same and percent core recoveries calculated to determine its soundness. In soils the investigation was carried down to at least $1\frac{1}{2}$ times the width of the wall base below the level of support.

Overnight water levels were carefully recorded throughout the field program.

All samples were field classified, logged, and brought into the laboratory for further study.

4. OBSERVATIONS

4.1 Soil Types

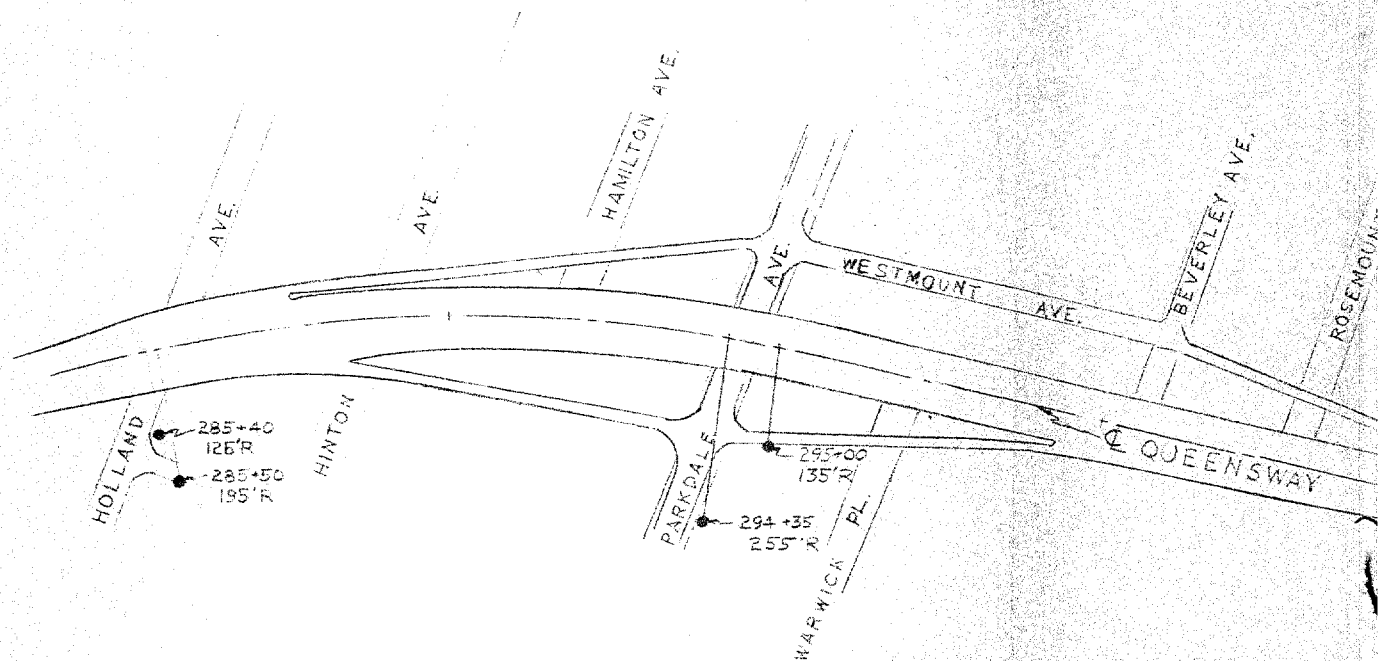
The soil types encountered are described in detail on Plates 2 to 8 but in general are as follows:

