cc: Foundation Section

Mr. A. Toye,

Bridge Engineer.

P. C. Brownridge
per: A. Rutka

April 24, 1957.

Re: Foundation Report -
Hwy. 401 - County Road
between Concessions 2 & 3
Westminster Twp.
W. P. 7[illegible]-56 W.J. F-56-26

We are forwarding herewith two copies of the above mentioned foundation report.

The subsoil conditions are such that a spread footing foundation will be satisfactory. There is no foundation stability problem with respect to the approach fills.

P. C. Brownridge
MATERIALS & RESEARCH ENGR.

per:

A. Rutka

A. Rutka
PRINCIPAL SOILS ENGR.

AR/hkeP
Attach.

cc: Messrs. H. Tregaskes
D. Ramsay
W. Fraser

Foundation Section
File

FOUNDATION REPORT

on

Highway No. 401 and Proposed Revision of
County Road Line "A" Crossing, 650 yards
East of Wellington Road, South of London

Site Plan No.: 401 C-53

Station: 309/80

Distribution:

Mr. A. Toye, Bridge Engineer	(2)
Mr. H. Tregaskes, Construction Engineer.	(1)
Mr. D. G. Ramsay, Design Engineer.	(1)
Mr. W. L. Fraser, District Engineer, London, Ontario.	(1)
Foundation Section	(1)
File	(1)

W. J. P-56-25

W. P. 707-56

Highway No. 401 and Proposed Revision of County Road Line "A" Crossing, 650 yards East of Wellington Road, South of London.

I. INTRODUCTION:

A subsoil investigation was made to determine the bearing values of the soil layers to support the foundations of the proposed new overpass bridge.

The location is some 650 yards to the east of the intersection of Highway No. 401 and Wellington Road, south of London, (profile F-3529-15, station 309+80).

The work started on 5 Dec. 1956 and was completed on 15 Dec. 1956.

II. PROCEDURE:

The subsoil investigation was carried out by means of a skid mounted core drill machine. Two boreholes and four dynamic penetrations were made for foundation and approach fill stability investigations.

The locations and elevations of the boreholes are shown in Drawing No. F-56-26-A, and their logs under Appendix I.

III. SUBSOIL FINDINGS AND ANALYSIS:

The location is in Westminister Township, south of London. The terrain is identified as till moraine.

The subsoil investigations revealed the stratigraphy of the terrain to be stiff, grey, clayey till. The consistency of the layer is slightly variable.

cont'd. /2

III. SUBSOIL FINDINGS AND ANALYSIS - (cont'd.)

From boreholes No. 1 and 4, undisturbed samples were extracted and tested in the laboratory. From the test results, it was found that the layer had average liquid limit of 25%, and average plastic limit of 12%. The soil is identified as stiff inorganic clay of low plasticity. From texture analysis, the soil was classified as medium clay with considerable amount of silt. The average moisture content was found to be 19%. However, the layer, in general, is considered to be impervious.

Spread footing foundations will be considered. The average unconfined compression value obtained from the laboratory tests is about 1.5 t.s.f. The minimum average field standard penetration result is 20 blows per foot.

In averaging unconfined test results, the higher values were used. The reason is the considerable seasonal difficulties encountered in sampling, and accordingly, some doubt as to the complete undisturbed state of samples when tested. However, from the above the soil can be credited with a bearing value of 2 t.s.f. with a safety factor of 3.

IV. CONCLUSIONS AND RECOMMENDATIONS:

From the above discussion, it will be concluded that:

1. The stratigraphy revealed is that of clayey till, with slightly variable consistency.
2. The higher unconfined values were used in taking the average. These values, considered in combination with the field standard penetration refusal values, accredit the soil with a bearing value of 2 t.s.f., with a safety factor of 3.

cont'd. /3

IV. CONCLUSIONS AND RECOMMENDATIONS - (cont'd.)

3. The spread footing foundations should be placed at elevation 655 ft. The soil at this elevation can provide a bearing value of 2 t.s.f., with a safety factor of 3.

