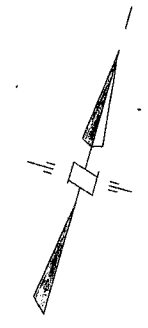
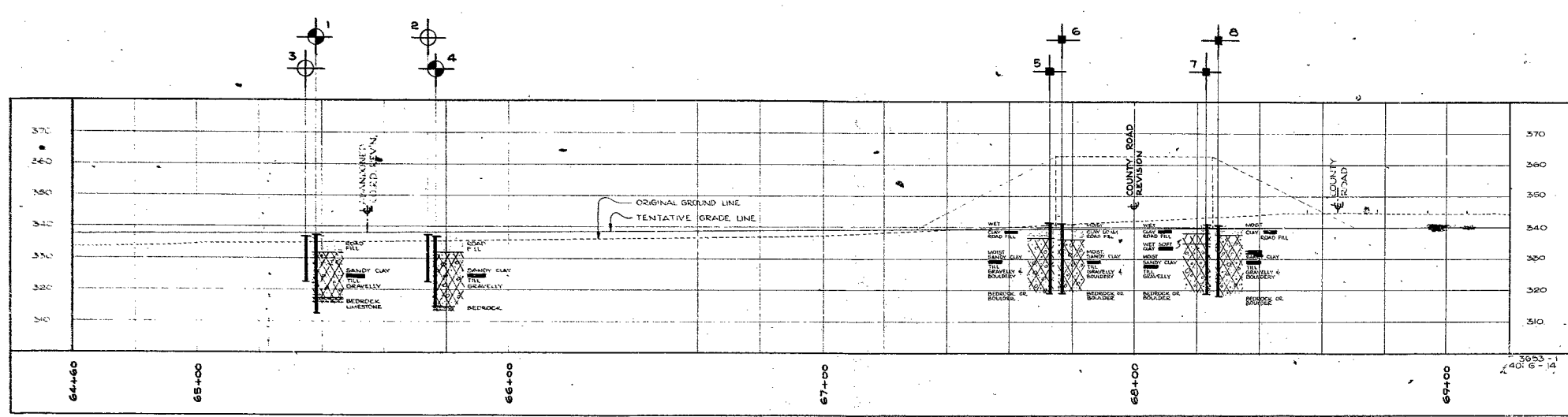
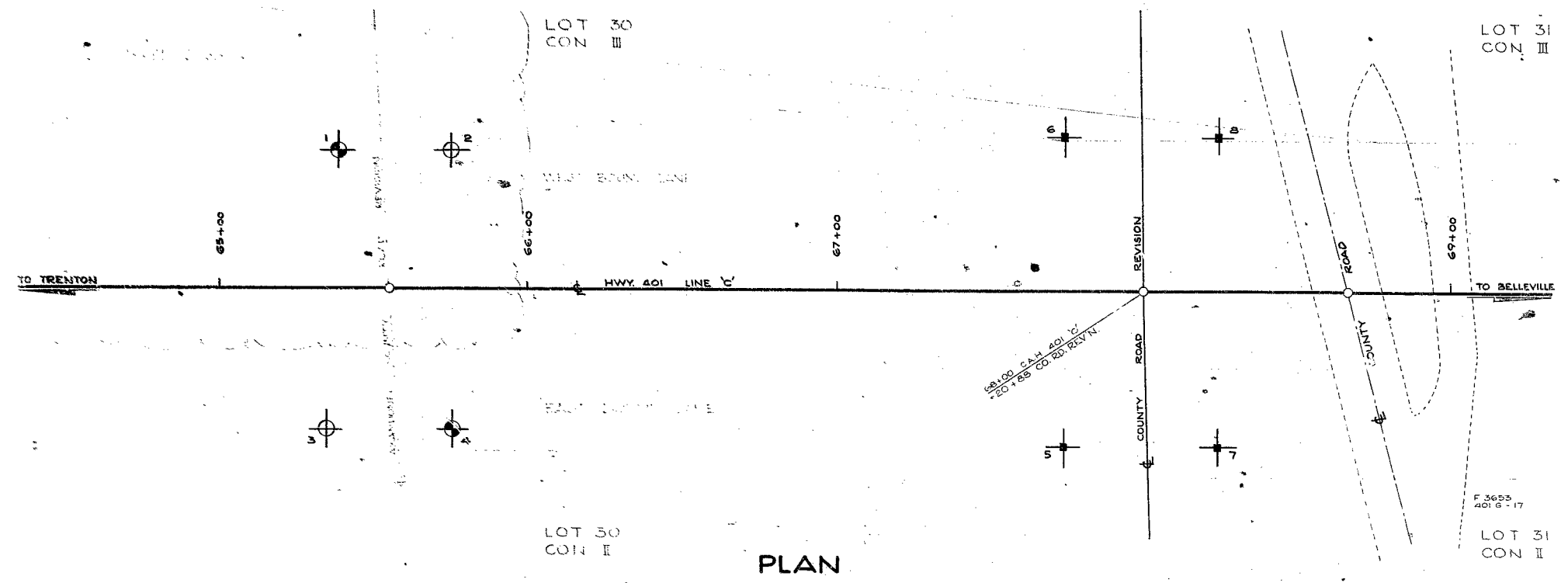


# 57-F-45  
W.P. # 45-57  
Hwy. # 401 E.  
CTY. RD. REV.  
CON. # 2 E. # 3  
2 MILES W. OF  
BELLEVILLE



SOME DEFECTS IN NEGATIVE DUE  
TO CONDITION OF ORIGINAL DOCUMENTS



LEGEND			
AUGER HOLE			
BORE HOLE			
PENETRATION HOLE			
BORE & PENETRATION HOLE			
HOE NO	ELEVATION	STATION	DISTANCE FROM E
1	337.5'	65+36'	45' LT
2	337.5'	65+75'	45' LT
3	336.8'	65+35'	45' RT
4	337.0'	65+76'	45' RT
5	341.74'	67+75'	50' RT
6	341.43'	67+75'	50' LT
7	341.17'	68+25'	50' RT
8	340.99'	68+25'	50' LT

NOTE  
THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BORE HOLE LOCATIONS. BETWEEN BORE HOLES THE BOUNDARIES ARE ASSUMED FROM CORRELATIONAL EVIDENCE AND MAY BE SUBJECT TO CONSIDERABLE ERROR.

DEPARTMENT OF HIGHWAYS - ONTARIO		
MATERIALS & RESEARCH SECTION - DOWNSVIEW		
COUNTY ROAD REVISION PR. 2 M. 15 D. ROSSING W. C. BELLEVILLE SHOW. SITION & ELEVATION OF HOLES		
HWY. NO. 401 LINE 'C'	W.P. 45-57	DIV. NO. 5
CO. HASTINGS		
TWP. SIDNEY	LOTS 30 & 31	CON'S I & II
SCALE 1 IN = 20 FT	SUBMITTED BY	DATE 28 APRIL 58
DRAWN BY R.E.F.	APPROVED BY	DRAWING NO F-57-45A

Mr. A. M. Toye,

August 10, 1959.

Bridge Engineer.

Materials & Research Section. 2 Mi. W. of Belleville - W.P. 44-55

Re: Foundation Report - Hwy. 401

Line 'C' & County Road Revision, Approx.

W.J. P-57-45.

Attention: Mr. E. McConchie.

This memo accompanies our detailed report on the foundation investigation recently completed at the above noted structure site. A change in the initial proposed revision resulted in a change in structure location and necessitated additional borings at this site.

The attached report presents the detailed results of the four borings carried out. Reference to the contents of the report shows that:-

- (1) The site is covered by dense sandy clay till followed by limestone bedrock.
- (2) Subsoil conditions are such that at Elev. 332' (approx. 9 ft. below existing ground surface) or below, for footings typically 7' to 10' wide, a footing pressure of at least 3 t.s.f. can be used for spread footing design. Settlement consequent upon application of this bearing pressure will be within tolerable limits.
- (3) No excessive seepage problems during footing excavations are anticipated.
- (4) No approach fill stability problems are anticipated.

If we can be of further assistance in the clarification of data or recommendations contained in the report, please contact our office.

AKL/ndef  
Encl.

cc: Messrs. A. M. Toye  
H. A. Fegaskes  
D. G. Ramsey  
S. Markiewicz  
T. A. Sharpe  
J. Cruspier  
A. Watt

L. G. Soderman,  
PRINCIPAL SOILS & FOUNDATIONS ENGR.  
per:

*AKKHL*  
(A. K. Loh,  
Foundation Project Engr.)

Foundation Section.  
Gen. Files.

# FOUNDATION REPORT

on

Hwy. 401, Line 'C' & County Road Revision,  
Lots 30 & 31, Con's. II & III, Twp. of Sidney,  
Approximately 2 Miles West of Belleville.

---

Plan No: F-3653.

Profile No: F-3653-1.

Chainage: Sta. 68+00.

## Distribution:

Mr. A. M. Toye, Bridge Engineer.	(2)
Mr. H. A. Tregaskes, Construction Engineer.	(1)
Mr. D. G. Ramsay, Design Engineer.	(1)
Mr. S. Markiewicz, Project Design Engr.	(1)
Mr. T. A. Sharpe, District Engr., Kingston.	(1)
Mr. J. Gruspier, Regional Soils Engr.	(1)
Mr. A. Watt, Ontario Water Resources Commission.	(1)
Foundation Section.	(1)
Gen. Files.	(1)

W.P. 45-57.

W.J. F-57-45.

## INTRODUCTION:

Presented in this report are the results of a subsoil investigation carried out at a structure location approximately 2 miles west of Belleville where Hwy. 401 'C' underpasses the county road revision in lots 30 & 31, Con's. II & III, Twp. of Sidney. This report contains the field and laboratory findings and recommendations for the foundation of the structure.

A change in the initial proposed revision resulted in a change in structure location and necessitates additional borings. Initially, a county road revision was proposed at chainage - Sta. 65+55. This was later relocated approximately 250 ft. east of the initial proposed crossing at chainage Sta. 68+00. Four auger borings were carried out at the final proposed crossing to confirm that the subsoil findings were similar to the initial investigation. Results of both investigations have been presented and are included in this report.

## DESCRIPTION OF THE SITE & GEOLOGY:

The site is drumlinized. The areas on both sides of Hwy. 401 are presently in pasture or woods. During both investigations, Hwy. 401 was under construction. At both crossings the upper 3 to 5 ft. of subsoil had been excavated and replaced by backfill material of sandy clay.

Physiographically, the site under consideration is located on the Peterborough Drumlin Field, a rolling till plain overlying the Black River limestone formation. At this site, approximately 20 ft. of dense clay till overlies the limestone bedrock.