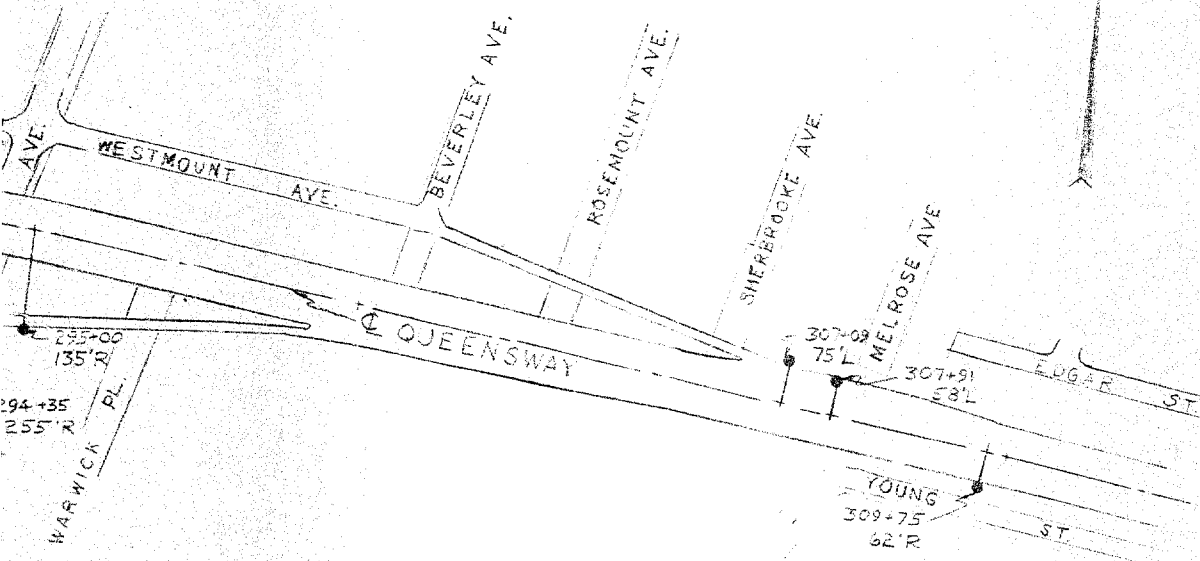
- 4.1.1 Holland Avenue and Sherwood Drive Area - sand or till in thicknesses of about 20 feet underlain by rock.
- 4.1.2 St. Matthias Anglican Church Area - Till of varying densities in thickness varying from 10 to 17 feet thick underlain by rock.
- 4.1.3 Stations 307+_09, 307+_91, 309+_75 - sand 2 TO 4 feet thick, underlain by till of varying densities from 10 to 18 feet thick, underlain by sand or rock.

The groundwater levels vary from 7 to 12 feet below the ground surface. Groundwater levels vary seasonally being normally highest in spring and autumn and lowest in summer and midwinter. These observations are considered at the seasonal low.

4.2 Laboratory

Moisture content tests were made on all soil samples and mechanical analysis on some till samples to confirm field classification and to determine their behaviour during construction.





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CONSULTING ENGINEERS

BOREHOLE LOCATIONS
QUEENSWAY
RETAINING WALLS #2

SCALE 1"=200

PLATE 1

McROSTIE & ASSOCIATES

CONSULTING ENGINEERS

OTTAWA CANADA

SOIL PROFILE AND SUMMARY OF FIELD AND LABORATORY TESTS

QWY, RETAINING
WALLS #2

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 227.1

DATE JAN. 21/60

HOLE NO.

REMARKS N.E. CORNER HOLLAND AND SHERWOOD DRIVE

285+40

ELEVATIONS GEODETIC

125'R

ELEVATIONS IN FEET							12511			
UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PROBING OR VANE TEST			
							LB. HAMMER		NO CASING	
							INCH DROP		INCH DIA. ROD	
GROUND SURFACE							BLOWS PER FOOT OR SHEAR STRENGTH IN KIPS PER FT. ²			
				TOPSOIL	0'	227.1				
				FINE SAND	2.0'	225.1'				
		16	1	HARD SILTY BROWNISH GRAY CLAY	4.7'	222.4'				
		35	2	DENSE TILL	7.5'	219.6'				
		25	3	MEDIUM DENSE FINE SAND & A FEW PEBBLES	12.5'	214.6'				
		21	4							
		35	5							
		42	6	DENSE FINE SAND WITH A FEW PEBBLES						
		32	7							
				ROCK	20.2'	206.9'				
				CORE RECOVERY - 75%						
				ROCK	24.2'					
				CORE RECOVERY - 97%						
				FRACTURED ROCK	29.2'					
				CORE RECOVERY - 70%						
				BOTTOM OF HOLE	30.6'	196.5'				
R - REMOULDED							% WATER CONTENT			
							NATURAL			
							LIQUID LIMIT			
							PLASTIC LIMIT			
							PLATE			
							2			