4. The approach fills are about 30 ft. high. With 2:1 side slope, the stability of the fill is secured within the accepted safety factor limits of 1.5-2.

V. Koriu,
Foundation Engineer.

APPENDIX I

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-1 OPERATION BORE JOB F-56-26 W.P. 707-56 BORING 1 STA. 28+70 (47' RT.)

CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT FEB. 1957

SAMPLER HAMMER WT. 250 LBS. DROP 30 1/2 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 8 DEC. 1956

ABBREVIATIONS

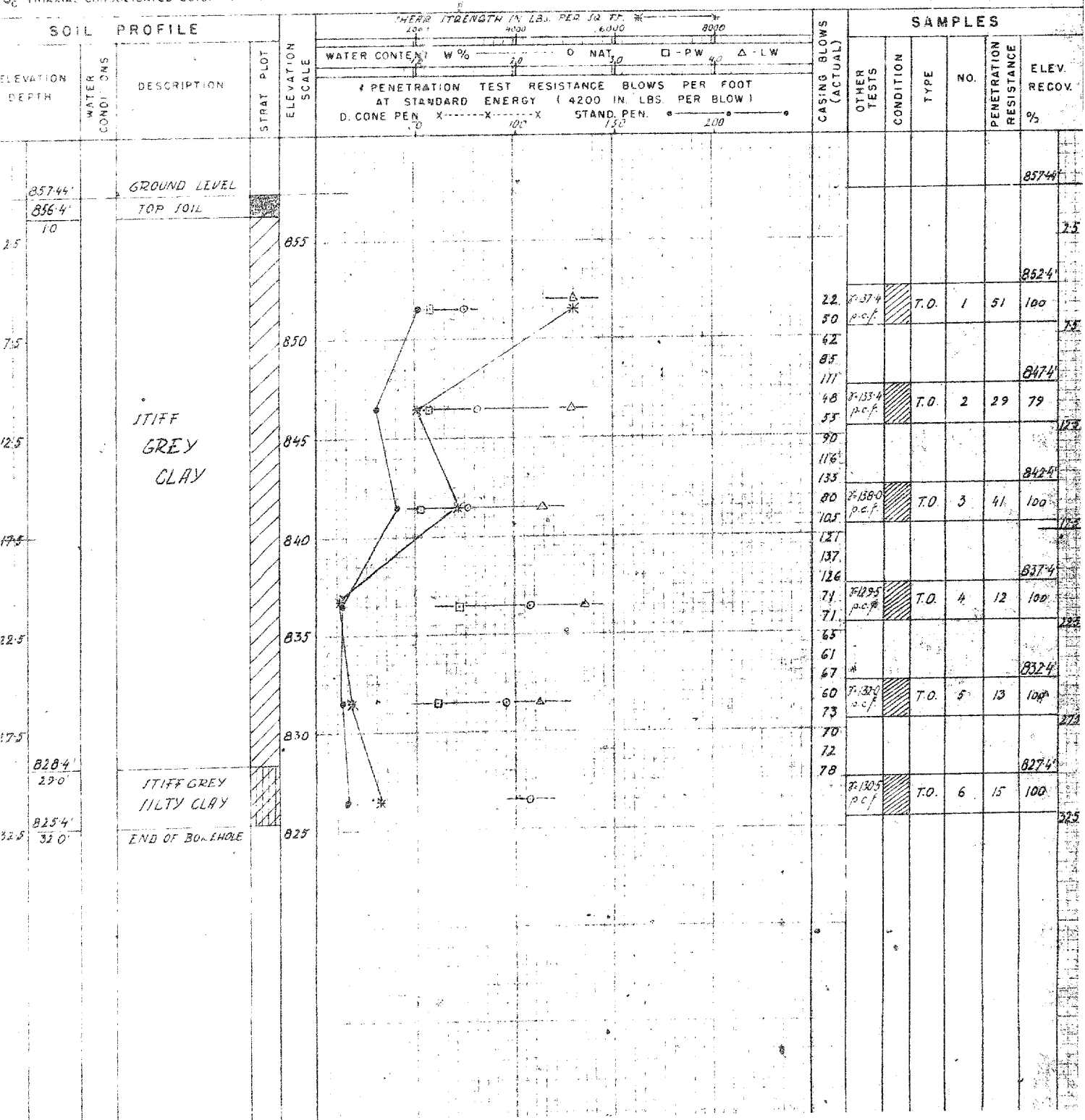
V - INSITU VANE SHEAR TEST; M - MECHANICAL ANALYSIS; U - UNCONFINED COMPRESSION; Q_C - TRIAXIAL CONSOLIDATED QUICK; Q - TRIAXIAL QUICK; S - TRIAXIAL SLOW; WL - WATER LEVEL IN CASING; WT - WATER TABLE IN SOIL; K - PERMIABILITY; C - CONSOLIDATION; CA - CASING; γ - UNIT WEIGHT

