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G.I.-30 SEPT. 1976

GEOCRES No. 30M12-112

W.P. No. —

CONT. No. —

W. O. No. —

STR. SITE No. —

HWY. No.

LOCATION SOIL INVESTIGATION, BRIDGE RECONST. & GRADE ADJUSTMENT, BASE LINE RD. AT ETOBICOKE CREEK

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. NONE

REMARKS:

To be plotted on 30M12 COORD { N. 4833,300 E. 612200

RACEY, MacCALLUM AND ASSOCIATES LIMITED

A COMPANY OWNED, DIRECTED AND OPERATED BY

Consulting Engineers
AND ASSOCIATED STAFF

30M12-112
GEOCRES No.

MONTREAL VANCOUVER
TORONTO

DONALD C. MacCALLUM, B.ENG., M.E.I.C., P.ENG
H. JOHN RACEY, B.SC., M.E.I.C., P.ENG
GEORGE L. HOUGHTON, A.M.I.MECH.E., M.E.I.C., P.ENG

TORONTO DIVISION
27 CARLTON STREET

Reference: S-512/T-2511
- Suplimentary Report -

3rd October, 1960

Township of Toronto,
Township Offices,
3185, Mavis Road,
COOKSVILLE - Ontario.

Attention: Mr. N. J. M. Maugham, P.Eng.

RE: SOIL INVESTIGATION, BRIDGE
RECONSTRUCTION AND GRADE ADJUSTMENT,
BASE LINE ROAD AT ETOBICOKE CREEK, ONT.

Dear Sir,

With respect to your telephone conversation on 30th September, 1960 with our Mr. J. J. Schoustra we have considered the topics then raised and our recommendations are presented below:

1. A rigid frame structure may be employed at the creek crossing
2. Side slopes of cuts may be trimmed to 1½:1 and it is thought preferable to prepare the fills to 2:1 side slopes.
3. Sodding of fills is considered mandatory whilst sodding the cuts would aid in preventing ditches becoming clogged up.

We are also enclosing the plot plan which you supplied for field location purposes.

Should you have any further queries, please do not hesitate to contact us.

Yours very truly
RACEY, MacCALLUM & ASSOCIATES LIMITED

M. I. Beeby, P.Eng.,
- Project Engineer -

MIB/BAH

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TORONTO DIVISION
27 CARLTON STREET

Reference: S-512/T-2511
- Report -

27th September, 1960

Township of Toronto,
Township Offices,
3185, Mavis Road,
COOKSVILLE - Ontario.

Attention: Mr. D. J. Van Beilen, P.Eng.,

RE: SOIL INVESTIGATION, BRIDGE
RECONSTRUCTION AND GRADE ADJUSTMENT,
BASE LINE ROAD AT ETOBICOKE CREEK, ONT.

Dear Sirs,

The enclosed report presents the results of our soil investigation at the above location.

We hope the report is satisfactory to you; if you have any questions about it please do not hesitate to get in touch with us.

Thank you for this opportunity of being of service to you.

Yours very truly,
RACEY, MacCALLUM AND ASSOCIATES LIMITED,

J. J. Schoustra, P.Eng.,
Divisional Soil Engineer.

JJS/YDP

Township of Toronto,
Township Offices,
3185, Mavis Road,
Cooksville, Ontario.

SOIL INVESTIGATION, BRIDGE RECONSTRUCTION AND GRADE ADJUSTMENT, BASE LINE ROAD AT ETOBICOKE CREEK, ONT.

Reference: S-512/T-2511
- Report -

Racey, MacCallum and Associates
Limited.

27th September, 1960.

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TORONTO DIVISION
27 CARLTON STREET

Reference: S-512/T-2511
- Report -

27th September, 1960

SOIL INVESTIGATION, BRIDGE RECONSTRUCTION AND GRADE ADJUSTMENT, BASE LINE ROAD AT ETOBICOKE CREEK, ONT.