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CONSULTING ENGINEERS

OTTAWA CANADA

SOIL PROFILE AND SUMMARY OF FIELD AND LABORATORY TESTS

QWY. RETAINING
WALLS#2

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 235.7 DATE JAN. 25/60

REMARKS NORTHERLY SIDE ST. MATTHIAS ANGLICAN CHURCH. SEE PLATE 10

FOR MECHANICAL ANALYSIS OF SAMPLE. ELEVATIONS GEODETIC

HOLE No
295+00
135'R

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	—PROBING OR VANE TEST—			
							LB. HAMMER		NO CASING	
							INCH DROP		INCH DIA. ROD	
GROUND SURFACE — 7							BLOWS PER FOOT OR SHEAR STRENGTH IN KIPS PER FT. ²			
				TOPSOIL	0	235.7'				
					10	234.7'				
				DENSE SANDY TILL						
		74	1							
					6.7'	229.0'				
		30	2	MEDIUM DENSE TILL						
		23	3							
					12.5'	223.2'				
		10	4	LOOSE TILL						
		74		DENSE SANDY TILL	15'	220.7'				
					16.9'	218.8'				
				ROCK						
				CORE RECOVERY - 78%	19.9'					
				ROCK						
				CORE RECOVERY - 83%	21.9'					
				ROCK						
				CORE RECOVERY - 100%	24.2'					
				ROCK						
				CORE RECOVERY - 83%	26.8'	208.9'				
				— BOTTOM OF HOLE						
R - REMOULDED							0 10 20 30 40 50 % WATER CONTENT NATURAL O LIQUID LIMIT □ PLASTIC LIMIT Δ			
							PLATE 5			

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OTTAWA CANADA

SOIL PROFILE AND SUMMARY OF FIELD AND LABORATORY TESTS

QWY. RETAINING
WALLS #2

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 243.9' DATE FEB. 1/60

REMARKS SEE PLATE II FOR MECHANICAL ANALYSIS OF SAMPLE

HOLE NO.
307+09
75'L

ELEVATIONS GEODETIC

UNCOMPRESSED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	—PROBING OR VANE TEST—				
							.....LB. HAMMER		NO CASING		
							.....INCH DROP		.....INCH DIA. ROD		
GROUND SURFACE							—BLOWS PER FOOT OR SHEAR STRENGTH IN KIPS PER FT.—				
				TOPSOIL	0	243.8'					
				FINE SAND	1'						
					4'	239.9'					
		39	1	DENSE TILL			0				
		36	2		11.5'	232.4	0				
				MEDIUM DENSE TILL							
		17	3				0				
					17.5'	226.4'					
		52	4	DENSE TILL			0				
					20'						
		24 or 6"	5	DENSE SANDY TILL			0				
					22.5'	221.4'					
		4" DROP		FRACTURED ROCK							
				CORE RECOVERY - 64%							
				ROCK CORE RECOVERY - 100%	27.2'						
				ROCK CORE RECOVERY - 92%	27.7'						
				BOTTOM OF HOLE	28.8'	225.1					
R - REMOULDED							0 10 20 30 40 50 % WATER CONTENT NATURAL O LIQUID LIMIT □ PLASTIC LIMIT Δ				
							PLATE 6				

