

W.O. S4-F-1

HWY. 17

WEST HAWKSBURY

CREEK

31 G-6

SLOPE STABILITY CALCULATION

FOR SLOPE 1:2 AT STA. 164+00

SLICE N ^o .	W			T
	BELOW HWL	ABOVE HWL	TOTAL	
1	864	3720	4584	400
2	708	3720	4500	1100
3	480	3720	4200	1800
4	96	3600	3696	2160
5	0	2230	2280	2160
6	0	1440	1440	1340

$$\begin{array}{r} 8960 \\ \times 8 \\ \hline \end{array}$$

DATA & CALCULATION

$$\sum T = \underline{\underline{71,680 \text{ LBS.}}}$$

L, 264

$$L_2 = 2\pi \times 48 \times \frac{81}{360} = 67.8'$$

$C_1 = 230 \text{ LBS/FT}^2$ (OR 333 LBS/FT^2 FOR MAX.)

$C_2 = 600 \text{ LBS/FT}^2$

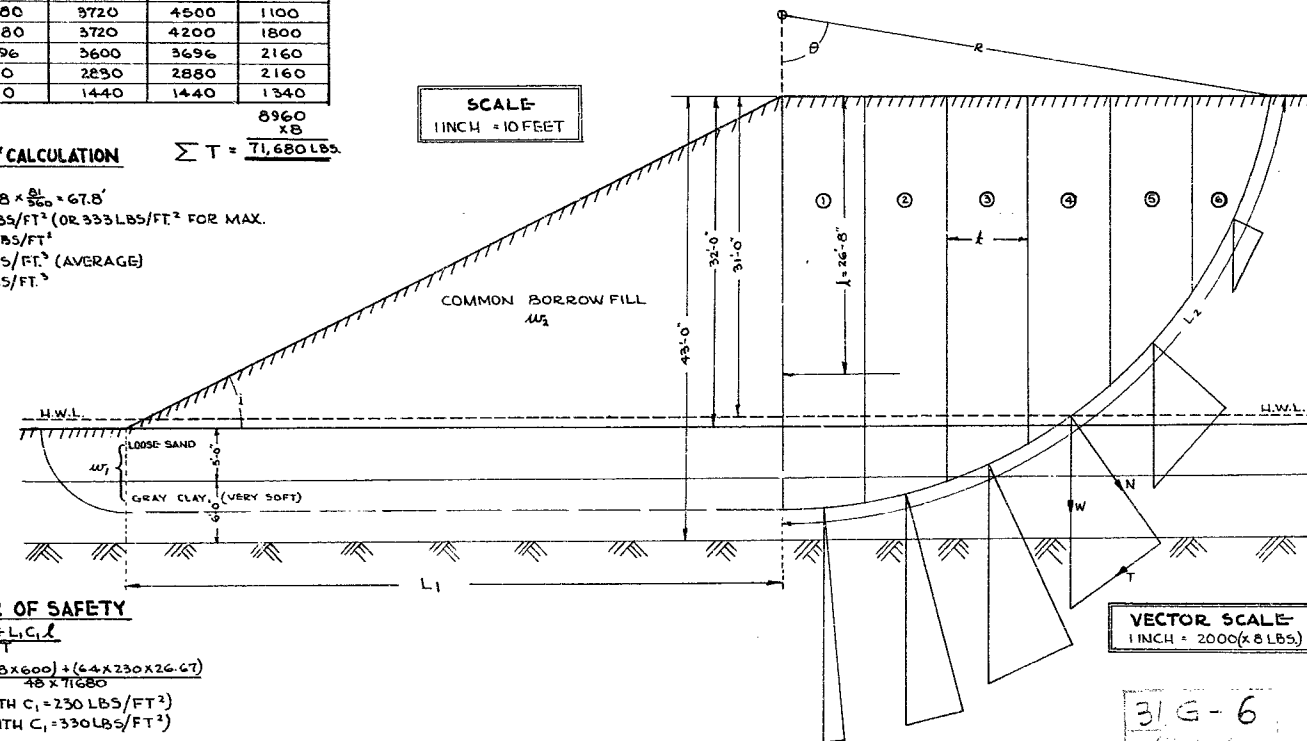
W₁ = 96 LBS/FT.³ (AVERAGE)

$$W_2 = 120 \text{ LBS/FT.}^3$$

$$w_2 = 120$$

$$x = 8'$$

$$\phi = 0^\circ$$



FACTOR OF SAFETY

$$F = \frac{RL_2C_2 + L_1C_1I}{R \Sigma T}$$

$$= \frac{(48 \times 67.8 \times 600) + (64 \times 230 \times 26.67)}{48 \times 71680}$$

$$=.68 \text{ (WITH } C_1 = 230 \text{ LBS/FT}^2)$$

OR: .73 (WITH $C_1 = 330 \text{ LBS/FT}^2$)

OR: .73 (WITH $C_1 = 330 \text{ LBS/FT}^2$)

VECTOR SCALE
1 INCH = 2000 (x 8 LBS.)

31 E - 6

54-7-

SLOPE STABILITY CALCULATION

FOR SLOPE OF 1:2 AT STA. 164+00

SLICE NO.	W	N	T
BELOW H.W.L.	ABOVE H.W.L.	TOTAL	
1	450	168	618
2	960	770	1730
3	1107	1365	2472
4	1107	1970	3077
5	1107	2565	3672
6	1107	3160	4267
7	922	3850	4772
8	388	3850	4238
9	0	3170	2260
10	0	1540	1360
		7740	7740

DATA / CALCULATION

$$L = 2\pi R \times \frac{1}{360} = 2\pi \times 63 \times \frac{1}{360} = 124'$$

$$L_1 = \frac{124}{115} \times 79 = 86.8'$$

$$L_2 = \frac{124}{115} \times 34 = 37.2'$$

$$C_1 = 230 \text{ LBS/FT}^2 \text{ (OR } 333 \text{ LBS/FT}^2 \text{ FOR MAX)}$$