INTRODUCTION :

At the present time Base Line Road is closed, there being no bridge structure at the Etobicoke Creek. The stone abutments of the old bridge are still in place. Etobicoke Creek flows in a steep sided broad U-shaped valley in the region of the Base Line Road. This results in very steep approach grades.

It is proposed to replace the missing structure, trim the approach grades, by balanced cut and fill operations and re-open Base Line Road to through traffic.

The purpose of a soil investigation was to provide subsoil data of use in both design and construction of the bridge and performance of grading operations. Results of the investigation, together with our concluded recommendations, are presented in the following paragraphs.

FIELD WORK :

Operations in the field began on 12th September, and were completed on 14th September, 1960. The four boreholes undertaken were sunk by means of a continuous flight power auger specially designed for soil sampling and rock coring. Soil samples were recovered in a 2-inch outside diameter split spoon sampler. The latter was mechanically driven into the ground, a process which furnished standard penetration resistances.

Ground elevation at each borehole was referred to Etobicoke Township Bench Mark #09, Elevation 492.20 feet. This bench mark is located in the South head wall of a culvert under Base Line Road approximately 2000 feet East of Etobicoke Creek.

The location of the four boreholes is shown on the plan and profile presented as Enclosure No 1.

Reference: S-512/T-2511 27th September, 1960
- Report - Continued.

SUBSOIL CONDITIONS :

All subsoil data, penetration records etc., are presented for each individual borehole on Engineering Data Sheets. These Data Sheets are included as Enclosures No 2, 3, 4, and 5. The boundary between glacial till and the underlying shale bedrock is plotted on the longitudinal section (Enclosure No 1).

The general pattern of strata appears to be 12½ to 17½ feet of grey brown sandy silt till overlying shale bedrock in rather poor condition.

From an inspection of the present abutments it would appear likely that many large shale slabs are dumped immediately behind the actual abutments. The maximum size of such slabs would be in the region of 3 feet.

In the natural undisturbed condition the glacial till is in a dense to very dense condition. However, in the disturbed and re-compacted condition, i.e. in an embankment as at Boreholes No 2 and 3, the material is in a medium dense verging on a loose state. The shale was in a rather poor condition, being easily broken during coring. It contained occasional thin clayey and silty layers, together with limestone bands up to one foot thick. The limestone could be easily broken when tapped on a sharp edge.

ENGINEERING CONSIDERATIONS :

a. Bridge Foundations :

Abutments should be founded on spread footings placed on sound shale bedrock but not on the overlying shale slab "float". Hence footings for both abutments will be at or below Elevation 442 - 444 feet.

The presence of the small silt and clay seams is no cause for alarm. With seams in the foundation of the size transected in the borings, use of a 10 tsf bearing capacity is considered permissible.

It is recommended that on preparation of the footing grade star drill probes be undertaken to sound out any large "mud" seams. This should be done in the presence of a qualified Foundation Engineer.

b. Approach Grades :

Excavation in the very dense glacial till will be tough but will present no problems to the usual backhoe plant. Similar

b. Approach Grades : Continued -

equipment will be able to cope with the small amount of excavation in the shale. The use of pavement breakers is, of course, to be expected at the occasional "tough" spot.

A mechanical grain size analysis was performed on a sample of the till and the results of this test indicated that 85-90% by weight passed the #200 sieve (.075 mm).

In its remoulded state and to a lesser extent in the natural state, the glacial till can be expected to erode easily. The The residual eroded soil on drying will be easily disturbed and blown around. The latter is most evident on inspection of the site at the present time.

The natural undisturbed bulk density of the glacial till is in the order of 140 pcf. It is not likely that this density could be reached on excavating and recompacting with normal earth moving and compacting plant. A standard Proctor compaction test was undertaken on a sample of till and the density/moisture content relationship so compiled is presented as Enclosure No 6. This compaction test indicated a maximum dry density of 112 pcf at 14½% moisture content. Field compaction operations should be geared to attain 95% of this dry density at least.