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CONSULTING ENGINEERS

OTTAWA CANADA

SOIL PROFILE AND SUMMARY OF FIELD AND LABORATORY TESTS

QWY RETAINING
WALLS #2

ELEVATION OF GROUND SURFACE (ZERO DEPTH) 238.7' DATE FEB. 3/60

HOLE NO.
309+75
62'R

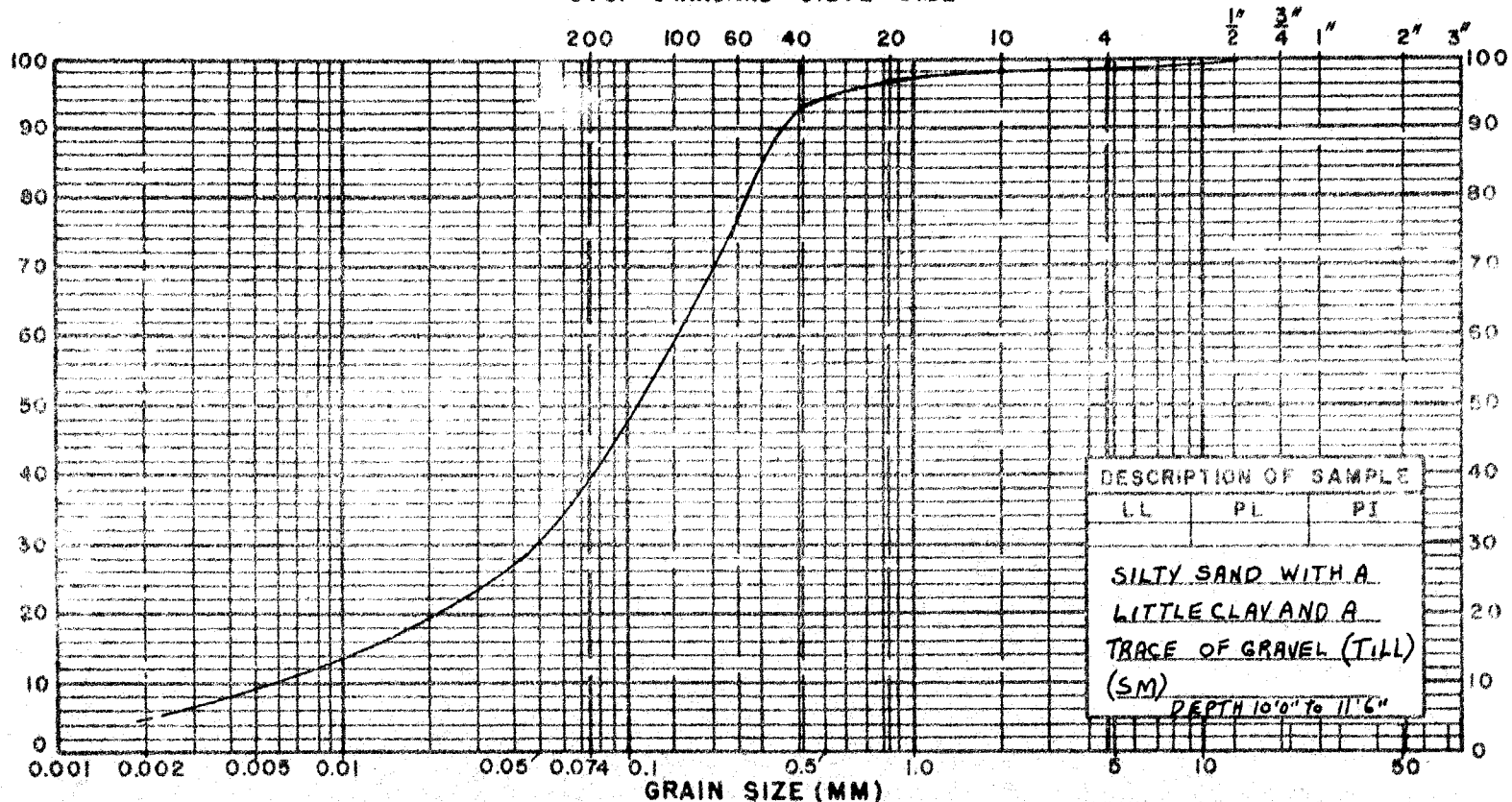
REMARKS SEE PLATE 13 FOR MECHANICAL ANALYSIS OF SAMPLE

ELEVATIONS GEODETIC

UNCONFINED COMPRESSIVE STRENGTH KIPS/FT. ²	SMALL SCALE PENETROMETER KIPS/FT. ²	STANDARD PENETRATION BLOWS/FT.	SAMPLE NUMBER	DESCRIPTION OF SOIL	DEPTH IN FEET	ELEVATION	PROBING OR VANE TEST					
							LB. HAMMER		NO CASING			
							INCH DROP		INCH DIA. ROD			
							BLOWS PER FOOT OR SHEAR STRENGTH IN KIPS PER FT. ²					
GROUND SURFACE												
				TOPSOIL	0	238.7'						
				FINE SAND	1.0'							
				MEDIUM DENSE TILL	3.0'	235.7'						
		21	1		6.5'	232.2'	0					
				DENSE TILL			0					
		42	2		12.5'							
		36	3	DENSE TILL WITH A 1 1/2" SILT LAYER	14'	224.7'	0					
		18	4	MEDIUM DENSE TILL								
		15	5									
		16	6		21.5'	217.2'						
				BOTTOM OF HOLE								
							0	10	20	30	40	50
							% WATER CONTENT					PLATE
							NATURAL 0					8
							LIQUID LIMIT 0					
							PLASTIC LIMIT Δ					

R - REMOULDED

UNIFIED SOIL CLASSIFICATION
MECHANICAL ANALYSIS OF SOILS
U. S. STANDARD SIEVE SIZE



DESCRIPTION OF SAMPLE
LL PL PI
SILTY SAND WITH A
LITTLE CLAY AND A
TRACE OF GRAVEL (TILL)
(SM)
DEPTH 10'0" TO 11'6"

CLAY OR SILT		SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE
40%			59%			1%