$$C_2 = 600 \text{ LBS/FT}^2$$

$$W_1 = 96 \text{ LBS/FT}^3 \text{ (AVERAGE)}$$

$$W_2 = 120 \text{ LBS/FT}^3$$

$$x = 10'$$

$$\phi = 0^\circ$$

$$\Sigma T = \frac{7740}{10} = 774 \text{ LBS}$$

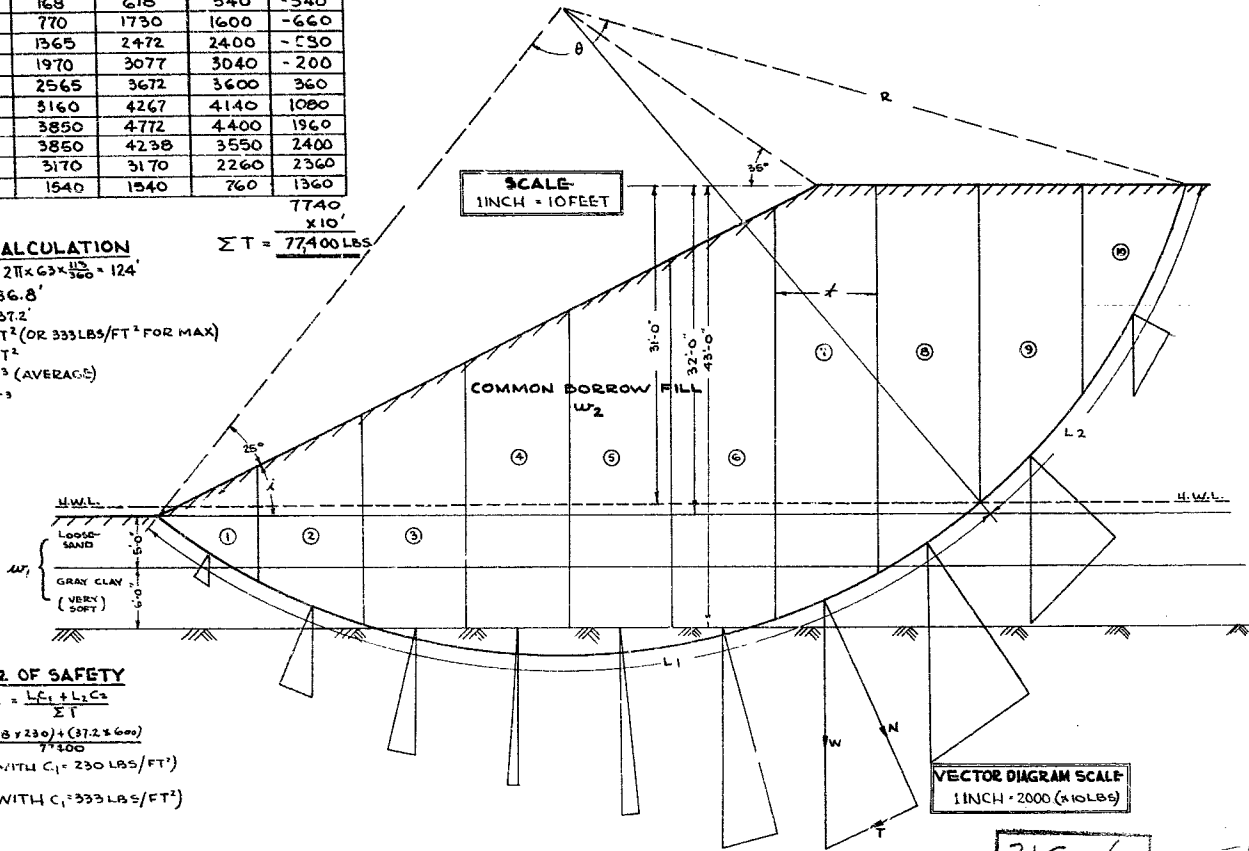
FACTOR OF SAFETY

$$F = \frac{\Sigma Lc}{\Sigma T} = \frac{Lc_1 + L_2 C_2}{\Sigma T}$$

$$= \frac{(86.8 \times 230) + (37.2 \times 600)}{7740}$$

$$= .54 \text{ (WITH } C_1 = 230 \text{ LBS/FT}^2)$$

$$\text{OR } = .65 \text{ (WITH } C_1 = 333 \text{ LBS/FT}^2)$$



SLOPE STABILITY CALCULATION

SLICE NO.	N	T
1	45400	4600
2	41200	13800
3	33600	20500
4	19400	20600
5	7200	15400

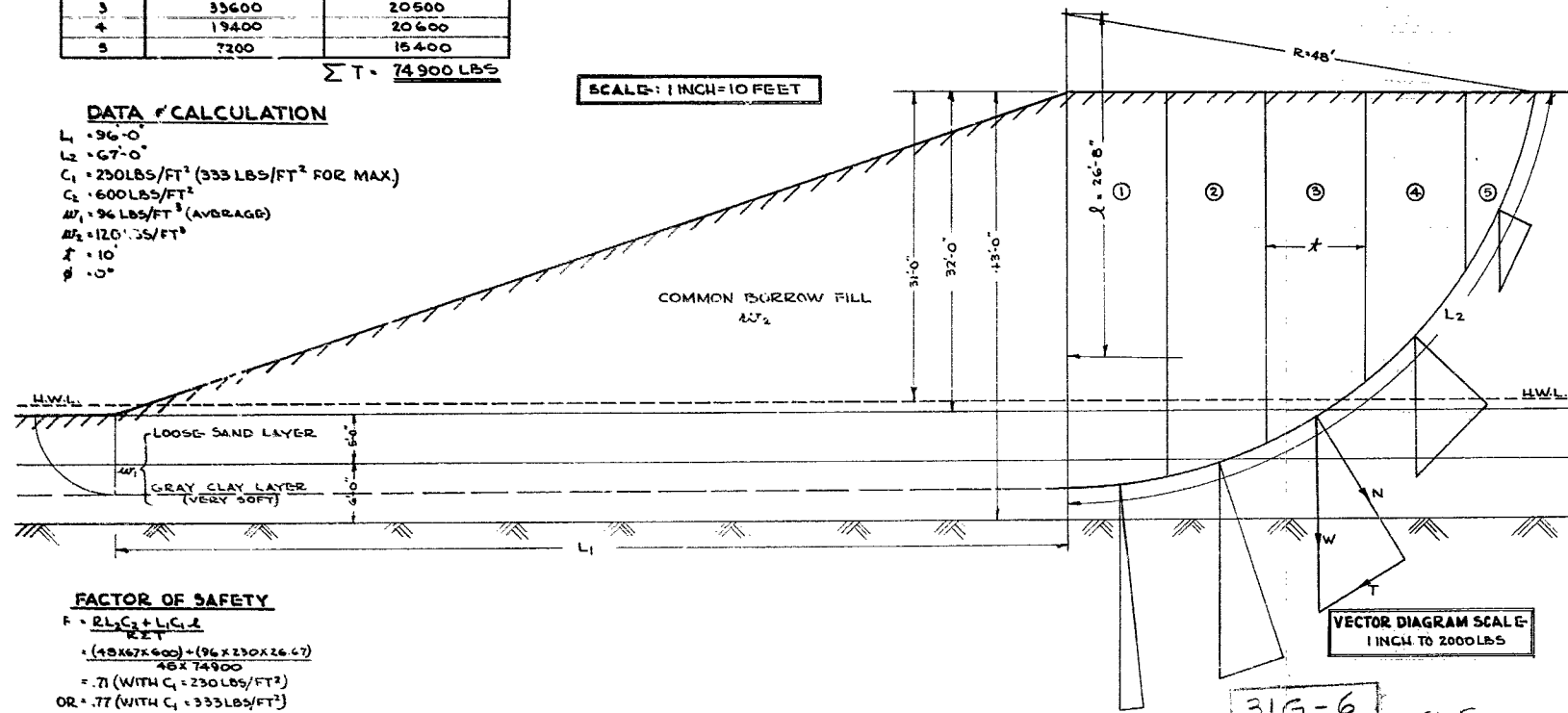
$\Sigma T = 74900 \text{ LBS}$

FOR SLOPE OF 1:3 AT STA. 164+00

SCALE: 1 INCH = 10 FEET

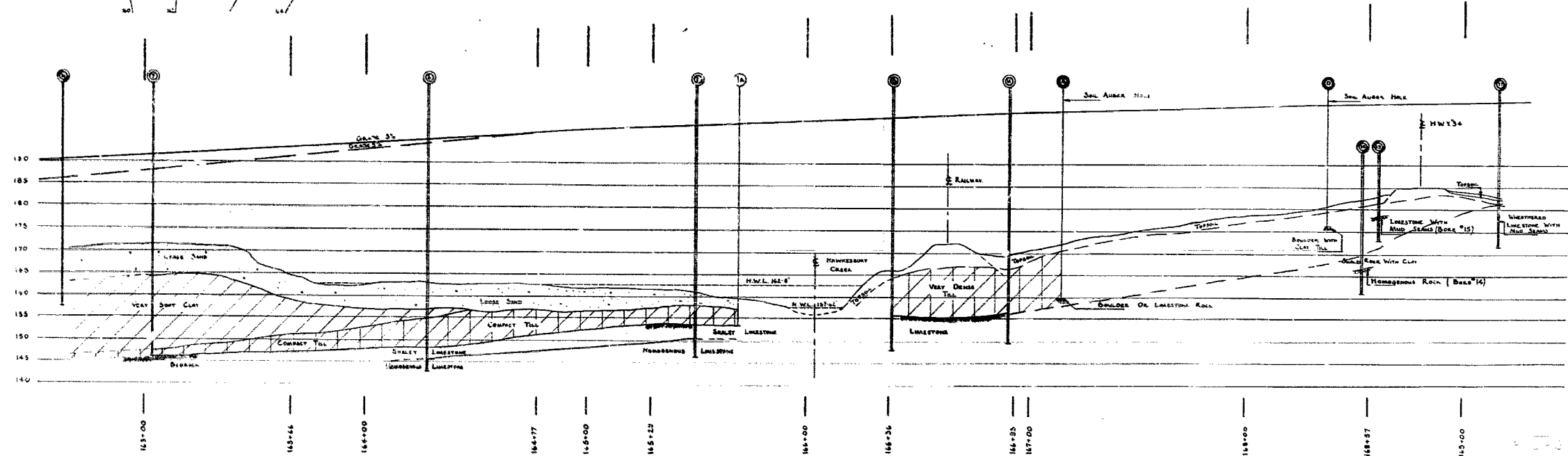
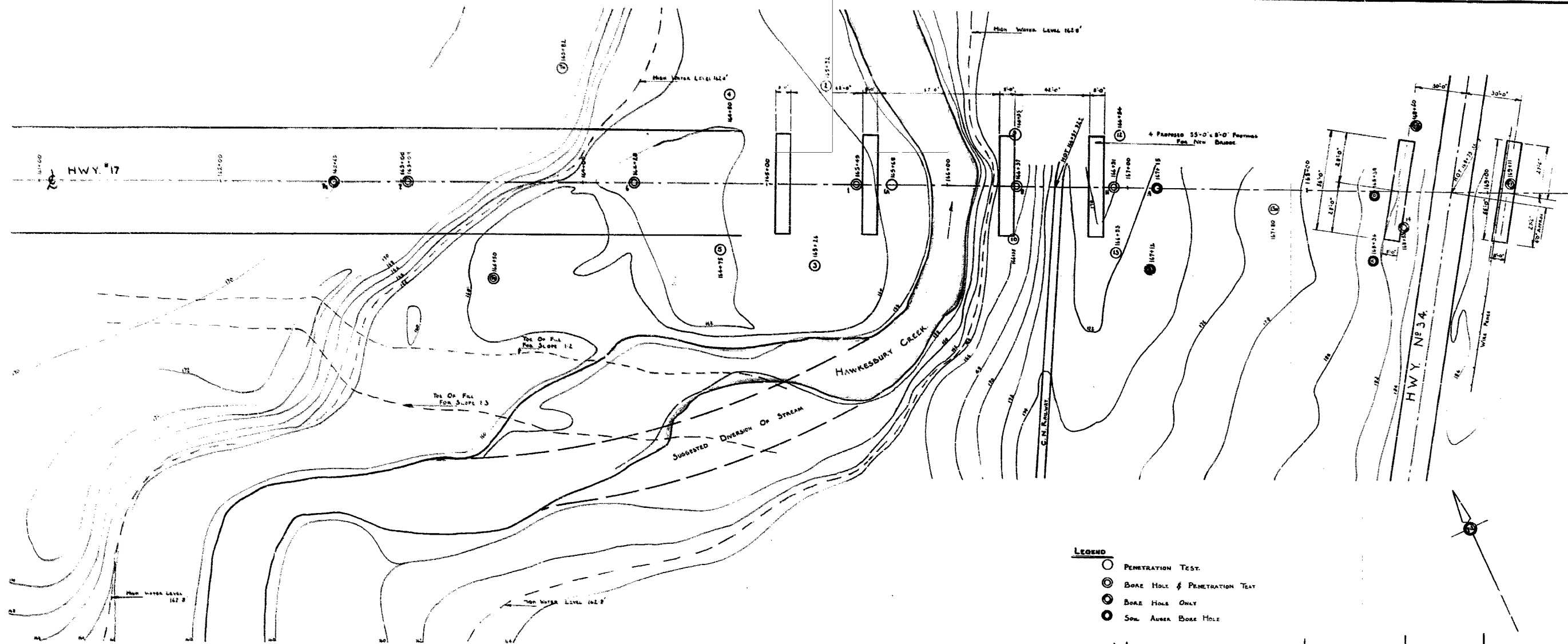
DATA FOR CALCULATION