In place density tests should be performed to check the density and moisture content of the fill being placed. Strict control of the moisture content is necessary in order for it to be possible to achieve the desired degree of compaction. Attainment of 95% of the Proctor dry density would produce a mean bulk density in the fill in the order of 121 pcf. Hence as a guide the ratio of volume of fill to volume of cut may be taken as 1.16. From a cursory examination of quantities it would appear that there will be some fill to spare.

It is suggested that the excavated shale be broken up, spread thinly and worked into the general fill. The profile, shown on Enclosure No 1, indicates that the amount of shale excavation should be nil, but some local high spots are likely to be encountered and excavation for drainage ditches will penetrate shale.

CONCLUSIONS :

From the results of the investigation, certain facts, recommendations etc., have been concluded and are summarised below :

Reference: S-512/T-2511
- Report - Continued.

27th September, 1960

CONCLUSIONS : Continued -

1. The subsoil consists of 12½ to 17½ feet of silty glacial till overlying shale in a rather poor condition.

2. Bridge abutments should be founded on sound shale bedrock not "float". Footings will be at or below Elevation 442 feet.

3. Excavation of both the till and the shale to the planned grades will be possible with backhoes and pavement breakers.

4. The glacial till should be compacted to a minimum of 107 pcf dry density. Placement of this fill should proceed at the optimum moisture content of 14½%.

5. Sheepsfoot compacting plant should be employed for all field compaction.

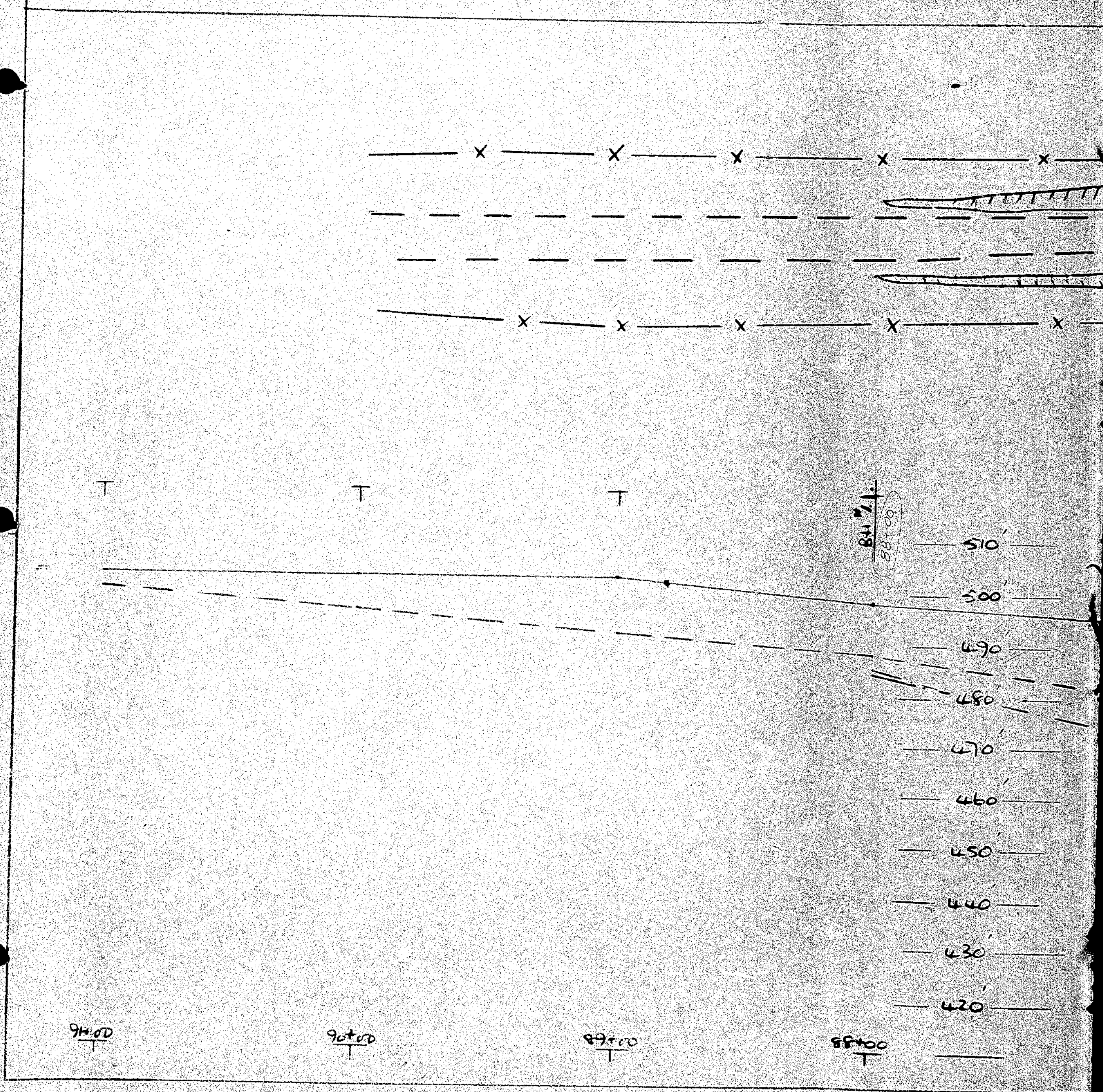
6. Excavated shale should be thoroughly broken up and spread, one thickness at a time, over as big an area of till fill as possible.