CRITERIA		
SOIL TYPE	Cu	Cc
GW	>4	1-3
SW	>6	1-3

PROJECT QWY RETAINING WALL E-449

SAMPLE No 285+50 195'R #2

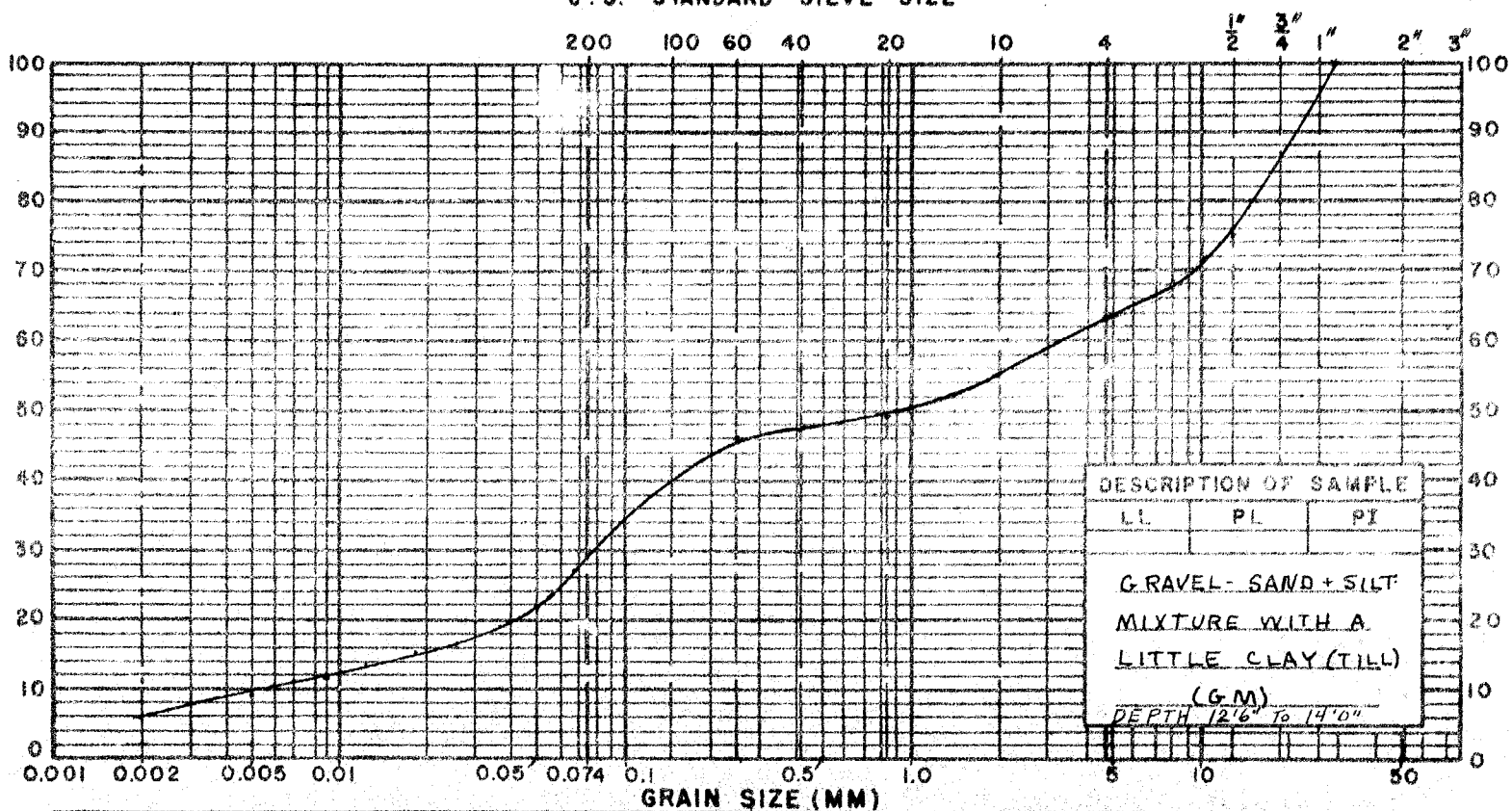
PLOTTED D.M DATE 9-2-60
CHECKED G.B DATE 10-2-60

REMARKS 002 TO .105 SIZE = 46%

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UNIFIED SOIL CLASSIFICATION
MECHANICAL ANALYSIS OF SOILS
U.S. STANDARD SIEVE SIZE

PERCENT FINER BY WEIGHT



CLAY OR SILT		SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE
29%			34%		37%	