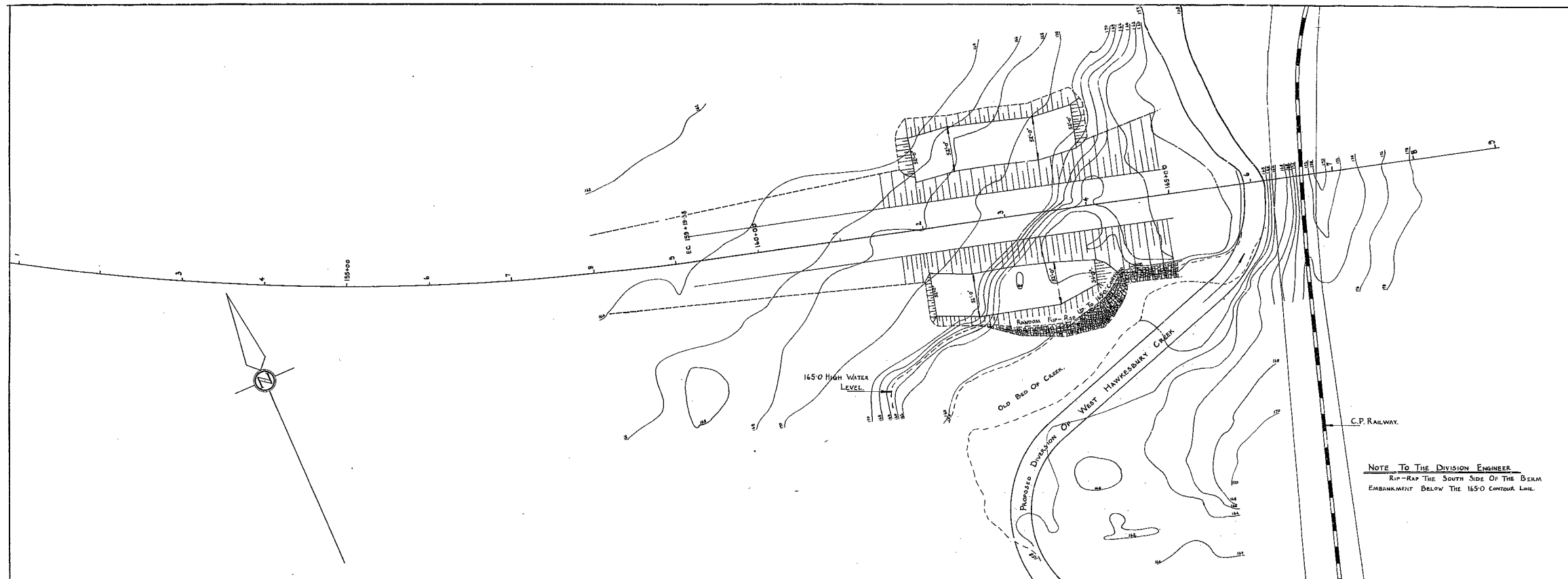
$L_1 = 96'-0"$
 $L_2 = 67'-0"$
 $C_1 = 230 \text{ LBS/FT}^2$ (333 LBS/FT² FOR MAX)
 $C_2 = 600 \text{ LBS/FT}^2$
 $W_1 = 96 \text{ LBS/FT}^3$ (AVERAGE)
 $W_2 = 120 \text{ LBS/FT}^3$
 $\delta = 10^\circ$
 $\phi = 0^\circ$



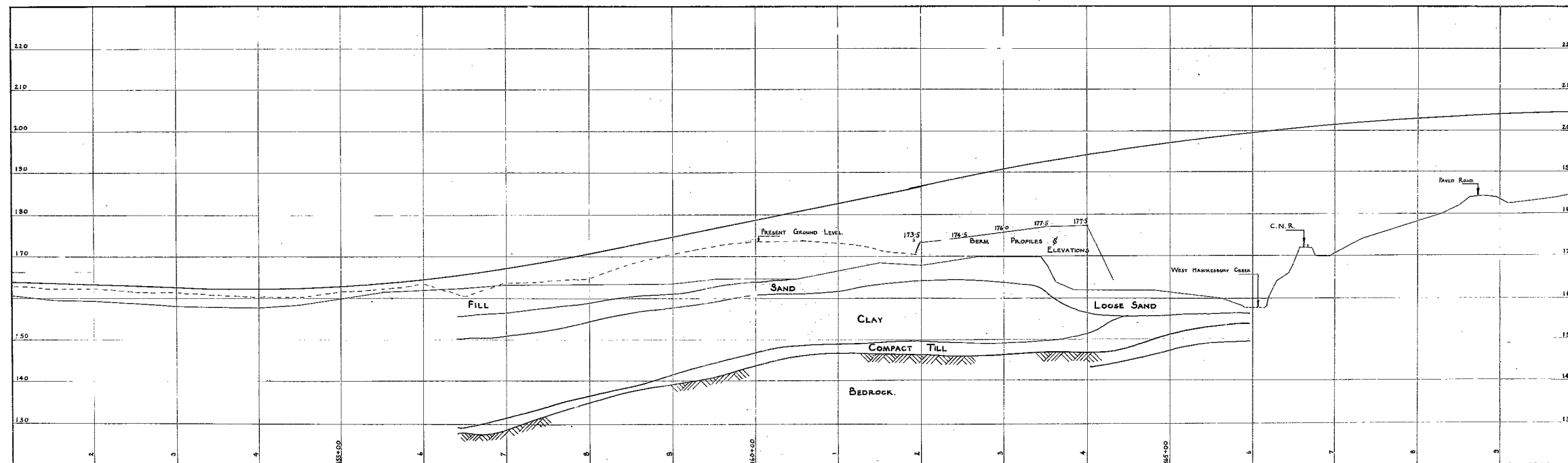
FACTOR OF SAFETY

$$\begin{aligned}
 F &= \frac{R L_2 C_2 + L_1 C_1}{\Sigma T} \\
 &= \frac{(48 \times 67 \times 600) + (96 \times 230 \times 26.67)}{48 \times 74900} \\
 &= .71 \text{ (WITH } C_1 = 230 \text{ LBS/FT}^2\text{)} \\
 \text{OR } &= .77 \text{ (WITH } C_1 = 333 \text{ LBS/FT}^2\text{)}
 \end{aligned}$$





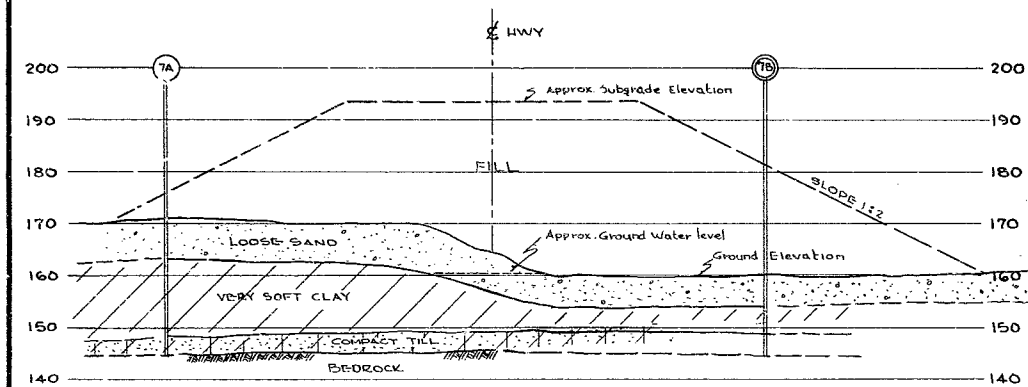
PLAN



PROFILE

DEPARTMENT OF HIGHWAYS, ONTARIO	
MATERIALS LAB. TORONTO	
WEST HAWKESBURY CREEK	
THE KING'S HIGHWAY NO. 17	SP. NO. 9
SS. PRESENT	SCALE: "HAT. 1"=10' HORIZ. 1"=50'
TW. WEST HAWKESBURY	LOT 11 & 12
PROPOSED BERM FOR WEST BRIDGE APPROACH	
DRAWING NO. F 54-1A	JOB NO. F 54-1
DATE: 10/1/35	DATE: 10/1/35
PLAN NO. 1	CHECKED BY: S.H.F.
DRAWN BY: M.L.F.	