FIELD WORK:

The field work associated with this investigation, was carried out on two separate occasions. An initial boring programme consisted of 2 sampled boreholes with dynamic cone penetration tests and 2 separate dynamic cone penetration tests. This programme was carried out using a standard diamond drill adapted for soil sampling at the initial proposed revision, Sta. 65+55 between November 1 and November 7, 1957. After the completion of this investigation, the proposed crossing was revised and relocated at Sta. 68+00. As a result of this change in alignment, a supplementary investigation consisting of 4 boreholes, was carried out by a power auger on March 26, 1958. This investigation confirmed similar subsoil findings at both the investigated sites. Sampling was not carried out in the auger holes since the power auger was not equipped for soil sampling. Chunk samples from the auger holes were visually examined and identified. In view of the similarity in geological formation as well as subsoil conditions, it is felt justified to assume that the strength and compressibility characteristics of the subsoil at the final proposed site are of the same order as at the initial proposed site.

Borings 1 & 4 were advanced by conventional wash boring procedures. Samples were recovered at depth required, by means of 2" I.D. thin-walled shelly tube samplers or a 2" O.D. split barrelled spoon sampler. The dimensions of this spoon sampler and the energy used in driving it, conform to the requirements of the Standard Penetration Test. Bedrock was drilled and cored 5 ft. to determine its quality and soundness. Borings 5, 6, 7 & 8, were advanced by conventional auger boring procedures. No samples were

FIELD WORK: ( cont'd. ) ...

obtained since the power auger was not equipped for soil sampling. Chunk samples that came up with the auger were kept for identification purposes.

Upon receipt in the laboratory, samples were visually examined and identified. Routine index tests were performed on selected representative samples. Laboratory test results have been presented in the borehole logs and detailed in Table No. 1 under Appendix I.

The location plan and subsoil profile are presented in Drawing No. F-57-45A.

SUBSOIL CONDITIONS:

The site is underlain by dense clay till of glacial origin, overlying limestone bedrock of the Black River Series.

In each of the boreholes, the 3 to 5 ft. thick clay fill was found to be underlain by the dense sandy clay till stratum extending from Elevations 336' - 331' to 319' - 315'. Underneath the till stratum, bedrock was encountered at Elev. 319' to 315'. Bedrock was cored from Elev. 3175' to 3125' in Boring 1 to determine its quality and soundness.

In general, the dense clay till contains predominantly clay and coarse gravel with various percentages of sand and silt. The average moisture content was found to be 10%. Field penetration test results show a minimum "N" value (standard penetration resistance expressed in blows per foot) of 50 can be obtained in the dense till. Due to the gravelly and bouldery nature of the till,

cont'd. /4 ...

SUBSOIL CONDITIONS: (cont'd.) ...

laboratory strength tests cannot be carried out on the samples. It is almost non-plastic.

Underneath the dense clay till, bedrock was encountered. Bedrock is composed of limestone of the Black River series. The limestone is in a sound condition with no sign of fracture or weathering. Bedrock is at Elev. 319' to 315'.

Field and laboratory test results have been presented and summarized in Table No. 1 and are included in this report under Appendix I.

WATER CONDITIONS:

Observations and measurements carried out during the boring programme, indicate that the ground water table at the site is at or close to the ground surface at approximately Elev. 341'. In view of the fact that no water-bearing sand seams of any significance, or artesian water conditions were encountered in the upper 20 ft. of subsoil, seepage inflow during footing excavations, will be local and of minor quantities, only.

FOUNDATION CONSIDERATIONS:

The dense sandy clay till is competent to provide adequate foundation support for the proposed structure. Subsoil conditions are such that at Elev. 332' or below (approx. 9 ft. below existing ground surface) spread footing support can be obtained in the dense sandy clay till. At this elevation or below, for footings of 7' to 10' in width, a bearing pressure of 3 t.s.f. (which incorporates a safety factor of 3) can be used for spread footing

cont'd. /5 ...



FOUNDATION CONSIDERATIONS: (cont'd.) ...

design. Settlement consequent upon application of this bearing pressure, will be within tolerable limits.

No excessive seepage problems with respect to footing excavations are anticipated.

Under the proposed grade line of the revised County road, the maximum height of fill is approximately 20 ft. The subsoil can safely support this embankment loading.

CONCLUSIONS & RECOMMENDATIONS:

- (1) The site is covered by dense sandy clay till followed by limestone bedrock.
- (2) Subsoil conditions are such that at Elev. 332' (approx. 9 ft. below existing ground surface) or below, for footings 7' to 10' wide, a bearing pressure of at least 3 t.s.f. can be used for spread footing design. Settlement consequent upon application of this bearing pressure will be within tolerable limits.
- (3) No serious ground water problems during footing excavations, are anticipated.
- (4) No approach fill stability problems are anticipated.

*AKLoh*

A. K. Loh,  
Foundation Project Engineer.

APPENDIX I.

# SUMMARY OF FIELD & LABORATORY TESTS

JCS P 57 - 45

W.P. 45 - 57

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOWS FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
1	S1	8'-9'6"	Dense grey sandy clay till, gravelly	56	9.1	--	--	-----	146.	
	S2	14'-15'6"	" " " " " "	55	9.0	--	--	-----	-----	
	S3	19'-20'	" " " " " "	>100	---	--	--	-----	-----	
	R4	20'-25'	Sound limestone	----	---	--	--	-----	-----	
4	T1	5'-7'	Dense grey sandy clay till, gravelly	31	10.5	--	--	-----	135.0	
	T2	10'-12'	" " " " " "	49	7.4	--	--	-----	140.0	
	S3	15'-16'6"	" " " " " "	62	12.8	--	--	-----	144.0	
	S4	20'-21'6"	" " " " " "	81	6.8	--	--	-----	-----	
			S1 Denotes spoon sample							
			T1 Denotes thin-walled Shelby tube							

## MATERIALS AND RESEARCH SECTION

W.P. 45-57 BORE HOLE NO. 1

JOB F57 - 45 STATION 65 + 38 (45' LT)




DATUM Elev. 337.5' COMPILED BY A.L.

BORING DATE Nov. 6/57 CHECKED BY                     

2" DIA. SPLIT TUBE  
2" SHELBY TUBE  
2" SPLIT TUBE  
2" DIA. CONE  
2" SHELBY  
CASING

### LEGEND

1/2 UNCONFINED COMPRESSION (Qu) -----	O
VANE TEST (C) AND SENSITIVITY (S) -----	+S
NATURAL MOISTURE AND	
LIQUIDITY INDEX -----	LI
LIQUID LIMIT -----	X
PLASTIC LIMIT -----	

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F.	
	↓ Ground level				
	Clay fill	337.5	0		
			5		
		331.5	10		
	Dense sandy clay till gravelly		15		
			20		
	Bedrock	317.5	25		
	Limestone	312.5	30		
	End of hole				

BLOWS/FT.

50 100 150 200

Ref. 9 @ 10' to 32.5'

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 45-57 BORE HOLE NO. 2

JOB F57 - 45 STATION 68/75 (45' LT)

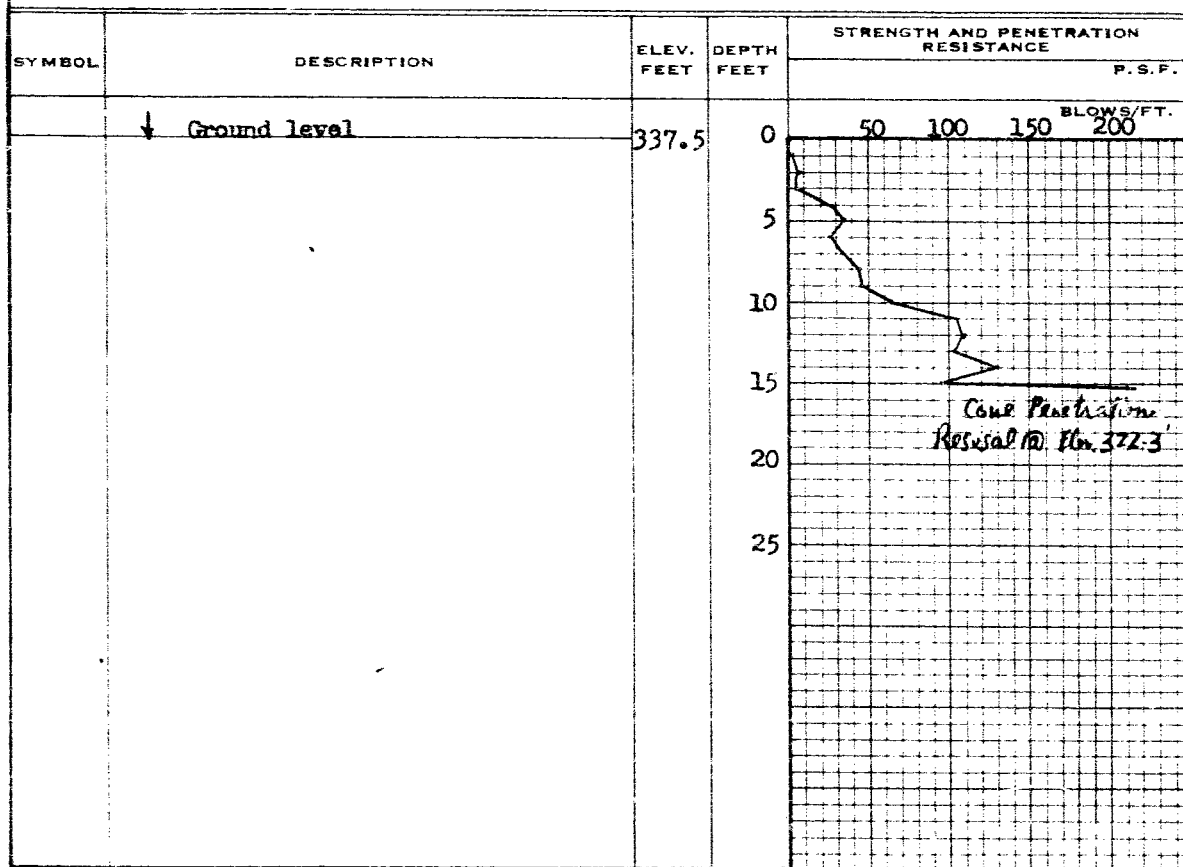
DATUM Elev. 337.5 \_\_\_\_\_ COMPILED BY A.J. \_\_\_\_\_

BORING DATE Nov. 1/57 CHECKED BY \_\_\_\_\_

2" DIA. SPLIT TUBE \_\_\_\_\_  
2" SHELBY TUBE \_\_\_\_\_  
2" SPLIT TUBE \_\_\_\_\_  
2" DIA. CONE \_\_\_\_\_  
2" SHELBY \_\_\_\_\_  
CASING \_\_\_\_\_