CRITERIA		
SOIL TYPE	Cu	Cc
GW	> 4	1-3
SW	> 6	1-3

PROJECT QUEENS WAY RETAINING WALL E-459

SAMPLE No. 295+00
135'R #4

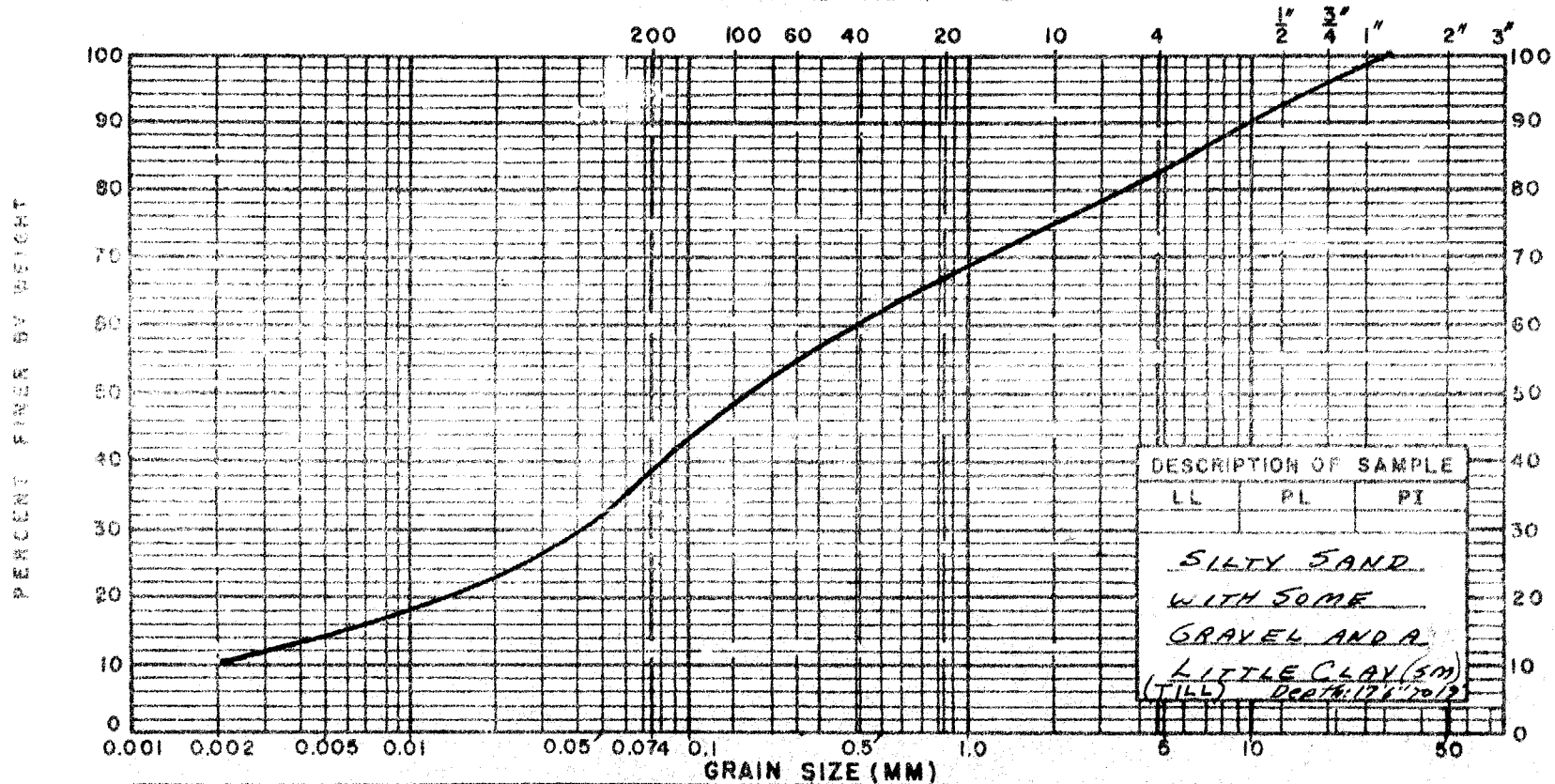
PLOTTED D.M. DATE 9-2-60

REMARKS .002 TO .105 SIZE = 30%

CHECKED G.B. DATE 10-2-60

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UNIFIED SOIL CLASSIFICATION
MECHANICAL ANALYSIS OF SOILS
U. S. STANDARD SIEVE SIZE



DESCRIPTION OF SAMPLE

LL PL PI

SILTY SAND
WITH SOME
GRAVEL AND A
LITTLE CLAY (SM)
(TILL) DEPTH 12' TO 13'

CLAY OR SILT		SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE
39%			43%			18%