CROSS SECTION-STA. 163+66

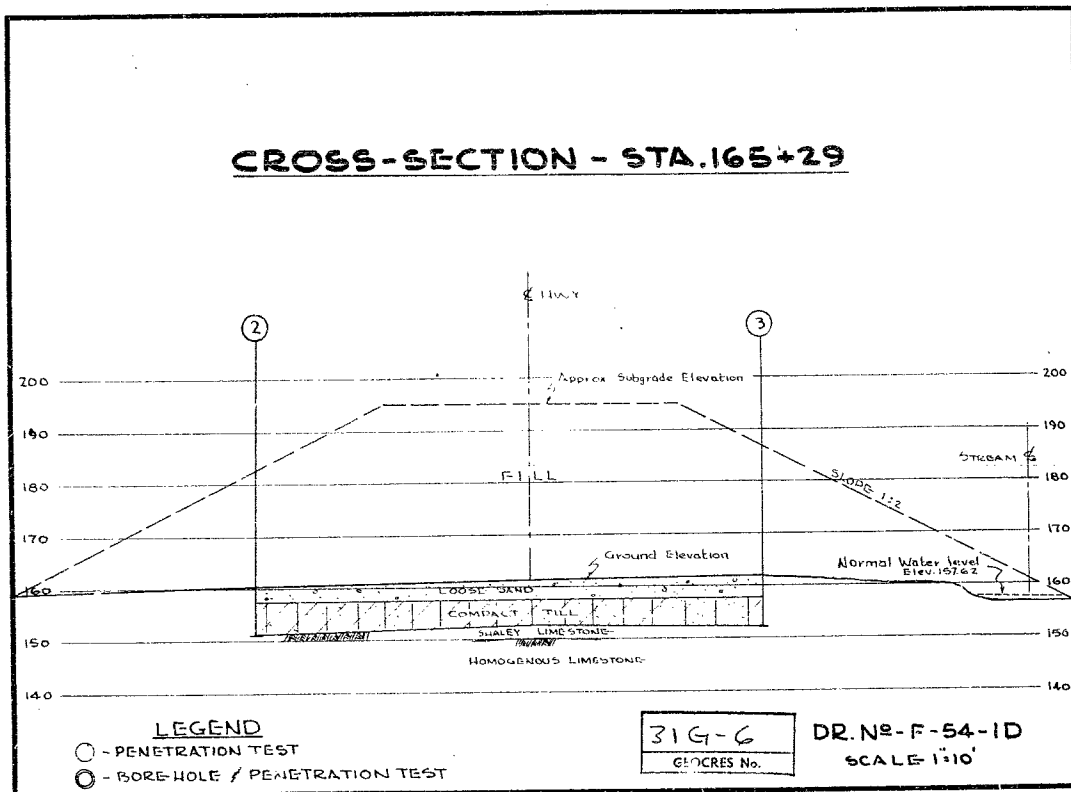
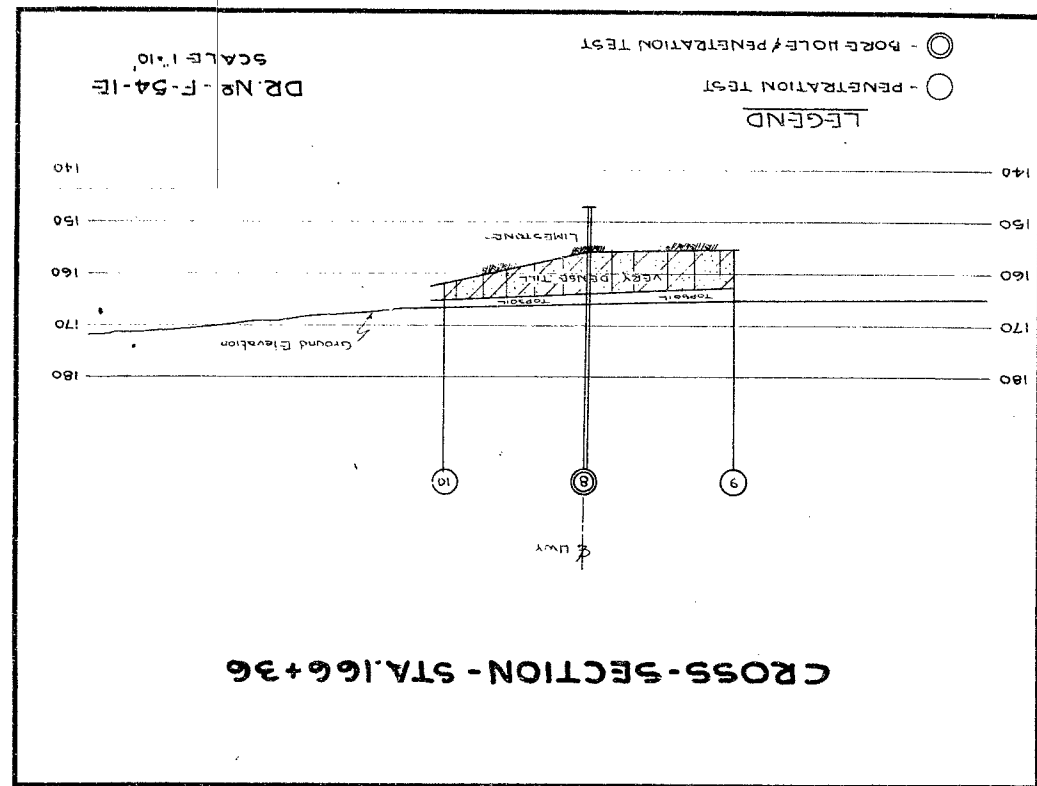


LEGEND

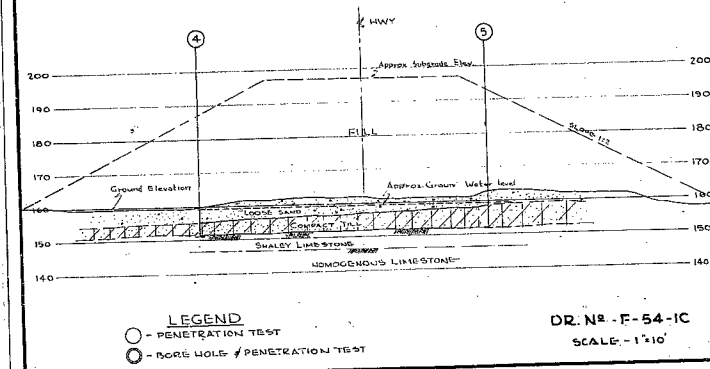
- - BORE HOLE / PENETRATION TEST
- - PENETRATION TEST

GEOCRE
Nº 314-6

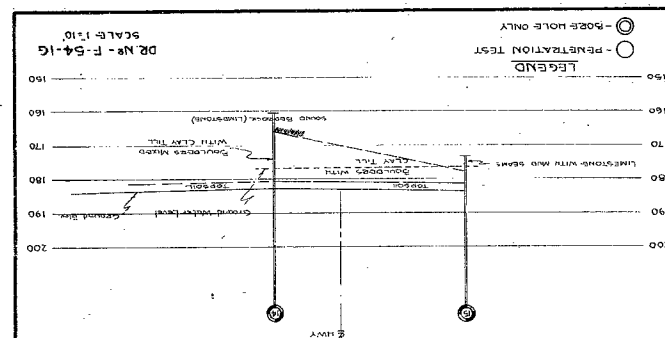
DR. Nº - F-54-1B
SCALE 1"=10'



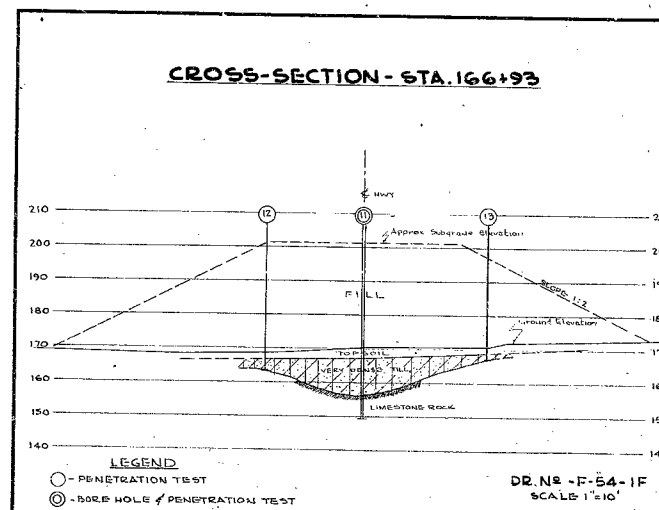
CROSS-SECTION STA. 164+77



CROSS-SECTION - STA. 168+57



CROSS-SECTION - STA. 166+93



31G-6
GEOCRE No.