SAMPLE TYPES

CS - CHUNK; DO - DRIVE OPEN; DF - DRIVE FOOT VALVE; TO - THIN WALLED OPEN; SS - SLEEVE SAMPLE; PS - PISTON SAMPLE; WS - WASHED SAMPLE; RC - ROCK CORE

SAMPLE CONDITION

D - DISTURBED; F - FAIR; G - GOOD; L - LOST



DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-1 OPERATION PENETRATION JOB F-56-26 W.P. 707-56 BORING 2 STA. 29+31 152'(L)

CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT FEB. 1957

SAMPLER HAMMER WT. 250 LBS. DROP 20 1/2 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 6 DEC. 1956.

ABBREVIATIONS

V - INSITU VANE SHEAR TEST; M - MECHANICAL ANALYSIS; U - UNCONFINED COMPRESSION; Q_C - TRIAXIAL CONSOLIDATED QUICK; Q - TRIAXIAL QUICK; S - TRIAXIAL SLOW; WL - WATER LEVEL IN CASING; WT - WATER TABLE IN SOIL; K - PERMIABILITY; C - CONSOLIDATION; CA - CASING; δ - UNIT WEIGHT

SAMPLE TYPES

CS - CHUNK; DO - DRIVE OPEN; DF - DRIVE FOOT VALVE; TO - THIN WALLED OPEN; SS - SLEEVE SAMPLE; PS - PISTON SAMPLE; WS - WASHED SAMPLE; RC - ROCK CORE

SAMPLE CONDITION

D - DISTURBED; F - FAIR; G - GOOD; L - LOST

SOIL PROFILE					SAMPLES						
ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %	CASING BLOWS (ACTUAL)
858.7		GROUND LEVEL									
3.7				855							
8.7				850							
13.7				845							
18.7				840							
23.7				835							
28.7				830							

WATER CONTENT W% — ○ - NAT. □ - PW △ - LW

PENETRATION TEST RESISTANCE BLOWS PER FOOT AT STANDARD ENERGY (4200 IN. LBS PER BLOW)

D CONE PEN. X------X------X STAND PEN. •——•——•

100 200 300 400

STOPPED AT ELEV. 832.7'

TL-129 (REV. 56)

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-1 OPERATION PENETRATION JOB F-56-26 WP 707-56 BORING 3 STA. 27+32 ℄

CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT FEB. 1957

SAMPLER HAMMER WT. 250 LBS. DROP 20½" ℄ 19 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 11 DEC. 1956

ABBREVIATIONS

V - INSITU VANE SHEAR TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
$\bar{O}_c$ - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL
K - PERMIABILITY
C - CONSOLIDATION
CA - CASING
γ - UNIT WEIGHT

SAMPLE TYPES

C.S. - CHUNK
D.O. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE
T.O. - THIN WALLED OPEN
S.S. - SLEEVE SAMPLE
P.S. - PISTON SAMPLE
W.S. - WASHED SAMPLE
R.C. - ROCK CORE

SAMPLE CONDITION

- DISTURBED
- FAIR
- GOOD
- LOST

SOIL PROFILE						SAMPLES					
ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	WATER CONTENT W % ---- O - NAT □ - PW △ - LW. PENETRATION TEST RESISTANCE BLOWS PER FOOT AT - STANDARD ENERGY (4200 IN. LBS PER BLOW) D. CONE PEN. X------X------X STAND. PEN. 50 100 150 200	CASING BLOWS (ACTUAL)	OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
8612'		GROUND LEVEL		860							
1											
6				855							
11				850							
16				845							
21				840	STOPPED AT ELEV. 8402'						

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-1 OPERATION BORE JOB F-56-26 W.P. 707-56 BORING 4 STA. 31+70 (56' Lt.)