7. The side slopes of the glacial till fill will erode easily if unprotected.

REGISTERED PROFESSIONAL ENGINEER
M. I. BEEBY
PROVINCE OF ONTARIO

M. I. Beeby, P.Eng.,
Project Engineer.

MIB/YDP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480'
470'
460'
450'
440'
430'
420'
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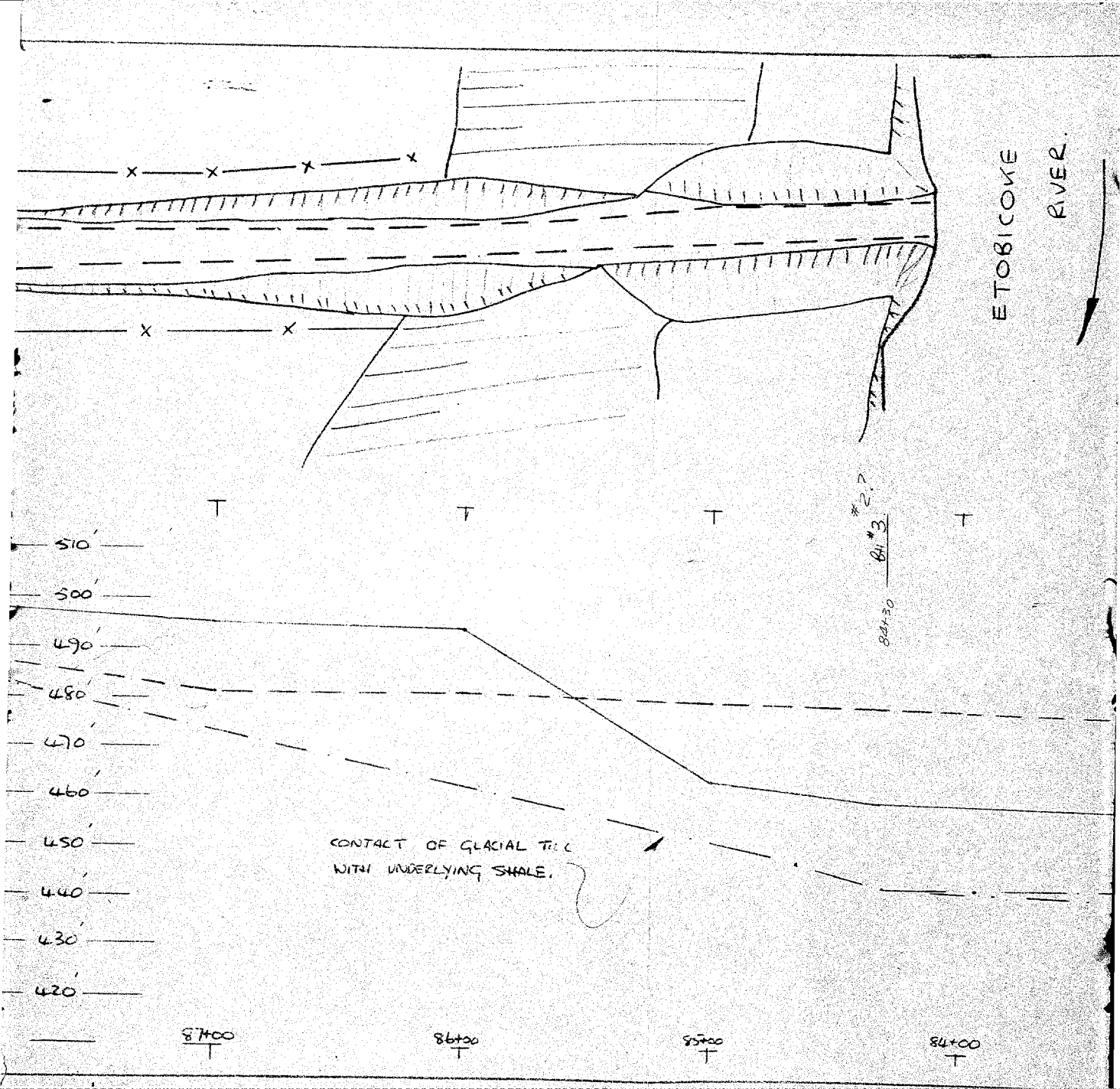
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RIVER.
#2?
BH #3
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470'