TL 129
54-90

MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

31 G-6
GEOCRE No.

DRILL RIG #1
CASING BX (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT 250 #
JOB F54-1
DATUM Geod. El. 161.3 Sta. 165+49.07' Rte 6
COMPILED BY H.E. CHECKED BY G.N.E.
BORING No. 1
DATE REPORT April 5-54
BORING DATE April 2-54

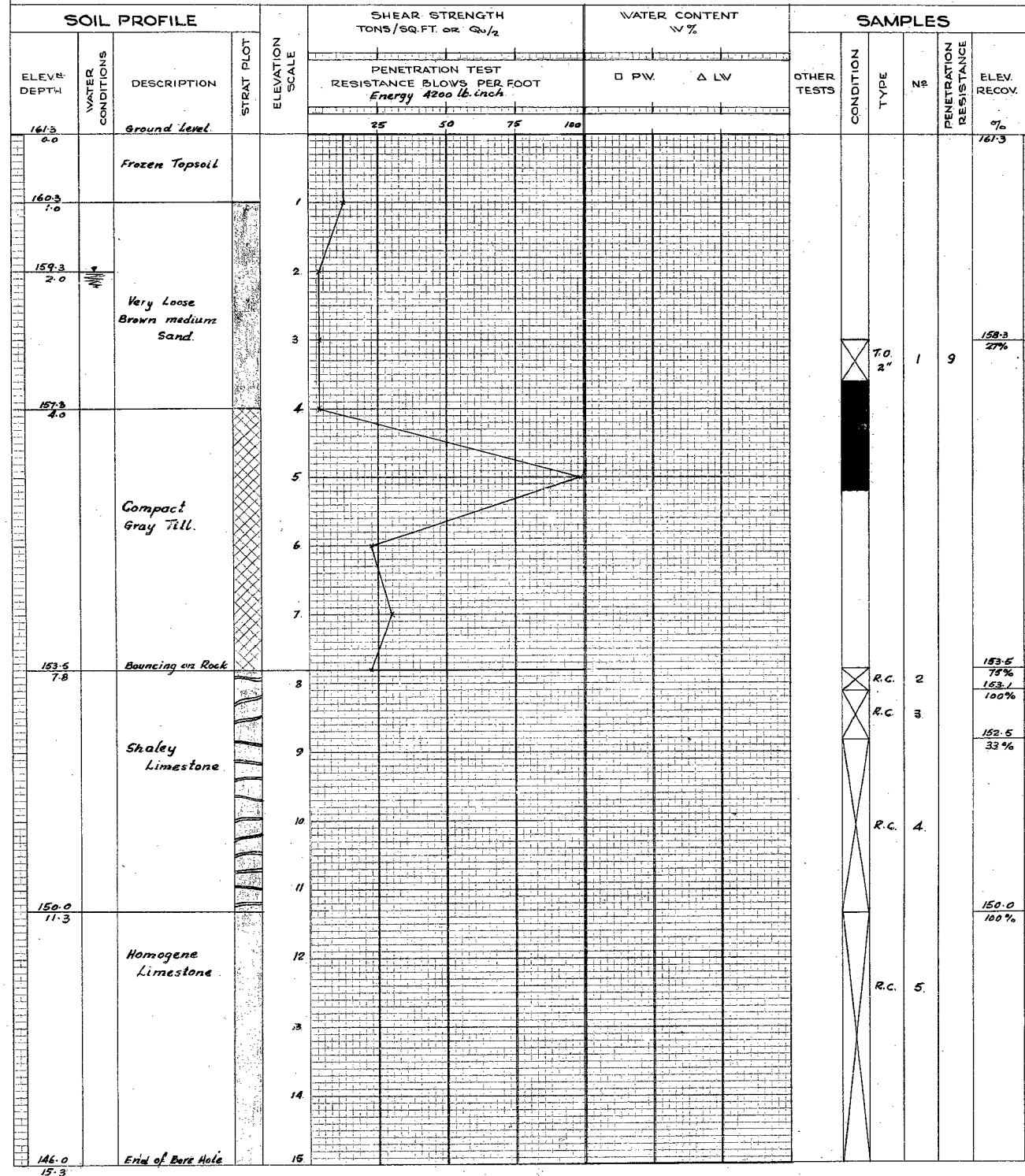
SAMPLE CONDITION



SAMPLE TYPES
C.S. - CHUNK
D.O. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE
TO. - THIN WALLED OPEN
WS - WASHED SAMPLE
RC - ROCK CORE

ABBREVIATIONS

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



TL 129
54-90

MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

314-6

GEORES No.

DRILL RIG 1 JOB F 54-1 BORING No. 6
CASING BX (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM Good El. 163.1, Sta 164+28, 1' Rt. DATE REPORT April 8-1954
SAMPLER HAMMER WT. 250 # DROP 25 INCHES COMPILED BY H.E. CHECKED BY G.M.F. BORING DATE April 5-6-7-1954

SAMPLE CONDITION



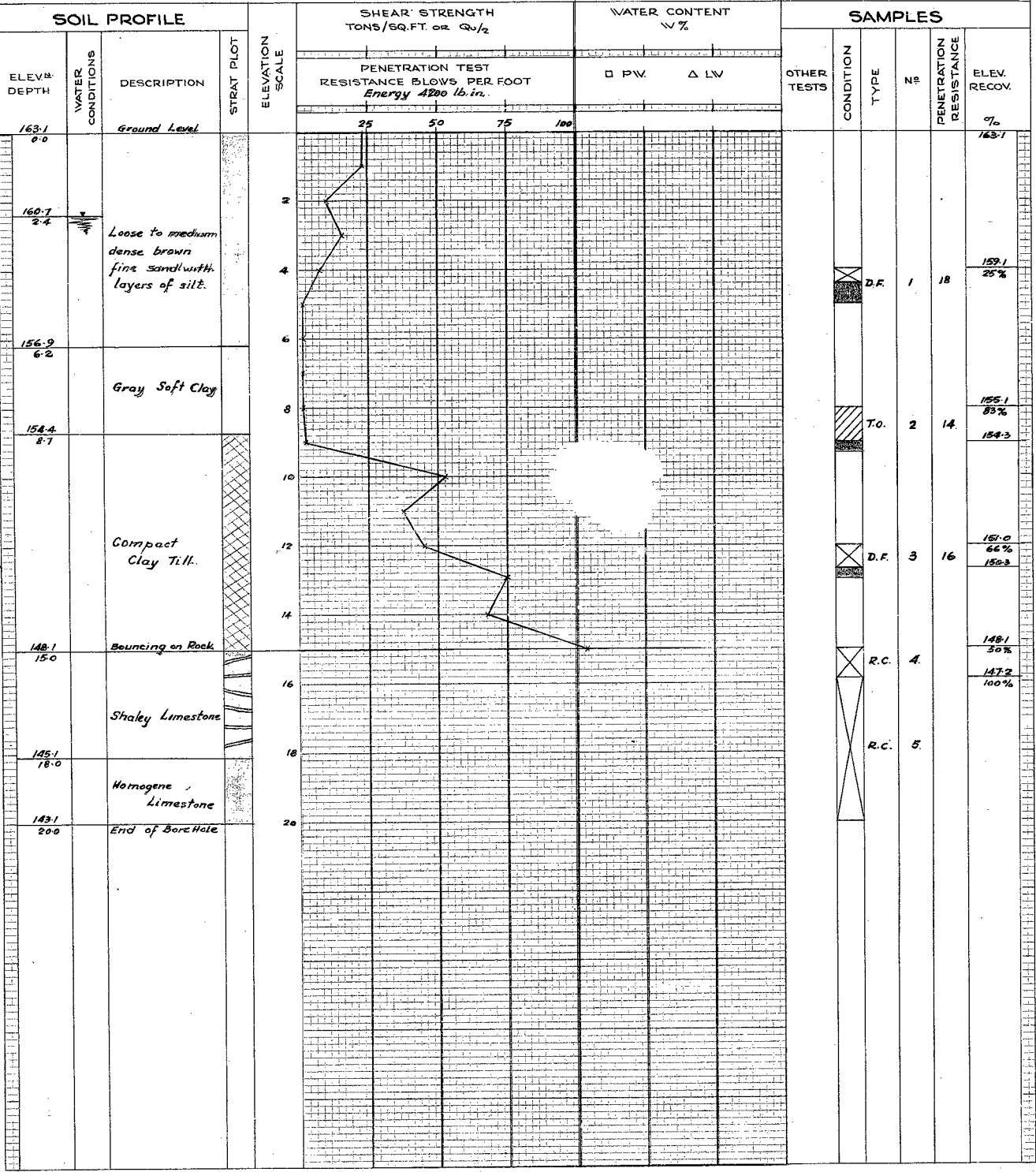
C.S. - CHUNK
D.O. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE
T.O. - THIN WALLED OPEN