### LEGEND

1/2 UNCONFINED COMPRESSION (Qu) -----	○
VANE TEST (C) AND SENSITIVITY (S) -----	+s
NATURAL MOISTURE AND	LI
LIQUIDITY INDEX -----	X
LIQUID LIMIT -----	○
PLASTIC LIMIT -----	○

[illegible]

## MATERIALS AND RESEARCH SECTION

BORING DATE Nov. 2/57 CHECKED BY \_\_\_\_\_

2" DIA. SPLIT TUBE \_\_\_\_\_  
2" SHELBY TUBE \_\_\_\_\_  
2" SPLIT TUBE \_\_\_\_\_  
2" DIA. CONE \_\_\_\_\_  
2" SHELBY \_\_\_\_\_  
CASING \_\_\_\_\_

1/2 UNCONFINED COMPRESSION (Qu) --- 0  
VANF TEST (C) AND SENSITIVITY (S) --- +  
NATURAL MOISTURE AND LIQUIDITY INDEX --- X  
LIQUID LIMIT ---  
PLASTIC LIMIT ---

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
					P.S.F.
↓	Ground level	336.8	0	BLOWS/FT.	
			5		
			10		
			15	Cone Penetration Refusal @ Elev. 322.3	
			20		
			25		

[illegible]

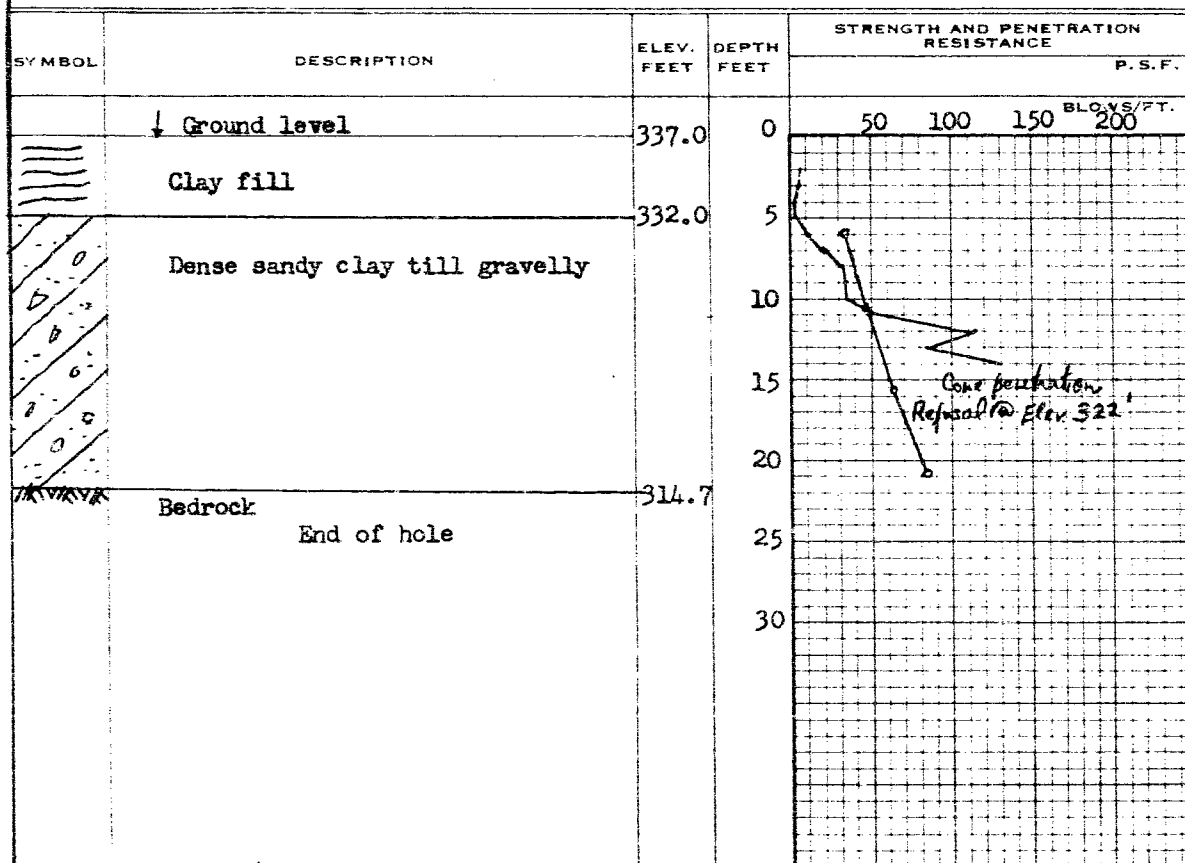
# DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 45-5 BORE HOLE NO. 4  
 JOB F57-45 STATION 65+76 (45' RT)  
 DATUM Elev. 337.0' COMPILED BY A.L.  
 BORING DATE Nov. 7/57 CHECKED BY \_\_\_\_\_

2" DIA. SPLIT TUBE \_\_\_\_\_  
 2" SHELBY TUBE \_\_\_\_\_  
 2" SPLIT TUBE \_\_\_\_\_  
 2" DIA. CONE \_\_\_\_\_  
 2" SHELBY \_\_\_\_\_  
 CASING \_\_\_\_\_

## LEGEND

1/2 UNCONFINED COMPRESSION ( $Q_u$ ) \_\_\_\_\_ O  
 VANE TEST (C) AND SENSITIVITY (S) \_\_\_\_\_ +  
 NATURAL MOISTURE AND LIQUIDITY INDEX \_\_\_\_\_ LI  
 LIQUID LIMIT \_\_\_\_\_ X  
 PLASTIC LIMIT \_\_\_\_\_



CONSISTENCY			SAMPLE	NATURAL
MOIST. CONTENT- % DRY WT.				UNIT WT
10	20	30		P.C.F.

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 45 - 57 BORE HOLE NO. 5

JOB F57 - 45 STATION 67° 75' (50' BT)




DATUM Elev. 341.7 \_\_\_\_\_ COMPILED BY \_\_\_\_\_ A.L. \_\_\_\_\_

BORING DATE Mar. 26/58 CHECKED BY \_\_\_\_\_

2" DIA. SPLIT TUBE \_\_\_\_\_  
 2" SHELBY TUBE \_\_\_\_\_  
 2" SPLIT TUBE \_\_\_\_\_  
 2" DIA. CONE \_\_\_\_\_  
 2" SHELBY \_\_\_\_\_  
 CASING \_\_\_\_\_

### LEGEND

1/2 UNCONFINED COMPRESSION (Qu) _____	O
VANE TEST (C) AND SENSITIVITY (S) _____	S
NATURAL MOISTURE AND	
LIQUIDITY INDEX _____	LI
LIQUID LIMIT _____	X
PLASTIC LIMIT _____	

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F.	
	↓ Ground level	341.7	0		
	Clay fill	336.7	5		
	Dense grey sandy clay till gravelly	319.2	10		
			15		
			20		
	Probably bedrock		25		
	end of auger borehole		30		

[illegible]



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 45 - 57 BORE HOLE NO. 6

JOB F57 - 45 STATION 67#75 (50' LT)


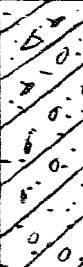

DATUM Elev. 341.4 \_\_\_\_\_ COMPILED BY A.L. \_\_\_\_\_

BORING DATE Mar. 26/58 CHECKED BY \_\_\_\_\_

2" DIA. SPLIT TUBE -----  
2" SHELBY TUBE -----  
2" SPLIT TUBE -----  
2" DIA. CONE -----  
2" SHELBY -----  
CASING -----

### LEGEND

1/2 UNCONFINED COMPRESSION (Qu) ———— O  
VANE TEST (C) AND SENSITIVITY (S) ———— +  
NATURAL MOISTURE AND LIQUIDITY INDEX ———— LI  
LIQUID LIMIT ———— X  
PLASTIC LIMIT ————

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P.S.F. BLOWS/FT.	
	Ground level	341.4	0		
	Clay fill	336.4	5		
	Dense grey sandy clay till gravelly		10		
			15		
			20		
	Probably bedrock	319.4	25		
	end of auger borehole		30		

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 45 - 57 BORE HOLE NO. 7

JOB F57-45 STATION 68/25 (50' RT)



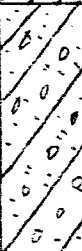

DATUM Elev. 341.2 COMPILED BY A.L.

BORING DATE Mar. 26/58 CHECKED BY \_\_\_\_\_

2" DIA. SPLIT TUBE \_\_\_\_\_  
2" SHELBY TUBE \_\_\_\_\_  
2" SPLIT TUBE \_\_\_\_\_  
2" DIA. CONE \_\_\_\_\_  
2" SHELBY \_\_\_\_\_  
CASING \_\_\_\_\_

### LEGEND

1/2 UNCONFINED COMPRESSION (Qu) _____	O
VANE TEST (C) AND SENSITIVITY (S) _____	+ S
NATURAL MOISTURE AND	
LIQUIDITY INDEX _____	X
LIQUID LIMIT _____	
PLASTIC LIMIT _____	

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				P.S.F.			
	↓ Ground level			BLOWS/FT.			
	Clay fill	341.2	0				
		338.2					
	Soft grey sandy clay (very wet)	335.2	5				
	Dense grey sandy clay till, gravelly		10				
			15				
			20				
	Probably bedrock	319.2	25				
	end of auger borehole		30				

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS AND RESEARCH SECTION

W.P. 45 - 57 ----- BORE HOLE NO. 8 -----

JOB F57 - 45 STATION 68/25 (50' IT)


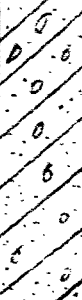
DATUM Elev. 341' \_\_\_\_\_ COMPILED BY A.L.

BORING DATE Mar. 26/58 CHECKED BY                     

2" DIA. SPLIT TUBE  
2" SHELBY TUBE  
2" SPLIT TUBE  
2" DIA. CONE  
2" SHELBY  
CASING

## LEGEND

1/2 UNCONFINED COMPRESSION (Qu)	---	0
VANE TEST (C) AND SENSITIVITY (S)	---	+5
NATURAL MOISTURE AND		
LIQUIDITY INDEX	---	LI
LIQUID LIMIT	---	X
PLASTIC LIMIT	---	---

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				P.S.F.			
	↓ Ground level			BLOWS/FT.			
	Clay fill	341.0	0				
		338.0					
	Dense grey sandy clay till, gravelly		5				
			10				
			15				
			20				
		318.5					
	Probably bedrock		25				
	end of auger borehole						

[illegible]

## UNCONFINED COMPRESSION TEST

SOIL SAMPLE \_\_\_\_\_

LOCATION F57-95 BORING NO. 1 SAMPLE DEPTH 19'-16'

LAB. SAMPLE NO. 57-S-30741 CIRCUMFERENCE 1 3/8" DATE TESTED Dec 14/57

SPECIFIC GRAVITY \_\_\_\_\_ INITIAL AREA,  $A_0$  \_\_\_\_\_ TESTED BY J. Brown

CALIBRATION FACTOR \_\_\_\_\_ INITIAL LENGTH,  $L_0$  15 1/16" PROVING RING NO. 328

**WATER CONTENT:**

SPECIMEN LOCATION	Moisture	Moisture	Density	ENTIRE REMOLDED SPECIMEN
CONTAINER NO.	6	42		
WT. CONTAINER + WET SOIL IN g.	92.7	79.5	945	
WT. CONTAINER + DRY SOIL IN g.	86.7	74.2		
WT. WATER, $W_w$ , IN g.	6.0	5.3		
WT. CONTAINER IN g.	17.6	17.8	109	
WT. DRY SOIL, $W_s$ , IN g.	69.1	56.4	136	
WATER CONTENT, $w$ , IN %	8.7%	9.4%	151.0 $\frac{lb}{cu. ft.}$	

[illegible]REMARKS: Shaw Street 1200 LBS/SQ.FT.