CRITERIA		
SOIL TYPE	Cu	Cc
GW	> 4	1-3
SW	> 6	1-3

PROJECT E449-QUEENSWAY RETAINING WALL

SAMPLE No. 307109
752 #4

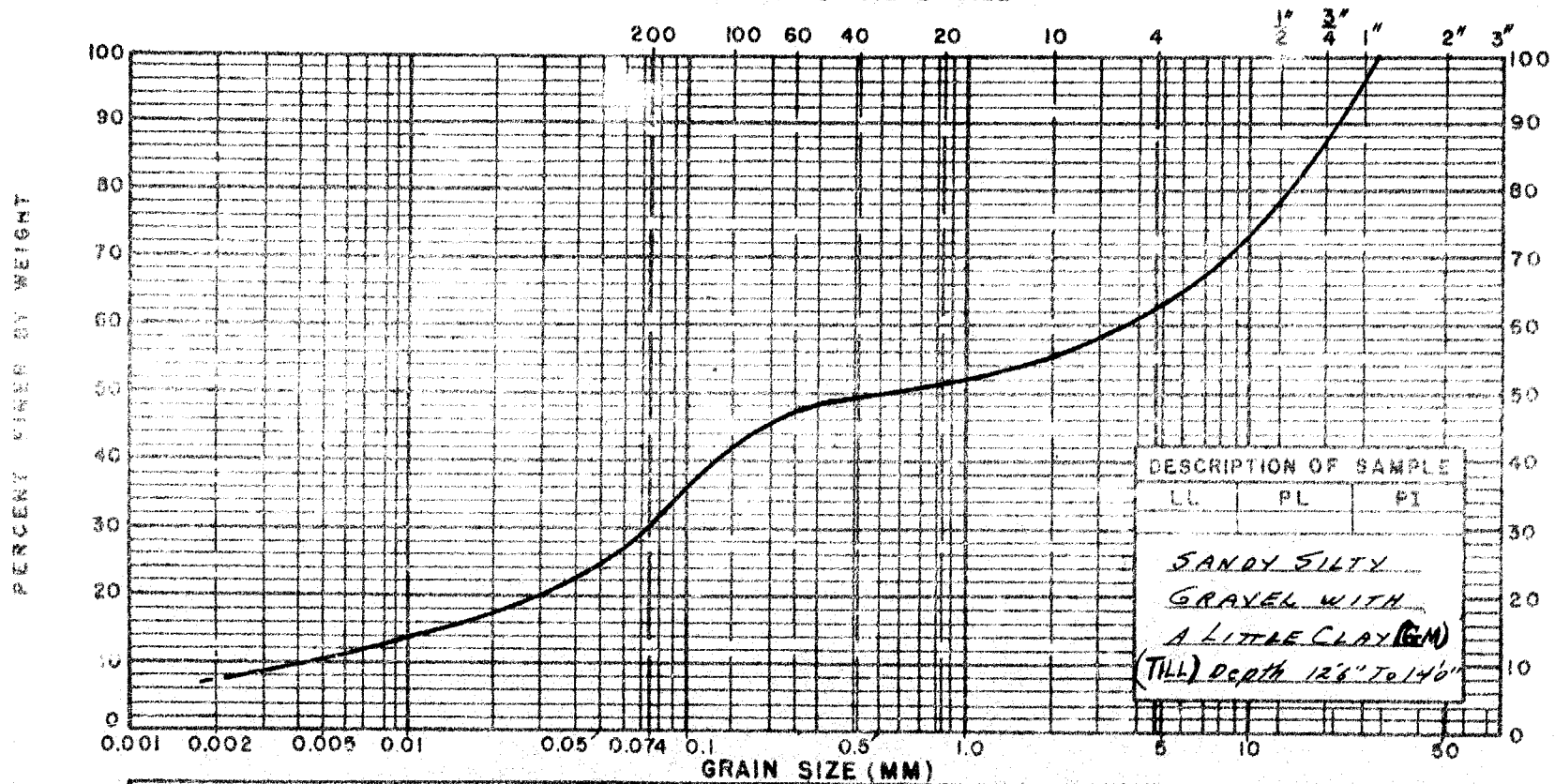
PLOTTED A.G. DATE 8-3-60

REMARKS

CHECKED D.M. DATE 9-2-60

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UNIFIED SOIL CLASSIFICATION
MECHANICAL ANALYSIS OF SOILS
U.S. STANDARD SIEVE SIZE



CLAY OR SILT		SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE
30%			33%		37%	