SAMPLE TYPES

W.S. - WASHED SAMPLE
R.C. - ROCK CORE

ABBREVIATIONS

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



TL 123
54-90

MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

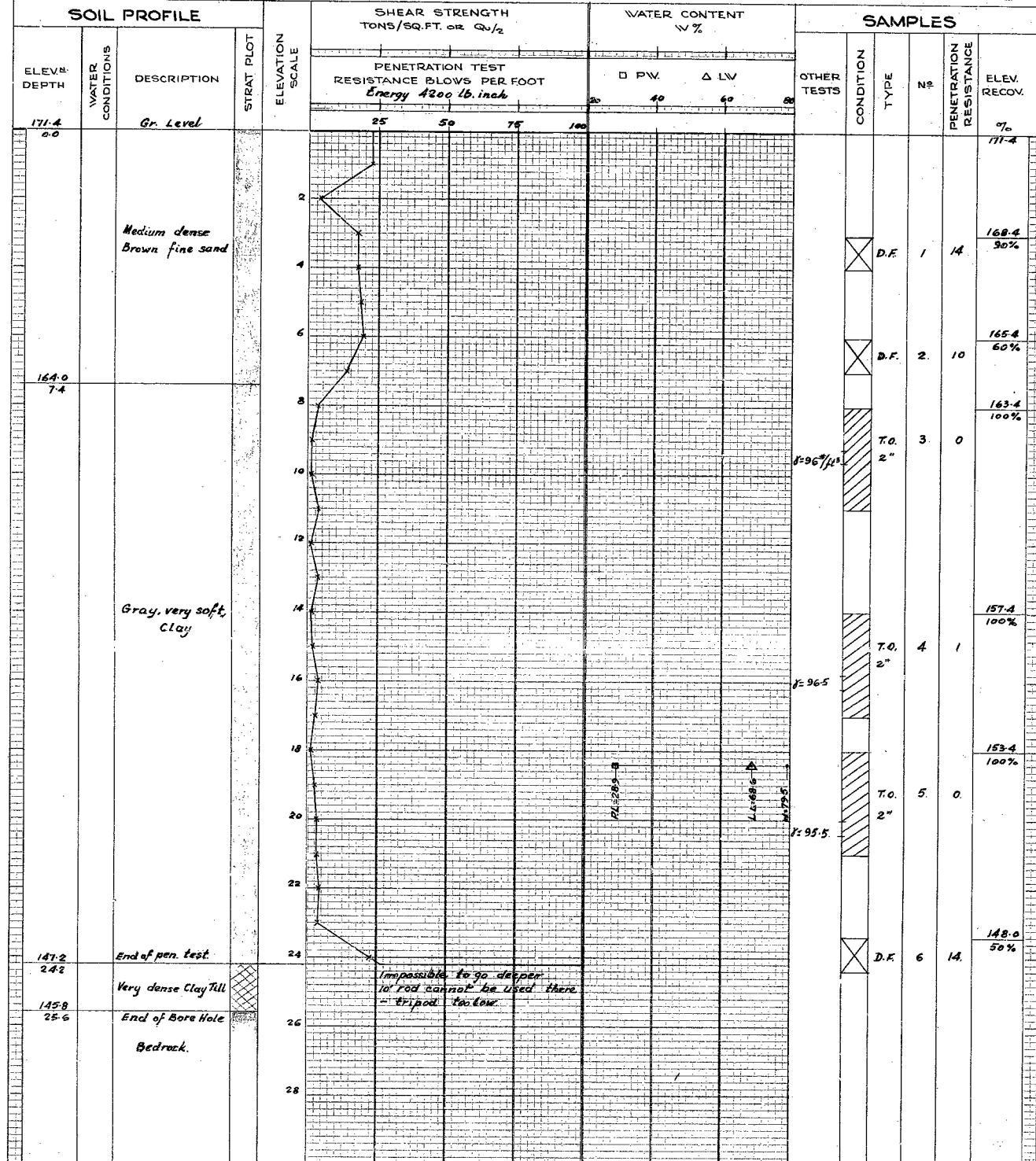
31 G-6
GEOCRE No.

DRILL RIG 1 JOB F54-1 BORING No. 7
CASING 8x (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM Good 171.4 Sta. 163+03.2 DATE REPORT April 8-9, 1954
SAMPLER HAMMER WT 250 * DROP 25 INCHES COMPILED BY H. A. CHECKED BY G. N. F. BORING DATE April 8, 1954

SAMPLE CONDITION
DISTURBED
GOOD
LOST

SAMPLE TYPES
C.S. - CHUNK
D.O. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE
TO. - THIN WALLED OPEN
W.S. - WASHED SAMPLE
R.C. - ROCK CORE

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



TL 129
54-90

MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

31 G-6
GEOCRE No.

DRILL RIG # 1 JOB F-54-1 BORING No. 7B
CASING 2X (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM EL. 160.2 STA. 163+50.55 RL DATE REPORT April 30 - 1954
SAMPLER HAMMER WT. 250 # DROP 29 INCHES COMPILED BY H.E. CHECKED BY G.N.F. BORING DATE April 28 - 1954

SAMPLE CONDITION



DISTURBED
GOOD
LOST

SAMPLE TYPES

C.S. - CHUNK
D.O. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE

T.O. - THIN WALLED OPEN

W.S. - WASHED SAMPLE
R.C. - ROCK CORE

ABBREVIATIONS

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

SOIL PROFILE

ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT
160.2 0.0			
		yellow Brown fine Sand	
156.5 3.7			
		Gray Sa. Till	
154.2 6.0			
		Very soft Gray Clay	
150.0 11.2		End of Bore Hole	
144.0 16.2		Bouncing on Rock End of Pen. Hole.	

SHEAR STRENGTH
TONS/SQ. FT. OR $Q_{u/2}$

PENETRATION TEST
RESISTANCE BLOWS PER FOOT
Energy 4200 lb/in.

WATER CONTENT
W %

□ P.W. Δ L.V.

SAMPLES

OTHER TESTS	CONDITION	TYPE	No.	PENETRATION RESISTANCE	ELEV. RECOV.
					%
					160.2
					157.2 100%
					154.2 63%
		T.O. 2'	2		
		T.O. 2"	3		151.2 100%

TL 129 54-90		MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS - ONTARIO OFFICE REPORT ON SOIL EXPLORATION				31 G-6 GEOCRE No.	
DRILL RIG #1		CASING (STANDARD SAMPLERS TO FIT UNLESS NOTED)		JOB F 54-1		BORING No. 7C	
SAMPLER HAMMER WT. 250		#		DROPPED 29 INCHES		DATE REPORT April 30-1954	
COMPILED BY H.E.		CHECKED BY G.N.F.		BORING DATE April 29-1954			
SAMPLE CONDITION		SAMPLE TYPES		ABBREVIATIONS			
<div><div></div><div></div><div></div></div>		C.S - CHUNK D.O - DRIVE OPEN D.F - DRIVE FOOT VALVE TO - THIN WALLED OPEN		V - INSITU VANE SHEAR TEST M - MECHANICAL ANALYSIS U - UNCONFINED COMPRESSION Qc - TRIAXIAL CONSOLIDATED QUICK Q - TRIAXIAL QUICK S - TRIAXIAL SLOW γ - UNIT WEIGHT K - PERMEABILITY C - CONSOLIDATION CA - CASING WL - WATER LEVEL IN CASING WT - WATER TABLE IN SOIL			
SOIL PROFILE		SHEAR STRENGTH TONS/SQ.FT. OR Qu/2		WATER CONTENT W %		SAMPLES	
ELEVATION DEPTH		PENETRATION TEST RESISTANCE BLOWS PER FOOT		D PW Δ LV		OTHER TESTS	
169.6 0.0						CONDITION TYPE No. PENETRATION RESISTANCE ELEV. RECOV.	
162.6 7.0						162.6 100% 160.1 159.6 100% 157.1	
157.1 12.5						157.1	

TL 129
54-90

MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

31 G-6
GEOCRES No.

DRILL RIG 1
CASING 8X (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT 250 # DROP 25 INCHES

JOB F 54-1
DATUM Elev 166.0 Sta 166+37
COMPILED BY H.E. CHECKED BY G.M.F.