MATERIALS LABORATORY  
DEPT. OF HIGHWAYS - ONTARIO

## UNCONFINED COMPRESSION TEST

SAMPLE NO. 3 DATE WP 45-57

SOIL SAMPLE \_\_\_\_\_

LOCATION F-57-45 BORING NO. 1 SAMPLE DEPTH 20'-20'-6"

LAB. SAMPLE NO. 57-S-30742 CIRCUMFERENCE 1 <sup>3</sup>/<sub>8</sub>" DATE TESTED Dec 16/57

SPECIFIC GRAVITY \_\_\_\_\_ INITIAL AREA,  $A_0$  \_\_\_\_\_ TESTED BY \_\_\_\_\_

CALIBRATION FACTOR \_\_\_\_\_ INITIAL LENGTH,  $L_0$  \_\_\_\_\_ PROVING RING NO. 328

**WATER CONTENT:**

SPECIMEN LOCATION	Moisture	Moisture		Density	ENTIRE REMOLDED SPECIMEN
CONTAINER NO.	24	46			
WT. CONTAINER + WET SOIL IN g.				✓	
WT. CONTAINER + DRY SOIL IN g.					
WT. WATER, $W_w$ , IN g.					
WT. CONTAINER IN g.	17.7	17.9		109	
WT. DRY SOIL, $W_s$ , IN g.					
WATER CONTENT, $w$ , IN %				1.85/cu ft	

[illegible]REMARKS: Show Stress LBS/SQ.FT.

Sample improperly sealed (Dry & Hard)  
Classification only.

DEPARTMENT OF HIGHWAYS - ONTARIO

MECHANICAL ANALYSIS AND ATTERBERG LIMITS OF SOILS

COARSE MATERIAL				HYGROSCOPIC MOISTURE			
WT. OF TOTAL SAMPLE (A)	• W <sub>1</sub>	663			SAMPLE A	SAMPLE B	HYDROM. SAMPLE
WT. OF SAMPLE RET. #4 - DRY	• W <sub>2</sub>	143		WT. OF WET SOIL + DISH			71.8
WT. OF SAMPLE PASS #4 - DRY	• W <sub>3</sub>	520		WT. OF DRY SOIL + DISH			71.5
WT. OF TOTAL SAMPLE (B)	• W <sub>4</sub>	513		WT. OF MOISTURE			0.3
WT. OF SAMPLE RET. #9 - DRY	• W <sub>5</sub>	48		WT. OF DRY SOIL + DISH			71.5
WT. OF SAMPLE PASS #9 - DRY	• W <sub>6</sub>	465		WT. OF DISH			18.2
% RETAINED #4 = $\frac{W_2}{W_1} \times 100$	• K	21.6		WT. OF DRY SOIL			53.3
% RETAINED #9 = $\frac{W_5}{W_4} \times (100-K)$	• L	7.3		% MOISTURE			0.6

SIEVE ANALYSIS RETAINED ON NO. 4 (W 2)							SIEVE ANALYSIS OF HYDROMETER MAT'L (W 10)						
SIEVE NO.	CUMUL. WT.	RETAINED			CUMULATIVE		SIEVE NO.	CUMUL. WT.	RETAINED			CUMUL. % PASS	
		WT.	% W <sub>2</sub>	% W <sub>1</sub>	% RET. W <sub>1</sub>	% PASS W <sub>1</sub>			WT.	% W <sub>10</sub>	% W <sub>1</sub>	W <sub>10</sub>	W <sub>1</sub>
1/2"							9						
1"	50				7.5	92	20	4.5			6.1		65
3/4"	70				10.6	89	35	9.0			12.3		59
1"	85				12.8	87	60	12.5			17.1		54
3/8"	107				16.1	84	150	20.0			27.3		44
#4	142				21.6	78	200	21.5			29.4		42
#9					28.9	71	PASS 200	22.0					
TOTAL							TOTAL						

HYDROMETER ANALYSIS OF MATERIAL PASSING NO. 9 SIEVE (W 10)

HYDROMETER NO. <u>49</u>				SP. GR. CORR. (A) <u>98</u>				DRY WT. OF SAMPLE W IO <u>52.0</u>		
TIME	TIME MIN.	TEMP °F	TEMP °C	HYDROMETER READING			H CMS	% PASS W IO = $\frac{100 RA}{10}$	CORRECTED DIAMETER	% PASS OF W <sub>1</sub>
				ORIG.	△ R	R				
	1	68	20.0	22.0	-1.0	26.0	12.2		.046	35
	2			25.0		24.0	12.6		.034	32
	5			23.0		22.0	12.9		.022	29
	15			21.0		20.0	13.2		.012	27
	30			19.0		18.0	13.5		.0090	24
	60	69	20.6	17.0	-0.5	16.5	13.8		.0065	22
	250	70	21.1	12.0		11.5	14.6		.0034	15
	1440									

LABORATORY REMARKS \_\_\_\_\_

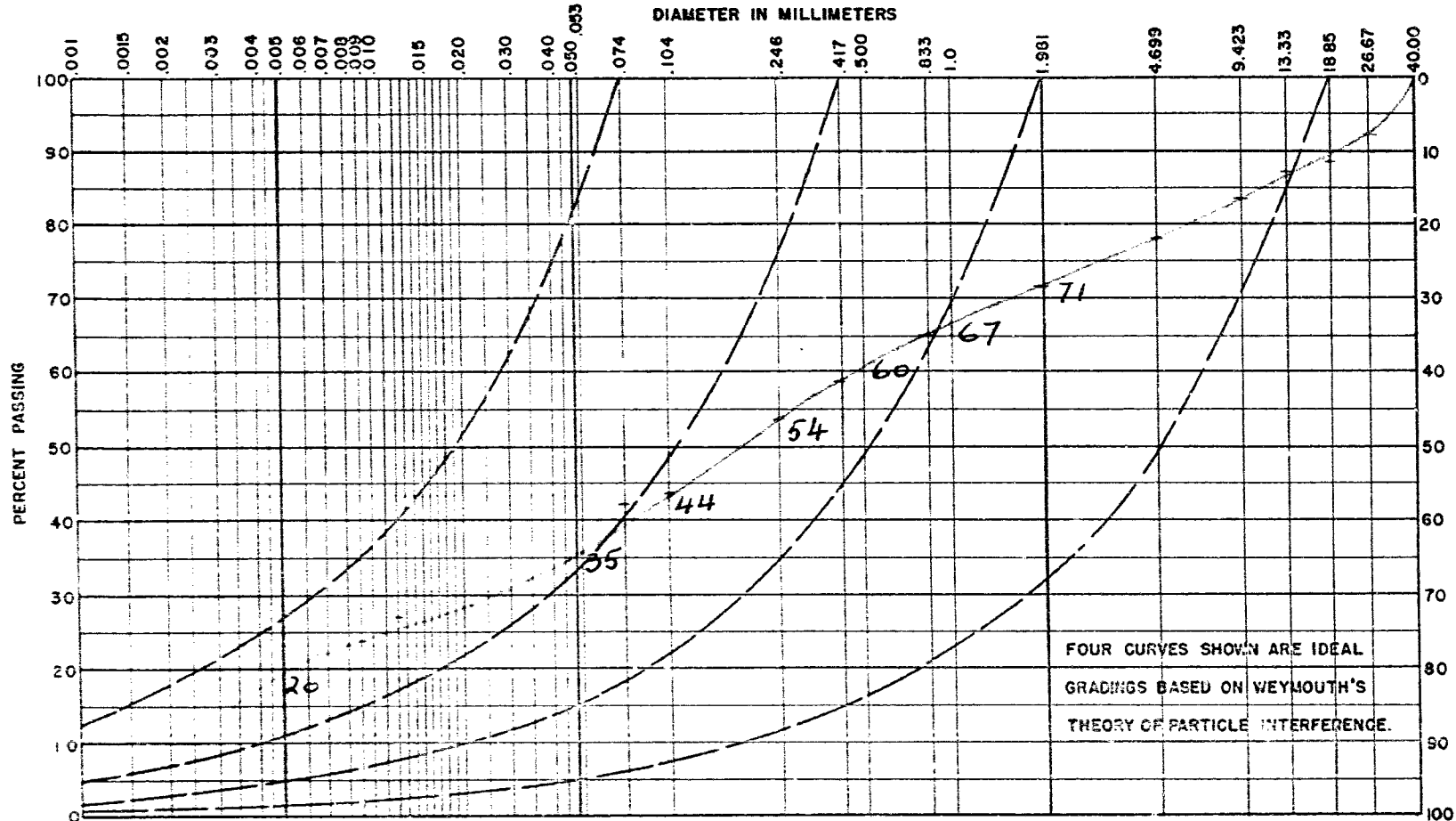
DECISIONING A B C D E \_\_\_\_\_

DATE \_\_\_\_\_

LAB. NO. 57-5-30741  
FIELD NO. F-57-45  
B.H.1 Sample 1

# U.S. BUREAU OF SOILS CLASSIFICATION

Clay	Silt	Very Fine Sand	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Gravel							
Binder <u>35</u>		Fine Aggregate <u>36</u>				Coarse Aggregate <u>29</u>								
TYLER SIEVE SIZES		270	200	150	60	35	20	9	4	3/8	1/2	3/4	1"	1 1/2"



LIQUID LIMIT \_\_\_\_\_

PLASTIC LIMIT \_\_\_\_\_

PLASTICITY INDEX \_\_\_\_\_

SPECIFIC GRAVITY \_\_\_\_\_

% FINE GRAVEL 6

% CO. & MED. SAND 18

% F. & V.F. SAND 27

% SILT 21

% CLAY 28

% V.F. SAND & SILT 34

LAB. TEXTURAL CLASS \_\_\_\_\_

SP. CL. LO (SP. LO.)