CASING B (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT FEB 1957

SAMPLER HAMMER WT 250 LBS. DROP 20" INCHES COMPILED BY HS CHECKED BY AL DATE BORING 12 DEC 1956

ABBREVIATIONS

V - INSITU VANE SHEAR TEST; M - MECHANICAL ANALYSIS; U - UNCONFINED COMPRESSION; Q_c - TRIAXIAL CONSOLIDATED QUICK; Q - TRIAXIAL QUICK; S - TRIAXIAL SLOW; WL - WATER LEVEL IN CASING; WT - WATER TABLE IN SOIL; K - PERMIABILITY; C - CONSOLIDATION; CA - CASING; γ - UNIT WEIGHT

SAMPLE TYPES

CS - CHUNK; DO - DRIVE OPEN; DF - DRIVE FOOT VALVE; TO - THIN WALLED OPEN; SS - SLEEVE SAMPLE; PS - PISTON SAMPLE; WS - WASHED SAMPLE; RC - ROCK CORE

SAMPLE CONDITION

D - DISTURBED; F - FAIR; G - GOOD; L - LOST

SOIL PROFILE

ELEVATION / DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT
857.9'		GROUND LEVEL	
856.9' / 1.0'		TOP SOIL	
		STIFF GREY CLAY	
833.9' / 23.0'		GREY CLAY	
828.9' / 29.0'		GREY SILTY CLAY	
825.9' / 32.0'		SILTY CLAY LOAM	

SHEAR STRENGTH IN LBS. PER SQ. FT. (2000, 4000, 6000, 8000)

WATER CONTENT W % (0, 20, 40) O - NAT, □ - PW, △ - LW

PENETRATION TEST RESISTANCE BLOWS PER FOOT AT STANDARD ENERGY (4200 IN. LBS PER BLOW)

D. CONE PEN. X (60, 100, 150) STAND. PEN. (200)

ELEVATION SCALE: 855, 850, 845, 840, 835, 830, 825

NOTE: LAB. UNCONFINED COMPRESSION TEST RESULT NOT RELIABLE DUE TO DISTURBED CONDITION OF SAMPLE.

CASING BLOWS (ACTUAL)	OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. / RECOV. %
7						857.9'
12						
38						
65						852.9'
46	-		T.O.	1	40	92
43						
58						
59						847.9'
63						
65	γ=129.0 p.c.f.		T.O.	2	20	71
63						
64						
71						842.9'
90						
76	γ=138.0 p.c.f.		T.O.	3	9	96
78						
80						
67						837.9'
72						
102	γ=130.4 p.c.f.		T.O.	4	10	92
96						
89						
77						832.9'
60						
73	γ=135.5 p.c.f.	X	T.O.	5	21	100
56						
47						
59						829.9'
56						
	γ=141.0 p.c.f.		T.O.	6	9	100

TL-129 (REV 56)

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 54-1 OPERATION PENETRATION JOB F-56-26 W.P. 707-56 BORING 5 STA. 31+23 (42' Rt.)