BORING NO 8
DATE REPORT April 14-1954
BORING DATE April 12-14-1954

SAMPLE CONDITION



C.S - CHUNK
D.O - DRIVE OPEN
D.F - DRIVE FOOT VALVE
T.O - THIN WALLED OPEN

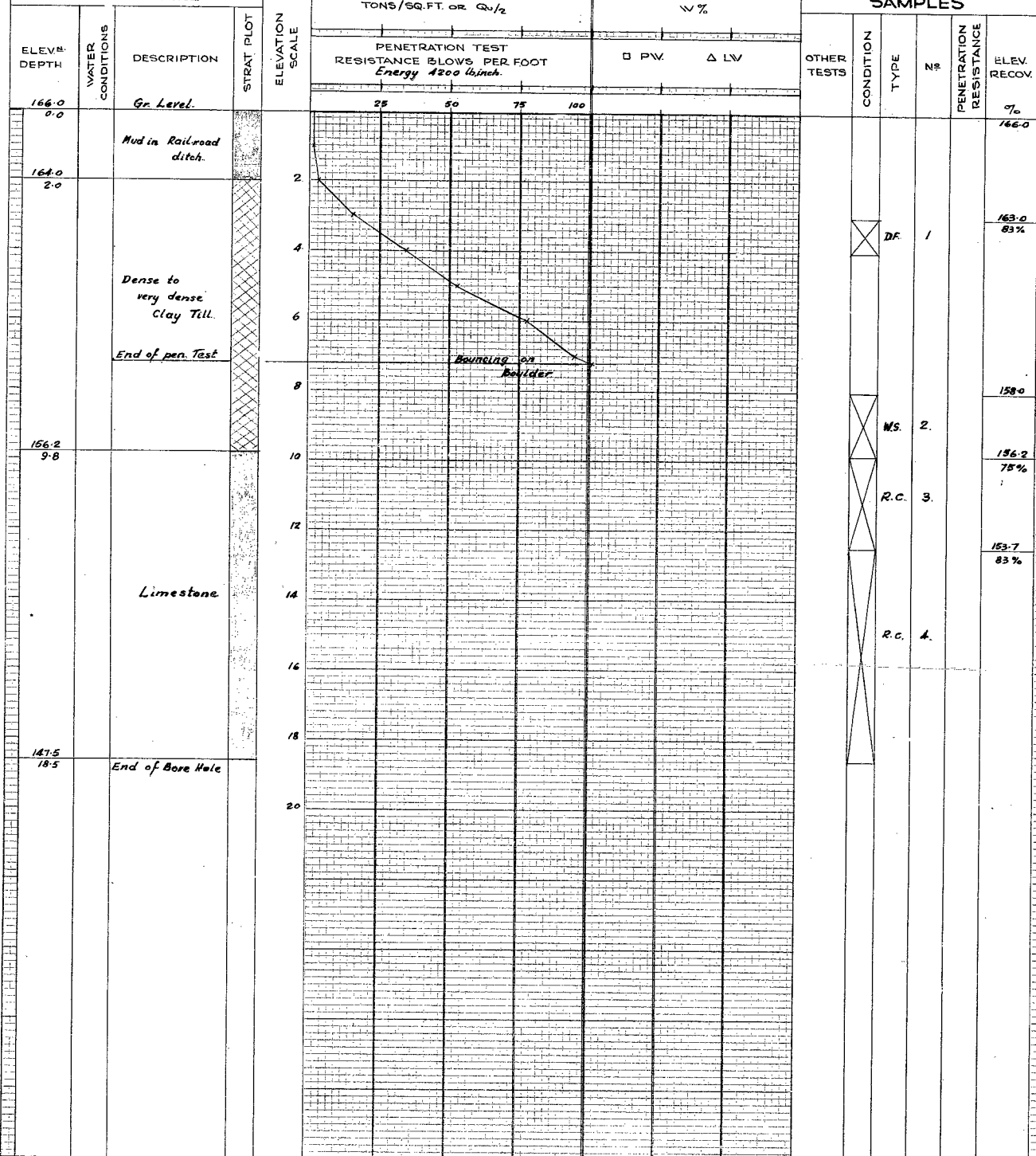
SAMPLE TYPES

W.S - WASHED SAMPLE
R.C - ROCK CORE

ABBREVIATIONS

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

SOIL PROFILE



ABBREVIATIONS

ABBREVIATIONS

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

[illegible]

TL 139
54-90

MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

314-6
GEOCRE No.

DRILL RIG #1
CASING BX (STANDARD SAMPLERS TO FIT UNLESS NOTED)
SAMPLER HAMMER WT 250 #
JOB F 54-1
DATUM 169.3 Sta. 166+21.8
DROP 25 INCHES
BORING No. 11
DATE REPORT April 13-1954
CHECKED BY G.N.F.
BORING DATE April 12-1954

SAMPLE CONDITION



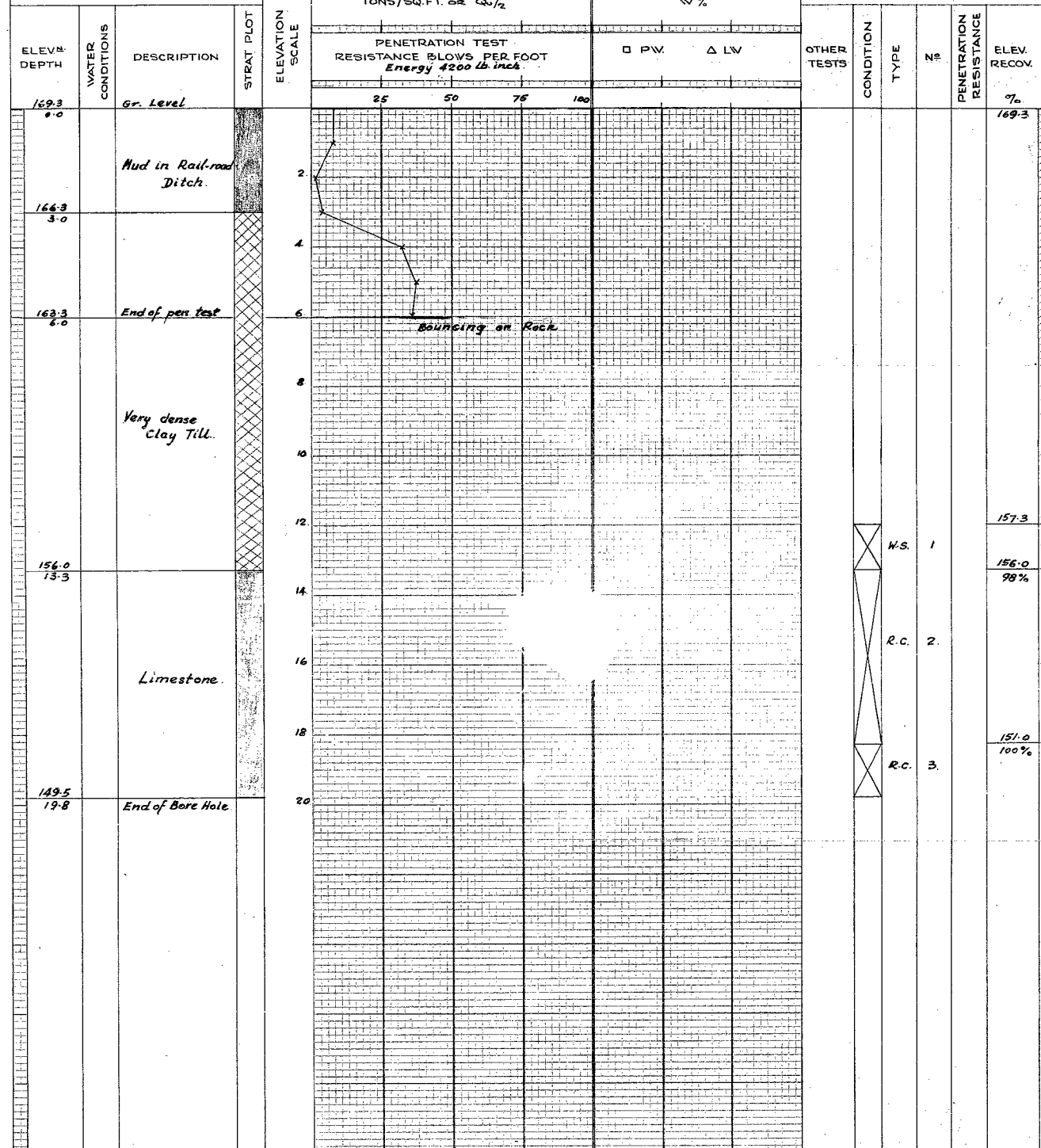
SAMPLE TYPES

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

ABBREVIATIONS

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CA - CASING
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

SOIL PROFILE



31 G-6
GÉOCRES N.

DRILL R.G. 1 JOB F 64-1
CASING bx (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM 182.6 sta. 166+53, 20' 0" BORING No. 14
SAMPLER HAMMER WT. 850 # DROP 22 INCHES COMPILED BY H. E. CHECKED BY GNE DATE REPORT April 24 - 1954
BORING DATE April 21 - 1954

SAMPLE CONDITION



DISTURBED
GOOD
LOST

SAMPLE TYPES

C.S. - CHUNK
D.O. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE
TO. - THIN WALLED OPEN
WS. - WASHED SAMPLE
RC. - ROCK CORE

ABBREVIATIONS

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

SOIL PROFILE

[illegible]

TL 129
34-90

MATERIALS LABORATORY-DEPARTMENT OF HIGHWAYS - ONTARIO
OFFICE REPORT ON SOIL EXPLORATION

316-6
GEOCRES No.

DRILL RIG 1 JOB ES-1 BORING NO. 15
CASING BY (STANDARD SAMPLERS TO FIT UNLESS NOTED) DATUM EL. 183.6, Sta 168+60.37 DATE REPORT May 4-1954
SAMPLER HAMMER WT. 250 * DROP 29 INCHES COMPILED BY H.E. CHECKED BY R.N.F. BORING DATE April 26-27-1954

SAMPLE CONDITION
DISTURBED
GOOD
LOST

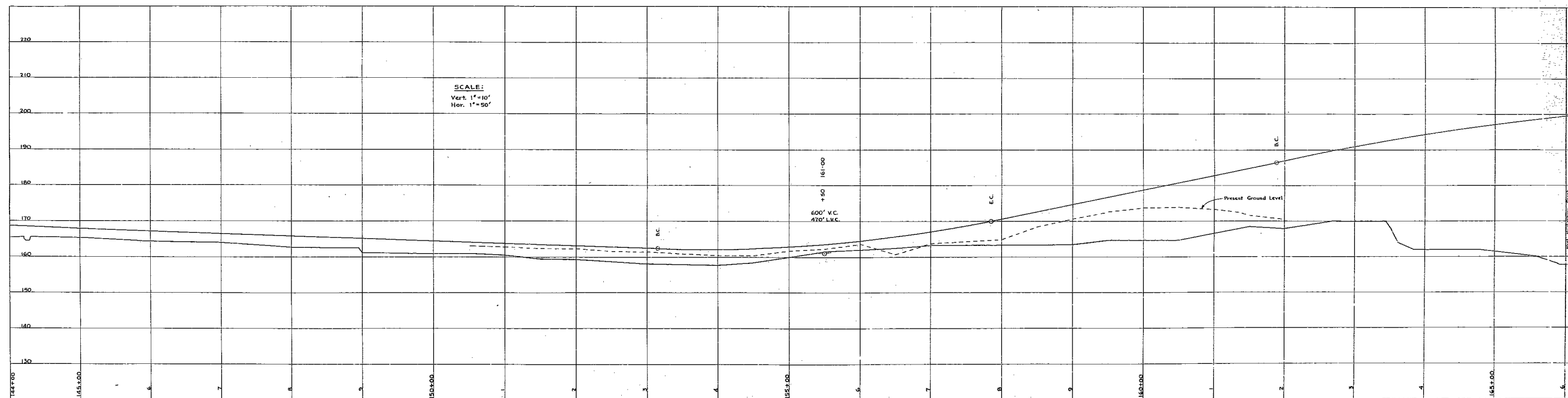
SAMPLE TYPES
C.G. - CHUNK
D.G. - DRIVE OPEN
D.F. - DRIVE FOOT VALVE
T.O. - THIN WALLED OPEN
V.S. - WASHED SAMPLE
R.C. - ROCK CORE