FIELD TEXTURAL CLASS \_\_\_\_\_

GROUP CLASS \_\_\_\_\_

MAX. WET DENSITY \_\_\_\_\_

MAX. DRY DENSITY \_\_\_\_\_

OPTIMUM MOISTURE \_\_\_\_\_

FIELD WET DENSITY \_\_\_\_\_

FIELD DRY DENSITY \_\_\_\_\_

FIELD MOISTURE \_\_\_\_\_

% COMPACTION \_\_\_\_\_

DEPARTMENT OF HIGHWAYS - ONTARIO

MECHANICAL ANALYSIS AND ATTERBERG LIMITS OF SOILS

COARSE MATERIAL				HYGROSCOPIC MOISTURE			
WT. OF TOTAL SAMPLE (A)	▪ W <sub>1</sub>	293			SAMPLE A	SAMPLE B	HYDROM. SAMPLE
WT. OF SAMPLE RET. #4 - DRY	▪ W <sub>2</sub>	79		WT. OF WET SOIL + DISH			26.1
WT. OF SAMPLE PASS #4 - DRY	▪ W <sub>3</sub>	214		WT. OF DRY SOIL + DISH			25.2
WT. OF TOTAL SAMPLE (B)	▪ W <sub>4</sub>	212		WT. OF MOISTURE			0.8
WT. OF SAMPLE RET. #9 - DRY	▪ W <sub>5</sub>	25		WT. OF DRY SOIL + DISH			25.2
WT. OF SAMPLE PASS #9 - DRY	▪ W <sub>6</sub>	187		WT. OF DISH			18.4
% RETAINED #4 = $\frac{W_2}{W_1} \times 100$	▪ K	27.0		WT. OF DRY SOIL			57.3
% RETAINED #9 = $\frac{W_5}{W_4} \times (100 - K)$	▪ L	8.6		% MOISTURE			0.2

SIEVE ANALYSIS RETAINED ON NO. 4 (W <sub>2</sub> )							SIEVE ANALYSIS OF HYDROMETER MAT'L (W <sub>10</sub> )						
SIEVE NO.	CUMUL. WT.	RETAINED			CUMULATIVE		SIEVE NO.	CUMUL. WT.	RETAINED			CUMUL. % PASS	
		WT.	% W <sub>2</sub>	% W <sub>1</sub>	% RET. W <sub>1</sub>	% PASS W <sub>1</sub>			WT.	% W <sub>10</sub>	% W <sub>1</sub>	W <sub>10</sub>	W <sub>1</sub>
1/2"							9						
1"							20	6.0		7.3			57
3/4"	33				11.3	89	35	11.5		14.0			50
1/2"	51				17.4	83	60	16.0		19.5			45
3/8"	61				20.8	79	150	23.0		28.0			36
#4	78				27.0	73	200	25.0		30.4			34
#9					35.6	64	PASS 200	25.5					
TOTAL							TOTAL						

HYDROMETER ANALYSIS OF MATERIAL PASSING NO.9 SIEVE (W<sub>10</sub>)

HYDROMETER NO. <u>49</u>				SP. GR. CORR. (A) <u>2.65</u>			DRY WT. OF SAMPLE W IO <u>52.5</u>			
TIME	TIME MIN.	TEMP °F	TEMP °C	HYDROMETER READING			H CMS	% PASS W IO = $\frac{100 RA}{10}$	CORRECTED DIAMETER	% PASS OF W <sub>1</sub>
				ORIG.	△ R	R				
	1	69	20.6	24.0	-0.5	23.5	12.6		.047	28
	2			22.5		22.0	12.9		.034	26
	5			20.0		19.5	13.3		.022	23
	15			18.5		18.0	13.5		.013	21
	30			16.5		16.0	13.9		.0090	17
	60			15.0		14.5	14.1		.0065	17
	250	70	21.1	10.5		10.0	14.9		.0034	12
	1440									

LABORATORY REMARKS \_\_\_\_\_

DECISIONING    A    B    C    D    E    \_\_\_\_\_

DATE \_\_\_\_\_

LAB. NO. 57-5-30746  
FIELD NO. F-57-45-  
B.H. 4 Sample 4



## DEPARTMENT OF HIGHWAYS - ONTARIO

## MECHANICAL ANALYSIS AND ATTERBERG LIMITS OF SOILS

COARSE MATERIAL				HYGROSCOPIC MOISTURE			
WT. OF TOTAL SAMPLE (A)	W <sub>1</sub>				SAMPLE A	SAMPLE B	HYDROM. SAMPLE
WT. OF SAMPLE RET. #4 - DRY	W <sub>2</sub>			WT. OF WET SOIL + DISH			60.2
WT. OF SAMPLE PASS #4 - DRY	W <sub>3</sub>			WT. OF DRY SOIL + DISH			59.8
WT. OF TOTAL SAMPLE (B)	W <sub>4</sub>			WT. OF MOISTURE			0.4
WT. OF SAMPLE RET. #9 - DRY	W <sub>5</sub>			WT. OF DRY SOIL + DISH			59.8
WT. OF SAMPLE PASS #9 - DRY	W <sub>6</sub>			WT. OF DISH			17.5
% RETAINED #4 = $\frac{W_2}{W_1} \times 100$	K			WT. OF DRY SOIL			41.3
% RETAINED #9 = $\frac{W_5}{W_4} \times (100-K)$	L			% MOISTURE			1.0

SIEVE ANALYSIS RETAINED ON NO. 4 (W <sub>2</sub> )							SIEVE ANALYSIS OF HYDROMETER MAT'L (W <sub>10</sub> )						
SIEVE NO.	CUMUL. WT.	RETAINED			CUMULATIVE		SIEVE NO.	CUMUL. WT.	RETAINED			CUMUL. % PASS	
		WT.	% W <sub>2</sub>	% W <sub>1</sub>	% RET. W <sub>1</sub>	% PASS W <sub>1</sub>			WT.	% W <sub>10</sub>	% W <sub>1</sub>	W <sub>10</sub>	W <sub>1</sub>
1/2"							9						
1"							20	5.2			6.7		6.1
3/4"							35	9.5			12.2		56
1/2"	22				8.0	92	60	13.5			17.3		51
3/8"	31				11.3	89	150	21.5			28.0		40
#4	55				21.2	79	200	23.0			30.0		38
#9					32.4	68	PASS 200	23.8					
TOTAL							TOTAL						

HYDROMETER ANALYSIS OF MATERIAL PASSING NO. 9 SIEVE (W<sub>10</sub>)

HYDROMETER NO. <u>42</u>				SP. GR. CORR. (A) <u>28</u>				DRY WT. OF SAMPLE W IO <u>53.0</u>			
TIME	TIME MIN.	TEMP °F	TEMP °C	HYDROMETER READING			H CMS	% PASS W IO $= \frac{100 RA}{10}$	CORRECTED DIAMETER	% PASS OF W <sub>1</sub>	
				ORIG.	△ R	R					
	1	64		29.0	-1.5	27.5	12.0		0.48	35	
	2			28.0		26.5	12.2		0.33	33	
	5			26.0		24.5	12.5		0.22	31	
	15			23.5		22.0	12.9		0.13	28	
	30	65		21.5		20.0	13.2		0.092	25	
	60	66		19.0	-1.0	18.0	13.5		0.065	23	
	250	71		14.5	-0.5	14.0	14.2		0.031	18	
	1440										

LABORATORY REMARKS

DECISIONING

A

B

C

D

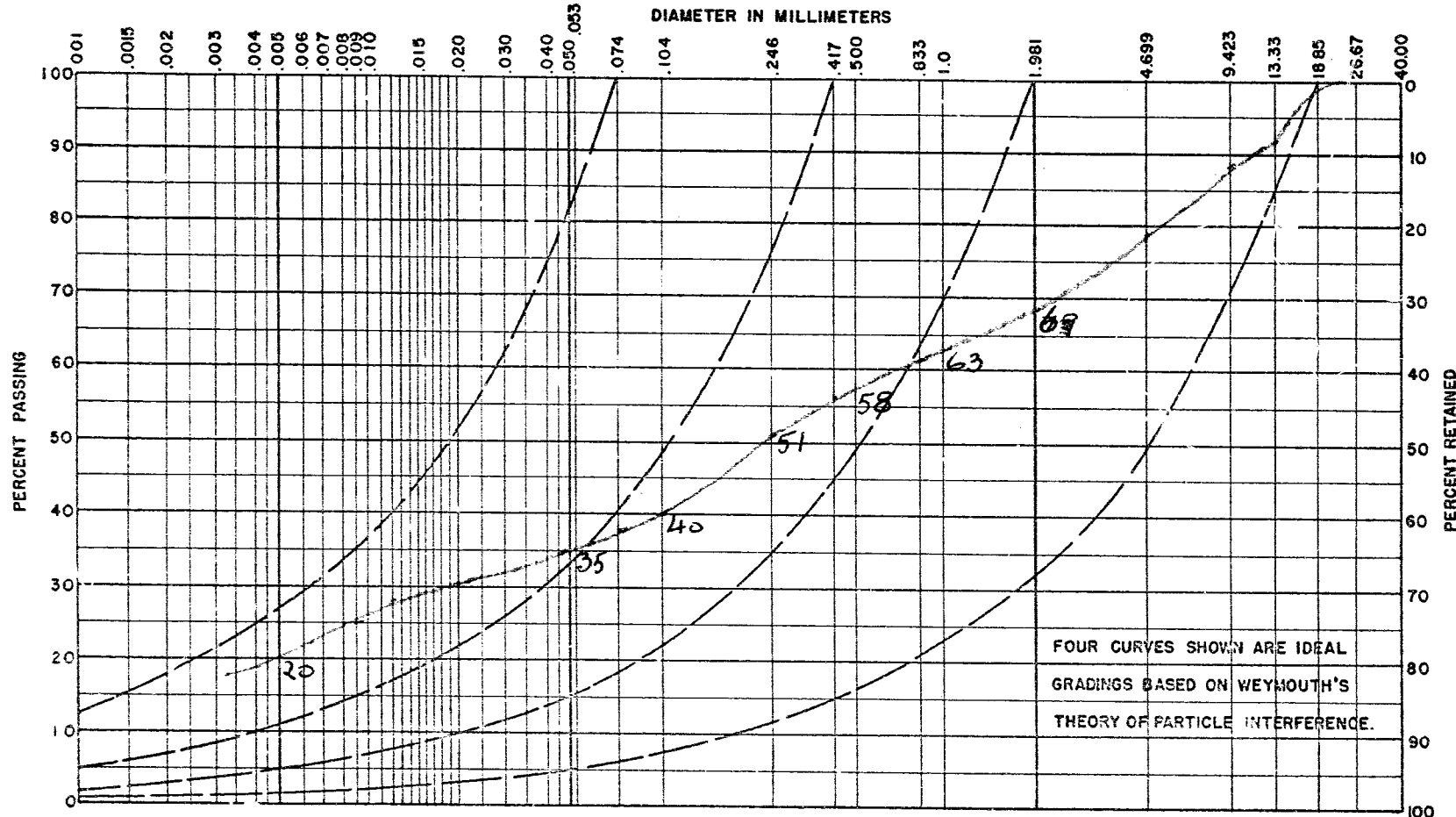
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DATE