CASING BX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT FEB. 1957

SAMPLER HAMMER WT. 250 LBS. DROP 20 1/2 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 14 DEC. 1956

ABBREVIATIONS

V - INSITU VANE SHEAR TEST
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Q_C TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
W.L. - WATER LEVEL IN CASING
W.T. - WATER TABLE IN SOIL
K - PERMIABILITY
C - CONSOLIDATION
CA. - CASING
γ - UNIT WEIGHT

SAMPLE TYPES

C.S. - CHUNK
D.O. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE
T.O. - THIN WALLED OPEN
S.S. - SLEEVE SAMPLE
P.S. - PISTON SAMPLE
W.S. - WASHED SAMPLE
R.C. - ROCK CORE

SAMPLE CONDITION

- DISTURBED
- FAIR
- GOOD
- LOST

SOIL PROFILE					SAMPLES					
ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	CASING BLOWS (ACTUAL)	OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
857.86'		GROUND LEVEL									
3				855							
8				850							
13				845							
18				840							
23				835							
28				830							

WATER CONTENT W% ——— O - NAT □ - PW △ - LW

PENETRATION TEST RESISTANCE, BLOWS PER FOOT AT STANDARD ENERGY (4200 IN. LBS. PER BLOW)

D. CONE PEN. X-----X-----X STAND PEN. 100 200 300 400

STOPPED AT ELEV. 836.86'

129 (REV 56)

DEPARTMENT OF HIGHWAYS ONTARIO

MATERIALS & RESEARCH BRANCH - FOUNDATIONS SECTION - DOWNSVIEW

OFFICE REPORT ON SOIL EXPLORATION

DRILL RIG 59-1 OPERATION PENETRATION JOB F-56-26 WP 707-56 BORING 6 STA. 32+29 (2' LT)

CASING NX (standard samplers to fit unless noted) DATUM GEODETIC DATE REPORT FEB. 1957

SAMPLER HAMMER WT 250 LBS. DROP 20 1/2 INCHES COMPILED BY H.S. CHECKED BY A.L. DATE BORING 5 DEC. 1957

ABBREVIATIONS

V - INSITU VANE SHEAR TES
M - MECHANICAL ANALYSIS
U - UNCONFINED COMPRESSION
Q_c - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL
K - PERMIABILITY
C - CONSOLIDATION
CA - CASING
γ - UNIT WEIGHT

SAMPLE TYPES

CS - CHUNK
DO - DRIVE OPEN
DF - DRIVE FOOT VALVE
TO - THIN WALLED OPEN
SS - SLEEVE SAMPLE
PS - PISTON SAMPLE
WS - WASHED SAMPLE
RC - ROCK CORE

SAMPLE CONDITION

- DISTURBED
- FAIR
- GOOD
- LOST

ELEVATION DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT PLOT	ELEVATION SCALE	WATER CONTENT W% ○ - NAT □ - P.W. Δ - L.W. / PENETRATION TEST RESISTANCE BLOWS PER FOOT AT STANDARD ENERGY (4200 IN. LBS. PER BLOW) D CONE PEN. X---X---X STAND. PEN. 100 200 300 400	CASING BLOWS (ACTUAL)	SAMPLES: OTHER TESTS	CONDITION	TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV. %
859.89'		GROUND LEVEL										
0				855	HAMMER		4					
5												
10				850								
15				845								
20				840								
25				835	STOPPED AT ELEV. 834.89'							