ABBREVIATIONS
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Q_c - TRIAXIAL CONSOLIDATED QUICK
Q - TRIAXIAL QUICK
S - TRIAXIAL SLOW
γ - UNIT WEIGHT
K - PERMEABILITY
C - CONSOLIDATION
CA - CASING
WL - WATER LEVEL IN CASING
WT - WATER TABLE IN SOIL

SOIL PROFILE				SHEAR STRENGTH TONS/SQ.FT. OR Q _u /2		WATER CONTENT W %		SAMPLES				
ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT ELEVATION SCALE	PENETRATION TEST RESISTANCE BLOWS PER FOOT		□ PW	Δ LV	OTHER TESTS	CONDITION	TYPE	NO.	ELEV. RECOV.
183.6		Gr. Level										183.6 7%
181.6 2.0		Topsoil	2									181.6 100%
179.6 4.0		Boulder of Limestone	A									179.6 60%
178.6 5.0		Clay Till.										
		Limestone with Hudseams	6 8 10 12									
173.1 10.5		End of Bore Hole										

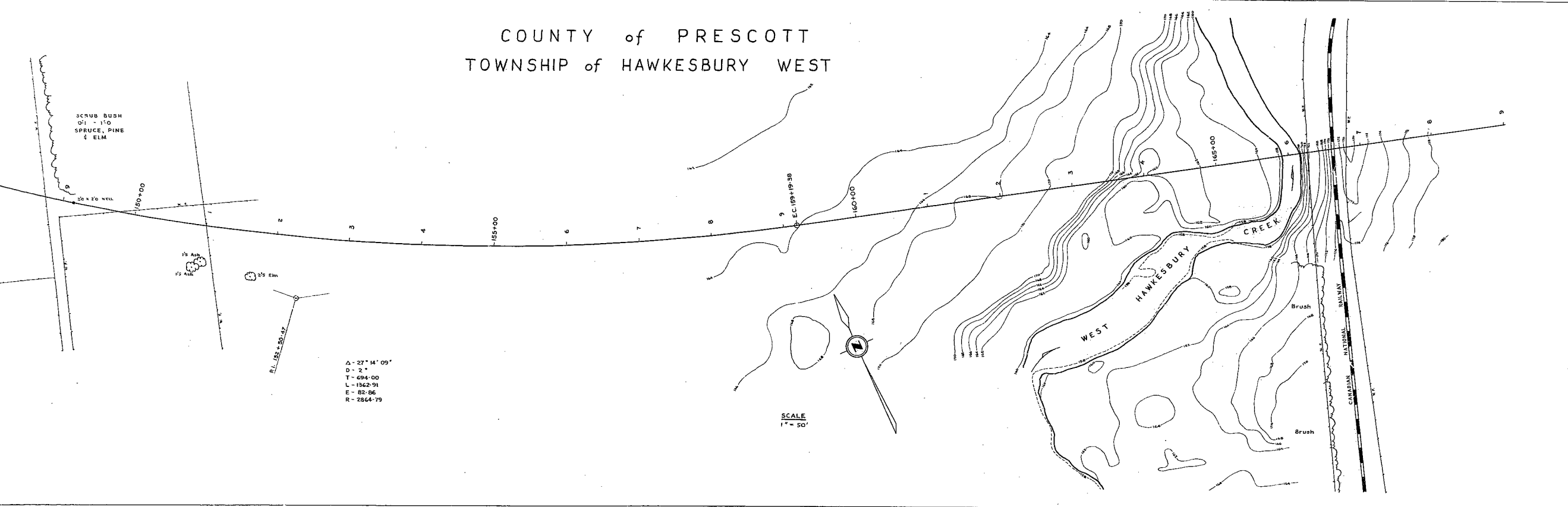
TL 119 54-90		MATERIALS LABORATORY - DEPARTMENT OF HIGHWAYS - ONTARIO				31 G-6 GEORES No.				
DRILL RIG #1		JOB # F54-1		BORING No. 17						
CASING - BX (STANDARD SAMPLERS TO FIT UNLESS NOTED)		DATUM EL. 182.9 Sta. 169+11.5 LHM		DATE REPORT May 4 - 1954						
SAMPLER HAMMER WT. 250		DROP 52 INCHES		COMPILED BY H.G. CHECKED BY S.H.E. BORING DATE April 26-27-1954						
SAMPLE CONDITION		SAMPLE TYPES		ABBREVIATIONS						
<div><div><div></div><div></div><div></div></div><div><div>DISTURBED</div><div>GOOD</div><div>LOST</div></div></div>		<div><div>C.S. - CHUNK</div><div>D.O. - DRIVE OPEN</div><div>D.F. - DRIVE FOOT VALVE</div><div>T.O. - THIN WALLED OPEN</div></div> <div><div>V.S. - WASHED SAMPLE</div><div>R.C. - ROCK CORE</div></div>		<div><div>V - INSITU VANE SHEAR TEST</div><div>M - MECHANICAL ANALYSIS</div><div>U - UNCONFINED COMPRESSION</div><div>Q - TRIAXIAL QUICK</div><div>S - TRIAXIAL SLOW</div><div>Y - UNIT WEIGHT</div><div>K - PERMEABILITY</div><div>C - CONSOLIDATION</div><div>CA - CASING</div><div>WL - WATER LEVEL IN CASING</div><div>WT - WATER TABLE IN SOIL</div></div>						
SOIL PROFILE		SHEAR STRENGTH TONS/SQ. FT. OR $Q_{u/2}$		WATER CONTENT W %		SAMPLES				
ELEV. - DEPTH	WATER CONDITIONS	DESCRIPTION	SYRAT PLOT ELEVATION SCALE	PENETRATION TEST RESISTANCE BLOWS PER FOOT	D P.W. Δ L.W.	OTHER TESTS	CONDITION TYPE	NO.	PENETRATION RESISTANCE	ELEV. RECOV.
182.9 0-0		Gr. Level								182.9
		Topsail	1							
181.4 1.5		Weathered Limestone	2				R.C.	1		181.4 100 %
179.4 3.5			3							
			4							
			5							177.9 100 %
			6				R.C.	2		176.6 66 %
		Limestone with Mudseams	7							
			8							
			9				R.C.	3		
			10							
171.6 11.3		End of Bore Hole	11							
			12							

PROFILE

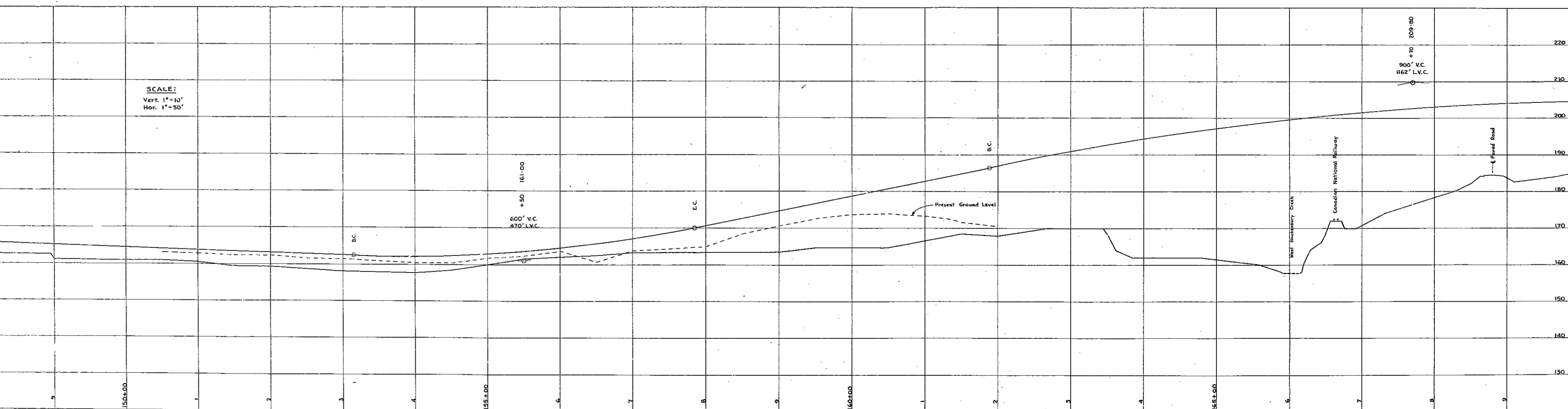


1

COUNTY of PRESCOTT
TOWNSHIP of HAWKESBURY WEST



PLAN



PROFILE

2

DEPARTMENT OF HIGHWAYS - ONTARIO		
MATERIALS & RESEARCH BRANCH		
WEST HAWKESBURY CREEK		
SCALE AS SHOWN	SUBMITTED BY	DATE OCT. 8/54
DRAWN BY H.D. REED	APPROVED BY	DRAWING NO. F-54-1K