 LAB. NO. 57-5-30742  
 FIELD NO. F-57-45  
 B.H. 1 Sample 3

# U.S. BUREAU OF SOILS CLASSIFICATION

Clay	Silt	Very Fine Sand	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Gravel							
Binder <u>35</u>		Fine Aggregate <u>34</u>					Coarse Aggregate <u>31</u>							
TYLER SIEVE SIZES		270	200	150	60	35	20	9	4	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	1 1/2"



LIQUID LIMIT \_\_\_\_\_

PLASTIC LIMIT \_\_\_\_\_

PLASTICITY INDEX \_\_\_\_\_

SPECIFIC GRAVITY \_\_\_\_\_

% FINE GRAVEL 9

% CO. & MED. SAND 17

% F. & V.F. SAND 23

% SILT 22

% CLAY 29

% V.F. SAND & SILT 29

LAB. TEXTURAL CLASS \_\_\_\_\_

CL. Lo. / SA. CL. Lo. / SA. CL. / LT. CL.

FIELD TEXTURAL CLASS \_\_\_\_\_

GROUP CLASS \_\_\_\_\_

MAX. WET DENSITY \_\_\_\_\_

MAX. DRY DENSITY \_\_\_\_\_

OPTIMUM MOISTURE \_\_\_\_\_

FIELD WET DENSITY \_\_\_\_\_

FIELD DRY DENSITY \_\_\_\_\_

FIELD MOISTURE \_\_\_\_\_

% COMPACTION \_\_\_\_\_

DEPARTMENT OF HIGHWAYS - ONTARIO

MECHANICAL ANALYSIS AND ATTERBERG LIMITS OF SOILS

COARSE MATERIAL				HYGROSCOPIC MOISTURE			
WT. OF TOTAL SAMPLE (A)	• W <sub>1</sub>	738			SAMPLE A	SAMPLE B	HYDROM. SAMPLE
WT. OF SAMPLE RET. #4 - DRY	• W <sub>2</sub>	175		WT. OF WET SOIL + DISH			76.4
WT. OF SAMPLE PASS #4 - DRY	• W <sub>3</sub>	563		WT. OF DRY SOIL + DISH			76.1
WT. OF TOTAL SAMPLE (B)	• W <sub>4</sub>	554		WT. OF MOISTURE			0.3
WT. OF SAMPLE RET. #9 - DRY	• W <sub>5</sub>	33		WT. OF DRY SOIL + DISH			76.1
WT. OF SAMPLE PASS #9 - DRY	• W <sub>6</sub>	521		WT. OF DISH			17.7
% RETAINED #4 = $\frac{W_2}{W_1} \times 100$	• K	23.7		WT. OF DRY SOIL			58.4
% RETAINED #9 = $\frac{W_5}{W_4} \times (100 - K)$	• L	4.9		% MOISTURE			0.5

SIEVE ANALYSIS RETAINED ON NO. 4 (W <sub>2</sub> )							SIEVE ANALYSIS OF HYDROMETER MAT'L (W <sub>10</sub> )						
SIEVE NO.	CUMUL. WT.	RETAINED			CUMULATIVE		SIEVE NO.	CUMUL. WT.	RETAINED			CUMUL. % PASS	
		WT.	% W <sub>2</sub>	% W <sub>1</sub>	% RET. W <sub>1</sub>	% PASS W <sub>1</sub>			WT.	% W <sub>10</sub>	% W <sub>1</sub>	W <sub>10</sub>	W <sub>1</sub>
1/2"	123			16.7		83	9						
1"	-			-		-	20	3.0			3.9		67
3/4"	-			-		-	35	7.0			9.1		62
1 1/2"	135			18.3		82	60	10.0			13.0		58
3/8"	145			19.6		80	150	18.0			23.4		48
#4	173			23.7		76	200	22.0			28.6		42
#9				28.6		71	PASS 200	22.3					
TOTAL							TOTAL						

HYDROMETER ANALYSIS OF MATERIAL PASSING NO.9 SIEVE (W<sub>10</sub>)

HYDROMETER NO. 49				SP. GR. CORR. (A) 98				DRY WT. OF SAMPLE W <sub>10</sub> 54.5			
TIME	TIME MIN.	TEMP °F	TEMP °C	HYDROMETER READING			H CMS	% PASS W <sub>10</sub> = $\frac{100 RA}{10}$	CORRECTED DIAMETER	% PASS OF W <sub>1</sub>	
				ORIG.	△ R	R					
	1	69		28.0	-0.5	27.5	12.0		.045	35	
	2			26.0		25.5	12.3		.033	33	
	5			23.0		22.5	12.8		.021	29	
	15	70		19.0	0.0	19.0	13.4		.012	24	
	30			16.5		16.5	13.8		.0090	21	
	60			14.0		14.0	14.2		.0064	18	
	250	71		9.0		9.0	15.1		.0033	12	
	1440										

LABORATORY REMARKS

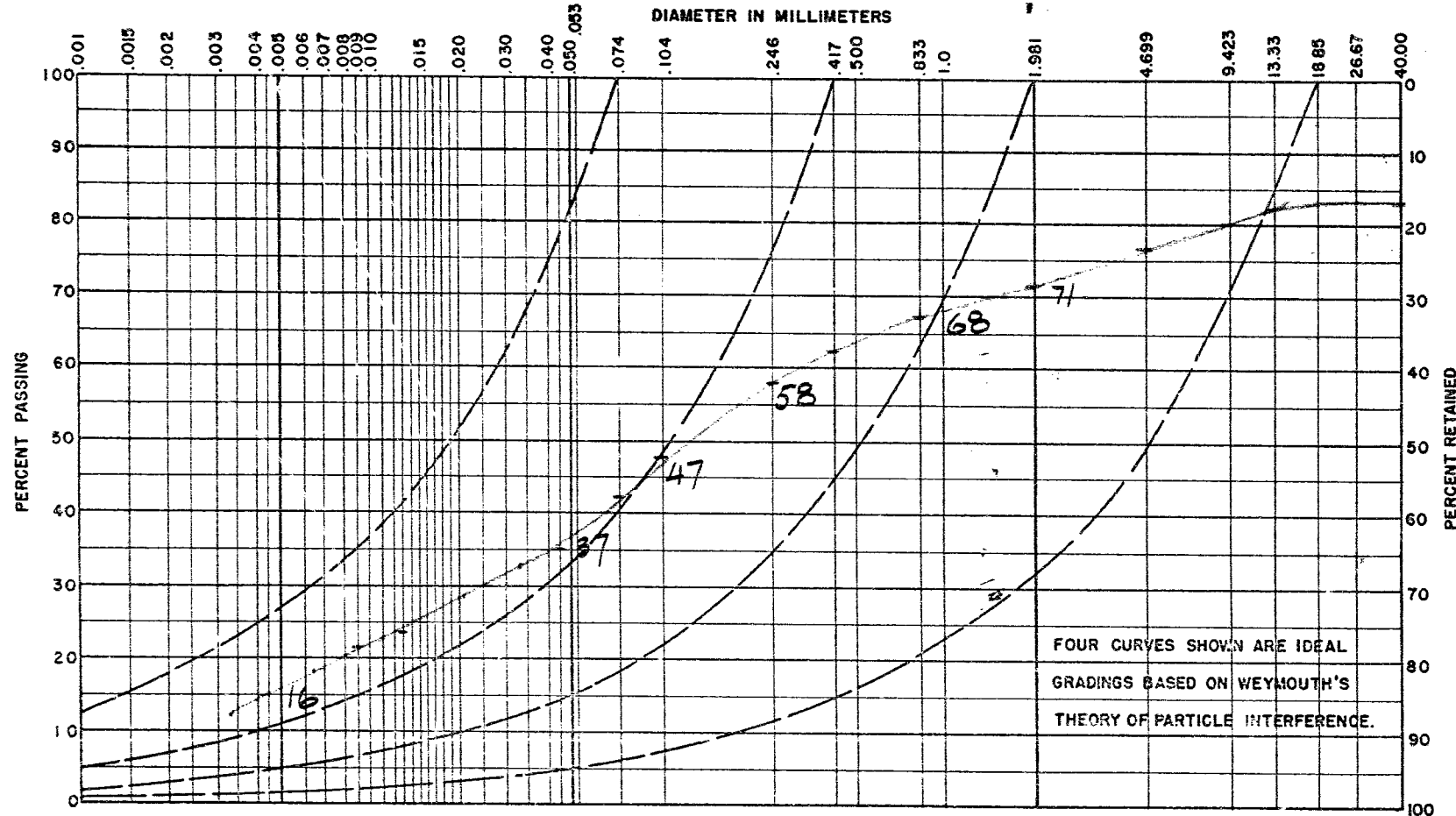
DECISIONING A B C D E

DATE

LAB. NO. 57-5-30743  
FIELD NO. F-57-45  
B.H.-4 Sample 1

# U.S. BUREAU OF SOILS CLASSIFICATION

Clay	Silt	Very Fine Sand	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Gravel							
Binder <u>37</u>		Fine Aggregate <u>34</u>				Coarse Aggregate <u>29</u>								
TYLER SIEVE SIZES		270	200	150	60	35	20	9	4	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	1 1/2"