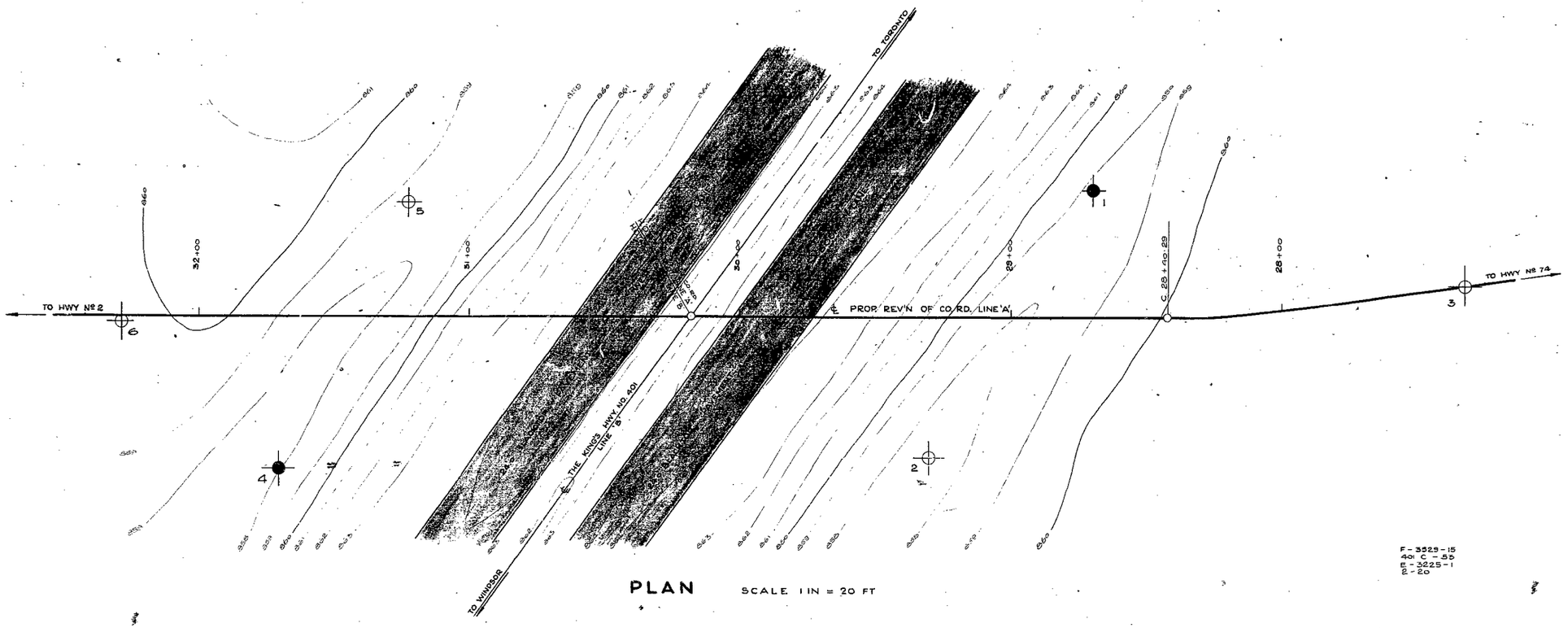
#56-F-26

W.P. #707-56

Hwy #401

COUNTY RD

LINE "A" CROSSING



PLAN SCALE 1 IN = 20 FT

F - 3529 - 15
401 C - 55
E - 2625 - 1
P - 20

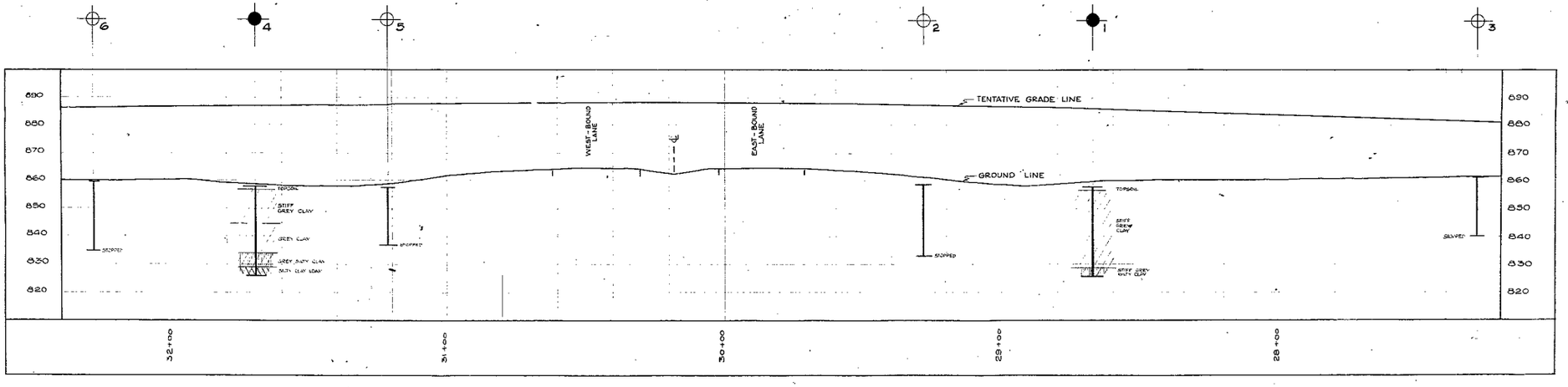
LEGEND

BORE HOLE

PENETRATION HOLE

BORE & PENETRATION HOLE

HOLE Nº	ELEVATION	STATION	DISTANCE FROM ℄
1	857·44'	28+70'	47' RT
2	858·7'	29+31'	52' LT
3	861·2	27+32'	℄
4	857·97'	31+70'	56' LT
5	857·86'	31+23'	42' RT
6	859·89'	32+29'	2' LT



PROFILE SCALE HOR. 1 IN = 20 FT
VER. 1 IN = 20 FT

— 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.