CRITERIA		
SOIL TYPE	Cu	Cc
GW	> 4	1-3
SW	> 6	1-3

PROJECT E-449 QUEENSWAY RETAINING WALL

SAMPLE No. 307+91
584 #3

PLOTTED A.G. DATE 8-2-60

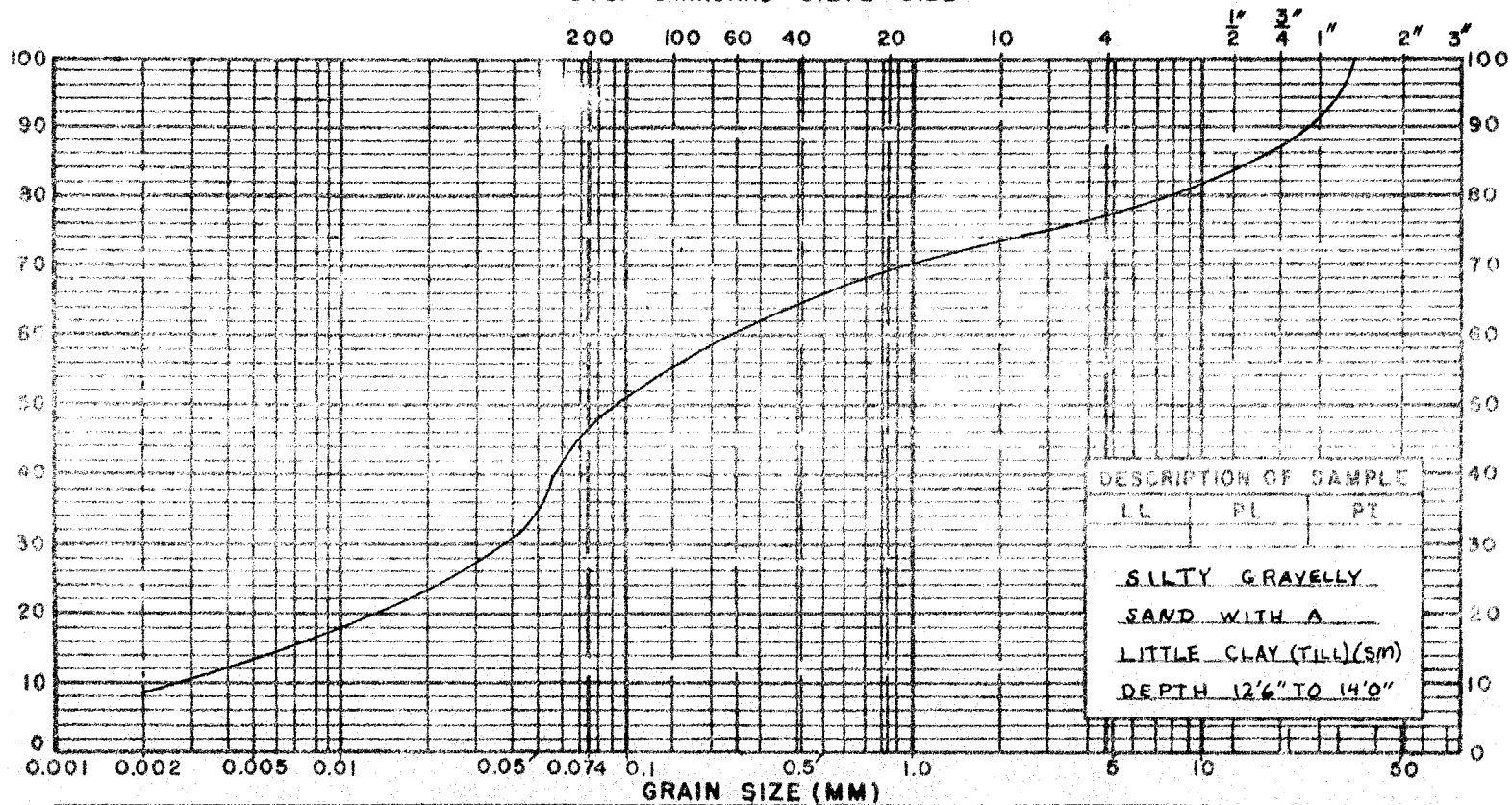
REMARKS 002 to 105 size = 30%

CHECKED D.M. DATE 9-2-60

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**UNIFIED SOIL CLASSIFICATION
MECHANICAL ANALYSIS OF SOILS
U.S. STANDARD SIEVE SIZE**

PERCENT FINER BY WEIGHT



DESCRIPTION OF SAMPLE
LL PL PT
SILTY GRAVELLY
SAND WITH A
LITTLE CLAY (TILL) (sm)
DEPTH 12'6" TO 14'0"

CLAY OR SILT		SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE
	47%		30%			23%

CRITERIA		
SOIL TYPE	Cu	Cc
GW	>4	1-3
SW	>6	1-3

PROJECT QUEENSWAY RETAINING WALL E-449

SAMPLE No. 309 + 75
62' R #3

PLOTTED D.M. DATE 9-2-60

REMARKS .002 TO .105 SIZE = 44%

CHECKED G.B. DATE 10-2-60

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