LIQUID LIMIT \_\_\_\_\_

PLASTIC LIMIT \_\_\_\_\_

PLASTICITY INDEX \_\_\_\_\_

SPECIFIC GRAVITY \_\_\_\_\_

% FINE GRAVEL 4

% CO. & MED. SAND 14

% F. & V.F. SAND 30

% SILT 30

% CLAY 22

% V.F. SAND & SILT 44

LAB. TEXTURAL CLASS \_\_\_\_\_

CL. LO. (SA. CL. LO. - SA. LO. - LO.)

FIELD TEXTURAL CLASS \_\_\_\_\_

GROUP CLASS \_\_\_\_\_

MAX. WET DENSITY \_\_\_\_\_

MAX. DRY DENSITY \_\_\_\_\_

OPTIMUM MOISTURE \_\_\_\_\_

FIELD WET DENSITY \_\_\_\_\_

FIELD DRY DENSITY \_\_\_\_\_

FIELD MOISTURE \_\_\_\_\_

% COMPACTION \_\_\_\_\_

## DEPARTMENT OF HIGHWAYS - ONTARIO

## MECHANICAL ANALYSIS AND ATTERBERG LIMITS OF SOILS

COARSE MATERIAL				HYGROSCOPIC MOISTURE			
WT. OF TOTAL SAMPLE (A)	▪ W <sub>1</sub>	1402			SAMPLE A	SAMPLE B	HYDROM. SAMPLE
WT. OF SAMPLE RET. #4 - DRY	▪ W <sub>2</sub>	354		WT. OF WET SOIL + DISH			72.9
WT. OF SAMPLE PASS #4 - DRY	▪ W <sub>3</sub>	1048		WT. OF DRY SOIL + DISH			72.4
WT. OF TOTAL SAMPLE (B)	▪ W <sub>4</sub>	551		WT. OF MOISTURE			0.5
WT. OF SAMPLE RET. #9 - DRY	▪ W <sub>5</sub>	147		WT. OF DRY SOIL + DISH			72.4
WT. OF SAMPLE PASS #9 - DRY	▪ W <sub>6</sub>	504		WT. OF DISH			17.7
% RETAINED #4 = $\frac{W_2}{W_1} \times 100$	▪ K	25.2		WT. OF DRY SOIL			54.7
% RETAINED #9 = $\frac{W_5}{W_4} \times (100 - K)$	▪ L	7.0		% MOISTURE			0.9

SIEVE ANALYSIS RETAINED ON NO. 4 (W <sub>2</sub> )							SIEVE ANALYSIS OF HYDROMETER MAT'L (W <sub>10</sub> )						
SIEVE NO.	CUMUL. WT.	RETAINED			CUMULATIVE		SIEVE NO.	CUMUL. WT.	RETAINED			CUMUL. % PASS	
		WT.	% W <sub>2</sub>	% W <sub>1</sub>	% RET. W <sub>1</sub>	% PASS W <sub>1</sub>			WT.	% W <sub>10</sub>	% W <sub>1</sub>	W <sub>10</sub>	W <sub>1</sub>
1/2"	123				8.8	91	9						
1"	159				11.3	89	20	5			6.6		61
3/4"	186				13.3	87	35	10.0			13.2		55
1 1/2"	253				18.0	82	60	13.5			17.8		50
3/8"	279				19.9	80	150	21.5			28.4		40
#4	353				25.2	75	200	24.0			31.7		36
#9					32.2	68	PASS 200	24.2					
TOTAL							TOTAL						

HYDROMETER ANALYSIS OF MATERIAL PASSING NO. 9 SIEVE (W<sub>10</sub>)

HYDROMETER NO. 49				SP. GR. CORR. (A) .98			DRY WT. OF SAMPLE W 10 51.5			
TIME	TIME MIN.	TEMP °F	TEMP °C	HYDROMETER READING			H CMS	% PASS W 10 = $\frac{100 RA}{10}$	CORRECTED DIAMETER	% PASS OF W <sub>1</sub>
				ORIG.	△ R	R				
	1	69		26.0	-0.5	25.5	12.3		.046	33
	2			24.0		23.5	12.6		.032	30
	5			21.5		21.0	13.0		.022	27
	15			18.5		18.0	13.5		.013	23
	30			16.0		15.5	14.1		.0092	20
	60			14.0		13.5	14.3		.0064	17
	250	71		10.0	0.0	10.0	14.9		.0033	13
	1440									

LABORATORY REMARKS \_\_\_\_\_

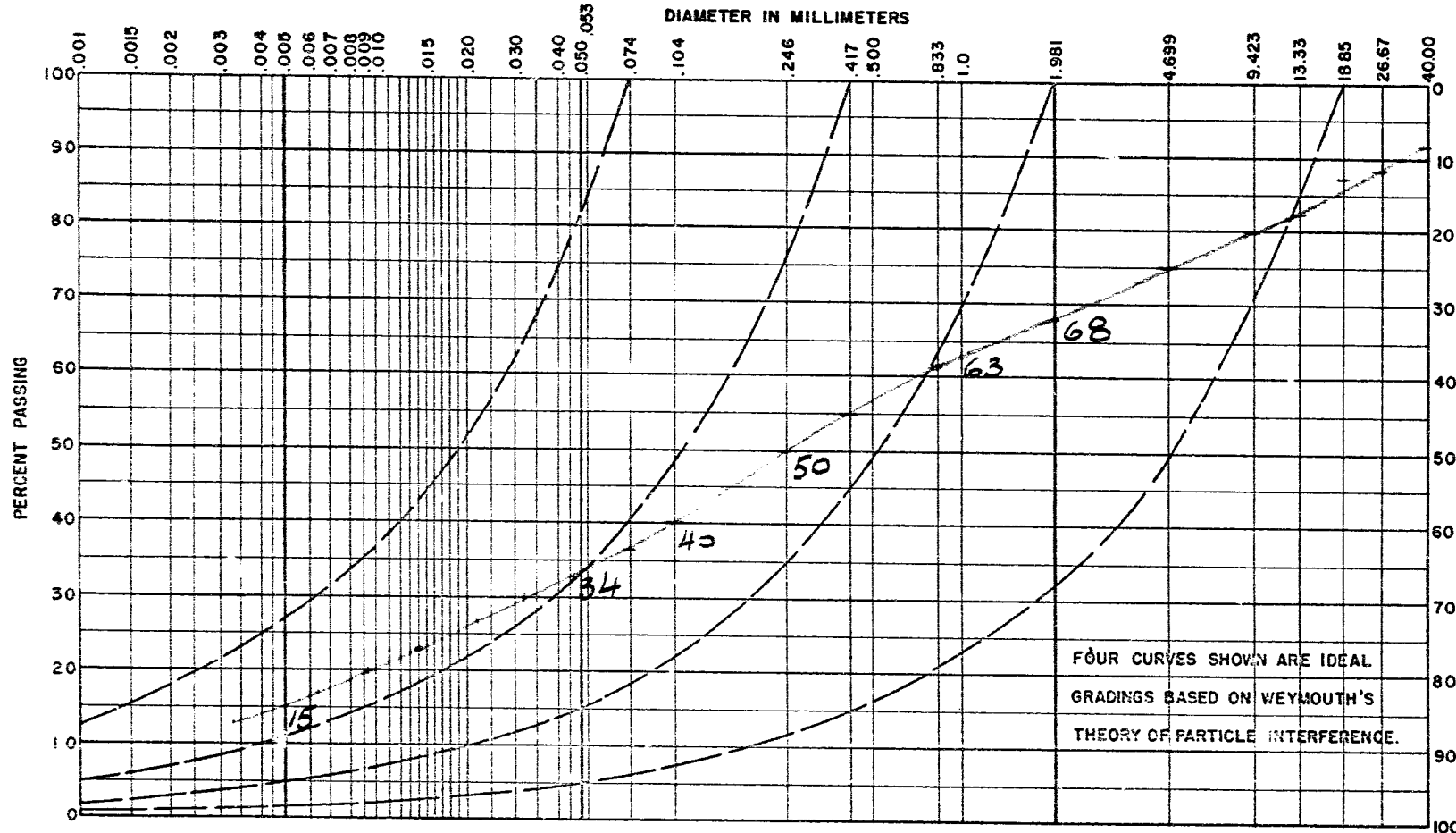
DECISIONING A B C D E \_\_\_\_\_

DATE \_\_\_\_\_

 LAB. NO. 575-30744  
 FIELD NO. 57-45  
 B.H.4 Sample 2

# U.S. BUREAU OF SOILS CLASSIFICATION

Clay	Silt	Very Fine Sand	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Gravel						
Binder <u>34</u>		Fine Aggregate <u>24</u>				Coarse Aggregate <u>32</u>							
TYLER SIEVE SIZES		270	200	150	60	35	20	9	4	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1" L



LIQUID LIMIT \_\_\_\_\_

PLASTIC LIMIT \_\_\_\_\_

PLASTICITY INDEX \_\_\_\_\_

SPECIFIC GRAVITY \_\_\_\_\_

% FINE GRAVEL 7

% CO. & MED. SAND 19

% F. & V.F. SAND 24

% SILT 28

% CLAY 22

% V.F. SAND & SILT 37

LAB. TEXTURAL CLASS \_\_\_\_\_

CL. LO. (SA. CL. LO.) (SA. LO.) (LO.)

FIELD TEXTURAL CLASS \_\_\_\_\_

GROUP CLASS \_\_\_\_\_

MAX. WET DENSITY \_\_\_\_\_

MAX. DRY DENSITY \_\_\_\_\_

OPTIMUM MOISTURE \_\_\_\_\_

FIELD WET DENSITY \_\_\_\_\_

FIELD DRY DENSITY \_\_\_\_\_

FIELD MOISTURE \_\_\_\_\_

% COMPACTION \_\_\_\_\_

MECHANICAL ANALYSIS AND ATTERBERG LIMITS OF SOILS

COARSE MATERIAL				HYGROSCOPIC MOISTURE			
WT. OF TOTAL SAMPLE (A)	• W <sub>1</sub>	534			SAMPLE A	SAMPLE B	HYDROM. SAMPLE
WT. OF SAMPLE RET. #4 - DRY	• W <sub>2</sub>	56		WT. OF WET SOIL + DISH			20.0
WT. OF SAMPLE PASS #4 - DRY	• W <sub>3</sub>	478		WT. OF DRY SOIL + DISH			69.8
WT. OF TOTAL SAMPLE (B)	• W <sub>4</sub>	475		WT. OF MOISTURE			0.2
WT. OF SAMPLE RET. #9 - DRY	• W <sub>5</sub>	19		WT. OF DRY SOIL + DISH			69.8
WT. OF SAMPLE PASS #9 - DRY	• W <sub>6</sub>	456		WT. OF DISH			12.2
% RETAINED #4 • $\frac{W_2}{W_1} \times 100$	• K	10.5		WT. OF DRY SOIL			52.1
% RETAINED #9 • $\frac{W_5}{W_4} \times (100-K)$	• L	3.6		% MOISTURE			0.4

SIEVE ANALYSIS RETAINED ON NO. 4 (W <sub>2</sub> )							SIEVE ANALYSIS OF HYDROMETER MAT'L (W <sub>10</sub> )						
SIEVE NO.	CUMUL. WT.	RETAINED			CUMULATIVE		SIEVE NO.	CUMUL. WT.	RETAINED			CUMUL. % PASS	
		WT.	% W <sub>2</sub>	% W <sub>1</sub>	% RET. W <sub>1</sub>	% PASS W <sub>1</sub>			WT.	% W <sub>10</sub>	% W <sub>1</sub>	W <sub>10</sub>	W <sub>1</sub>
1 1/2"							9						
1"	30				56	94	20	2.0		3.3		83	
3/4"	-						35	4.4		2.4		79	
1/2"	39				7.3	93	60	6.7		11.2		75	
3/8"	50				9.4	91	150	10.5		12.5		68	
#4	55				10.5	90	200	11.5		12.2		67	
#9					14.1	86	PASS 200	12.0					
TOTAL							TOTAL						