DEPARTMENT OF HIGHWAYS:-ONTARIO-
MATERIALS & RESEARCH SECTION - DOWNSVIEW

LINE 'A' OF COUNTY RD. CROSSING HWY. 401 3 MI. SOUTH OF LONDON

THE KING'S HIGHWAY No. 401 DIV. No. 2
CO. MIDDLESEX
TWP. WESTMINSTER LOT 15 CON III

POSITIONS & ELEVATIONS OF HOLES

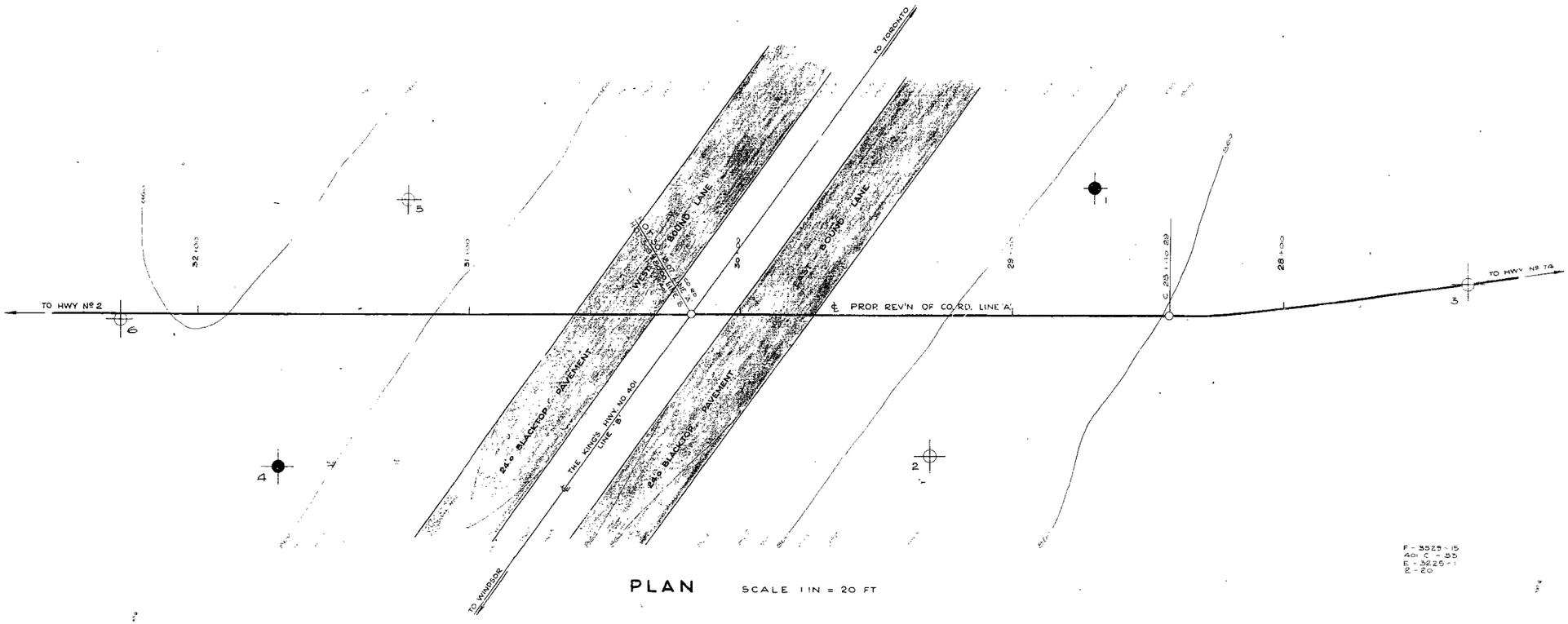
APPROVED

ENGINEER CHIEF ENGINEER

REVISIONS: DATE BY DESCRIPTION REFERENCE PLANS

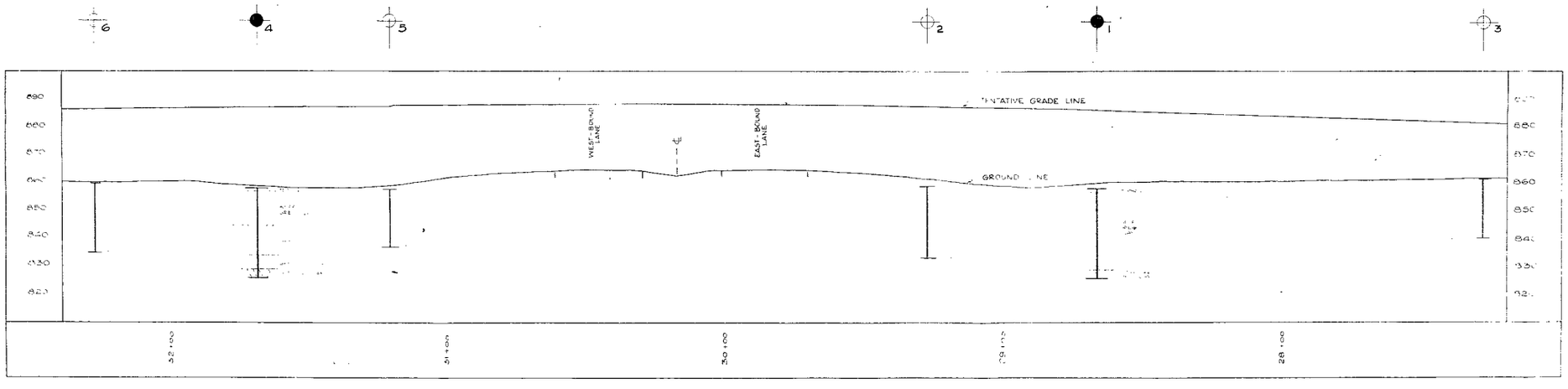
DESIGN CHECK
DRAWING D.F CHECK
TRACING CHECK
DATE MARCH 5, 1957

CONTRACT NUMBERS W. P 707-56
DRAWING NUMBER F-56-26 A



PLAN SCALE 1 IN = 20 FT

F - 3529 - 15
401 C - 35
E - 3225 - 1
2 - 20



PROFILE SCALE HOR. 1 IN = 20 FT
VER. 1 IN = 20 FT

LEGEND

BORE HOLE

PENETRATION HOLE

BORE & PENETRATION HOLE

HOLE Nº	ELEVATION	STATION	DISTANCE FROM ℄
1	857.44'	28+10'	47 RT
2	858.7'	29+31'	52 LT
3	861.2'	27+32'	℄
4	857.97'	31+70'	56 LT
5	857.84'	31+25'	42 RT
6	859.89'	32+23'	2 LT

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

DEPARTMENT OF HIGHWAYS: ONTARIO
MATERIALS & RESEARCH SECTION — DOWNSVIEW

LINE 'A' OF COUNTY RD. CROSSING HWY. 401 3 MI. SOUTH OF LONDON

HE KINGS HIGHWAY Nº 401 SHT. Nº 2
CO. MIDDLESEX
TWP. WESTMINSTER 15

POSITIONS & ELEVATIONS OF HOLES

APPROVED

F - 56 - 26 A