HYDROMETER ANALYSIS OF MATERIAL PASSING NO.9 SIEVE (W<sub>10</sub>)

HYDROMETER NO. <u>49</u>				SP. GR. CORR. (A) <u>28</u>			DRY WT. OF SAMPLE W IO <u>51.5</u>			
TIME	TIME MIN.	TEMP °F	TEMP °C	HYDROMETER READING			H CMS	% PASS W IO = $\frac{100 RA}{10}$	CORRECTED DIAMETER	% PASS OF W <sub>1</sub>
				ORIG.	△ R	R				
	1	64		39.5	-1.5	38.0	10.3		0.45	62
	2			38.5		37.0	10.5		0.32	60
	5			36.5		35.0	10.8		0.20	57
	15			34.0		33.5	11.0		0.12	55
	30	65		34.0		32.5	11.2		0.085	53
	60	66		30.5	-1.0	29.5	11.7		0.060	48
	250	70		23.5	-0.5	23.0	12.7		0.030	38
	1440									

LABORATORY REMARKS

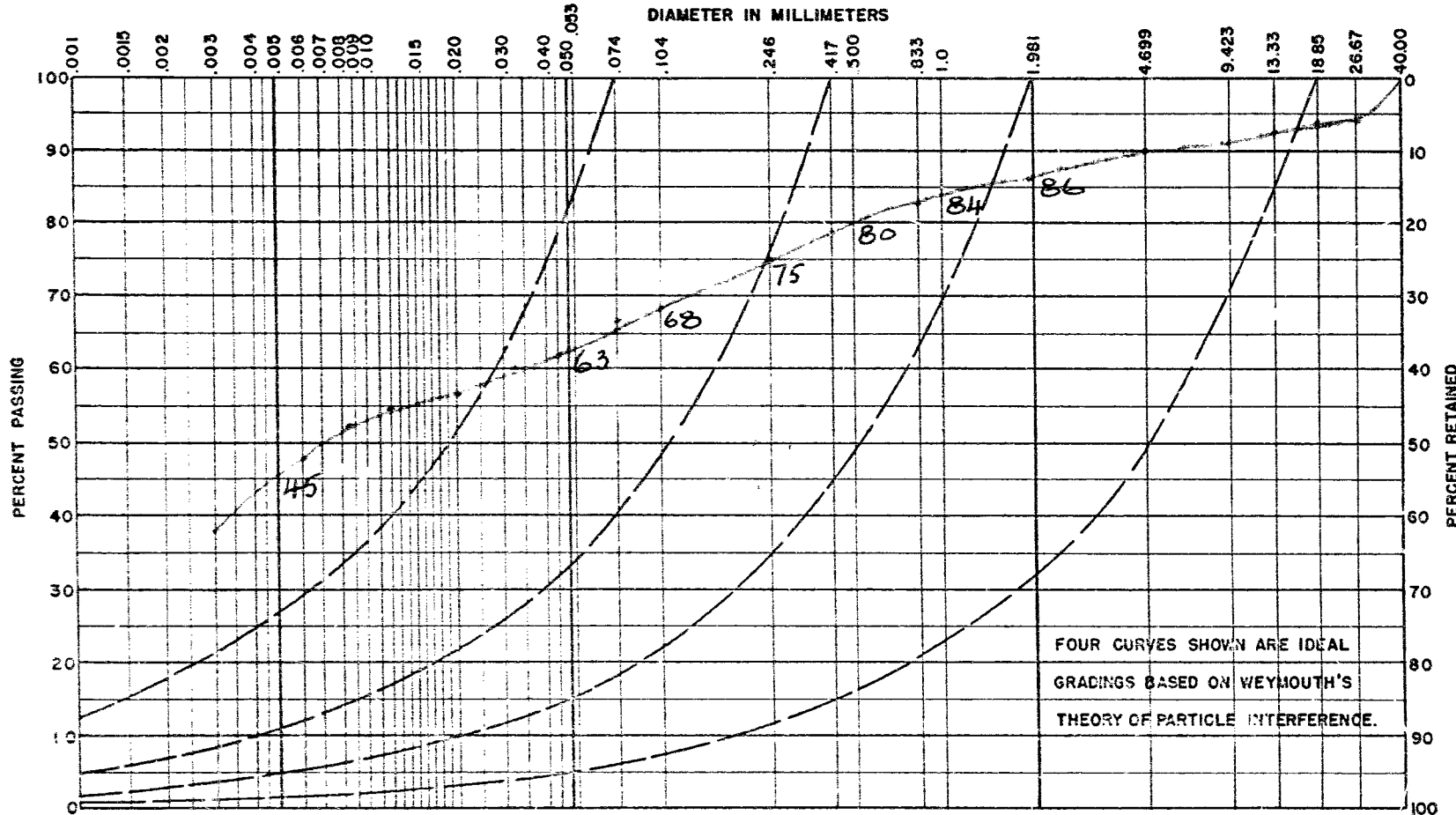
DECISIONING      A      B      C      D      E

DATE

LAB. NO. 57-5-30745  
FIELD NO. F-57-45  
13.4.4 Sample 3

# U.S. BUREAU OF SOILS CLASSIFICATION

Clay	Silt	Very Fine Sand	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Gravel						
Binder <u>63</u>		Fine Aggregate <u>23</u>					Coarse Aggregate <u>14</u>						
TYLER SIEVE SIZES		270	200	150	60	35	20	9	4	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"



LIQUID LIMIT \_\_\_\_\_

PLASTIC LIMIT \_\_\_\_\_

PLASTICITY INDEX \_\_\_\_\_

SPECIFIC GRAVITY \_\_\_\_\_

% FINE GRAVEL 2

% CO. & MED. SAND 10

% F. & V.F. SAND 14

% SILT 21

% CLAY 53

% V.F. SAND & SILT 27

LAB. TEXTURAL CLASS \_\_\_\_\_

MED. CL. (LT. CL.)

FIELD TEXTURAL CLASS \_\_\_\_\_

GROUP CLASS \_\_\_\_\_

MAX. WET DENSITY \_\_\_\_\_

MAX. DRY DENSITY \_\_\_\_\_

OPTIMUM MOISTURE \_\_\_\_\_

FIELD WET DENSITY \_\_\_\_\_

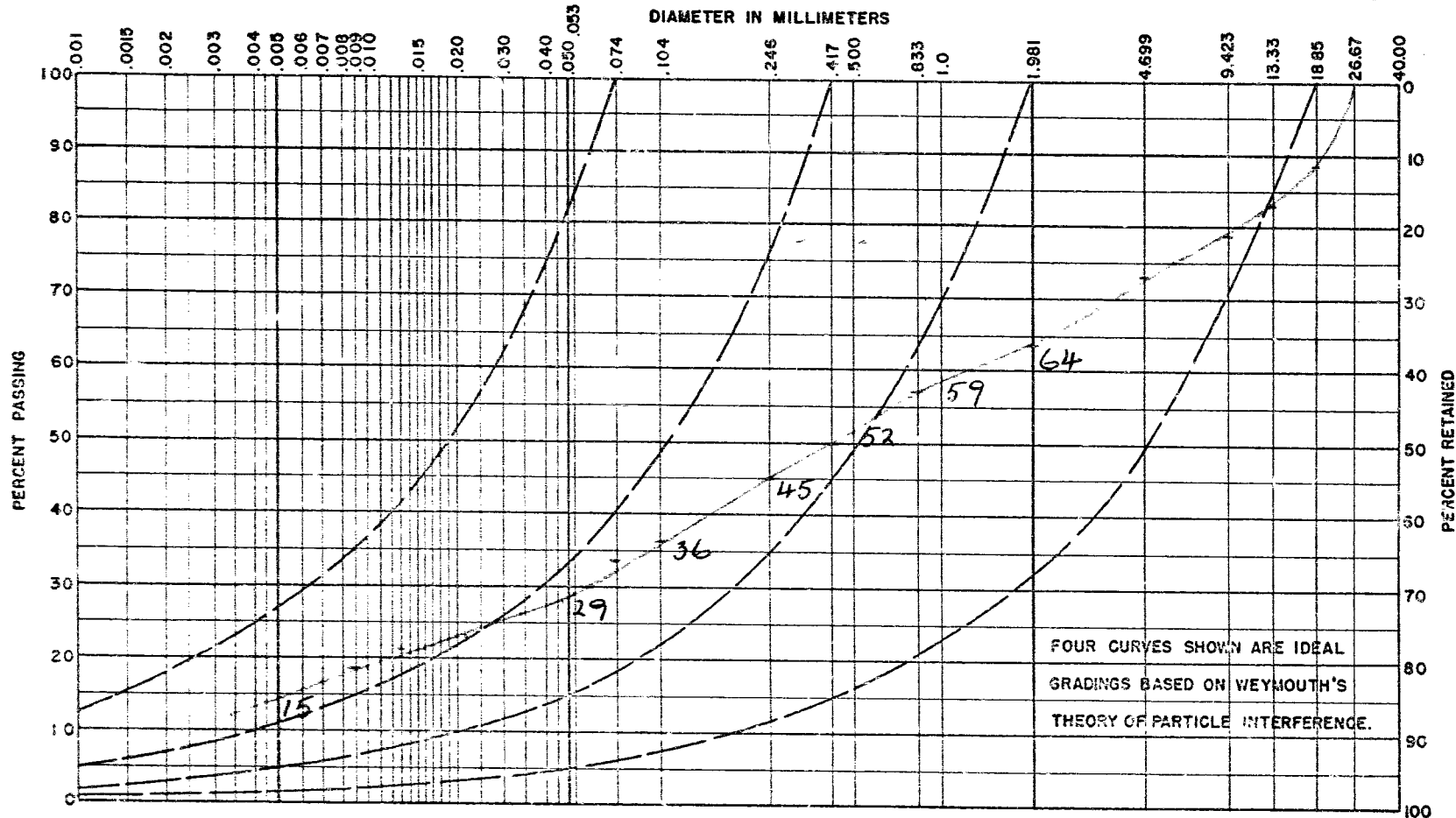
FIELD DRY DENSITY \_\_\_\_\_

FIELD MOISTURE \_\_\_\_\_

% COMPACTION \_\_\_\_\_



Clay	Silt	Very Fine Sand	Fine Sand	Medium Sand	Coarse Sand	Fine Gravel	Gravel							
Binder <u>29</u>		Fine Aggregate <u>35</u>				Coarse Aggregate <u>36</u>								
TYLER SIEVE SIZES		270	200	150	60	35	20	9	4	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	1 1/2"



% COMPACTION \_\_\_\_\_