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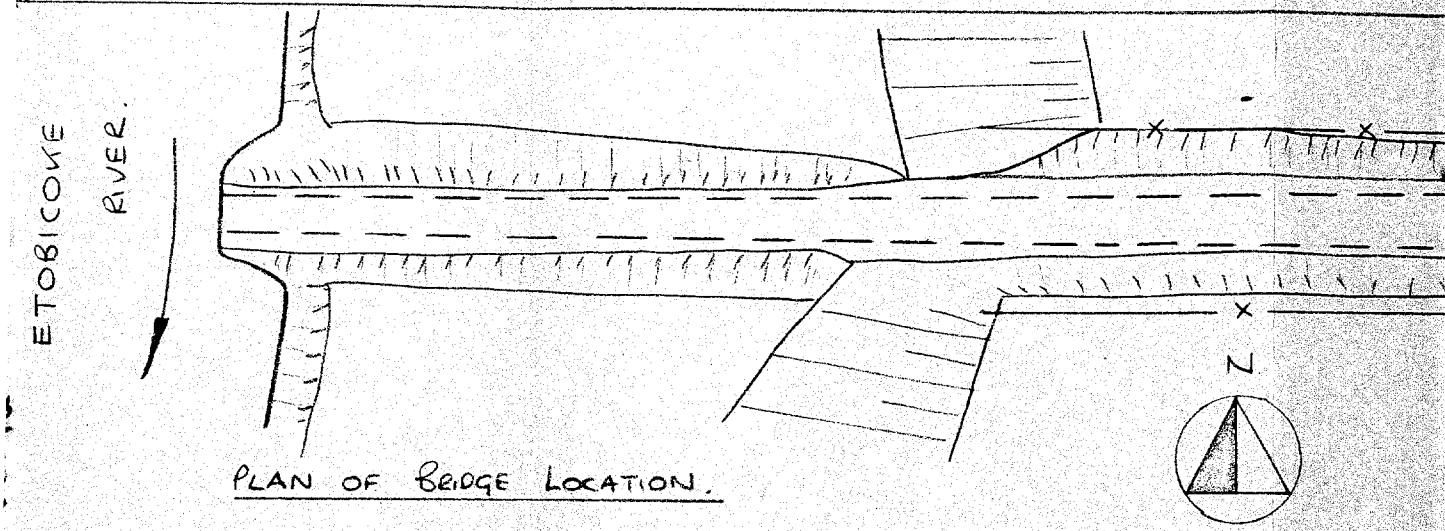
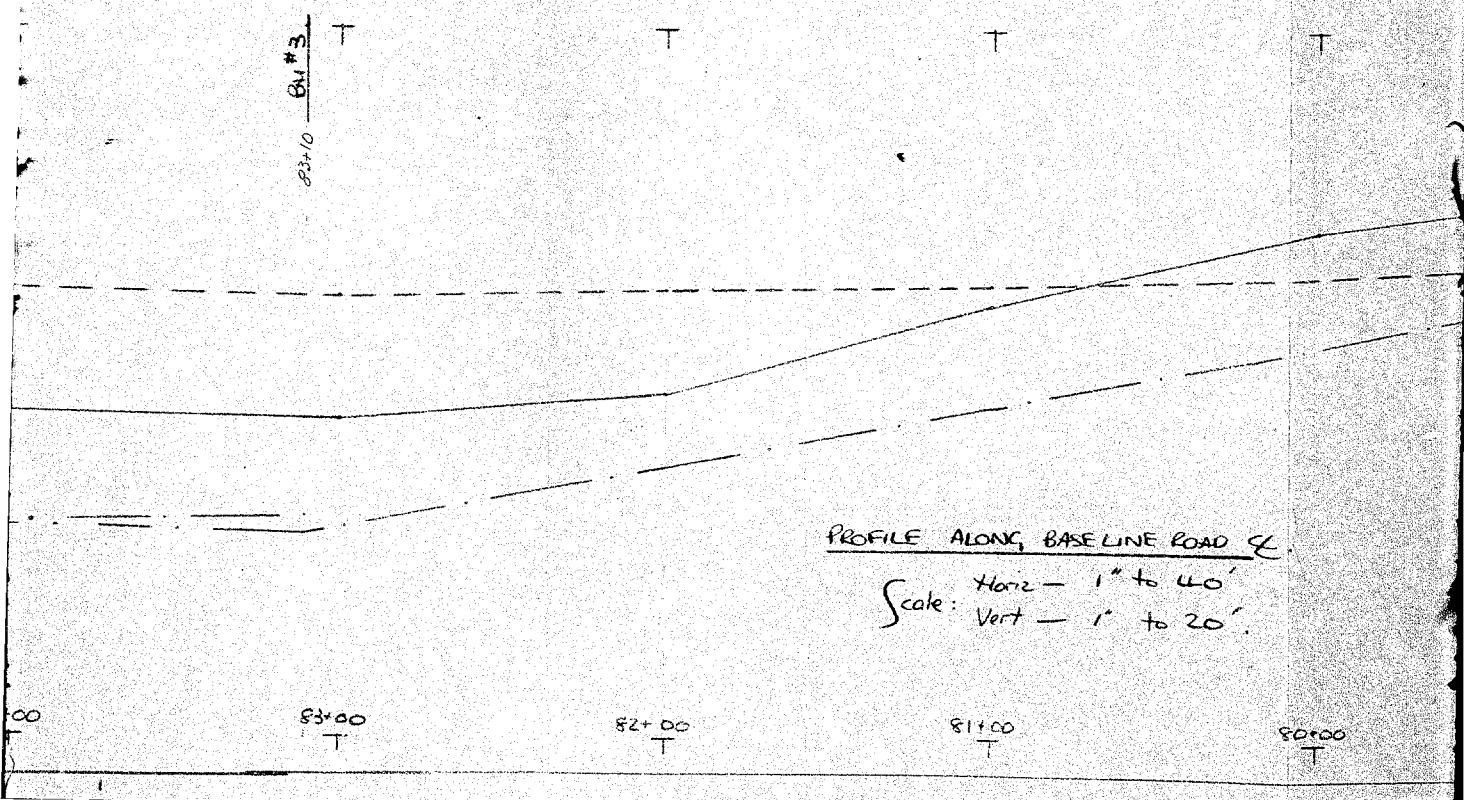
CONTACT OF GLACIAL TILL
WITH UNDERLYING SHALE.
87+00
86+00
85+00
84+00



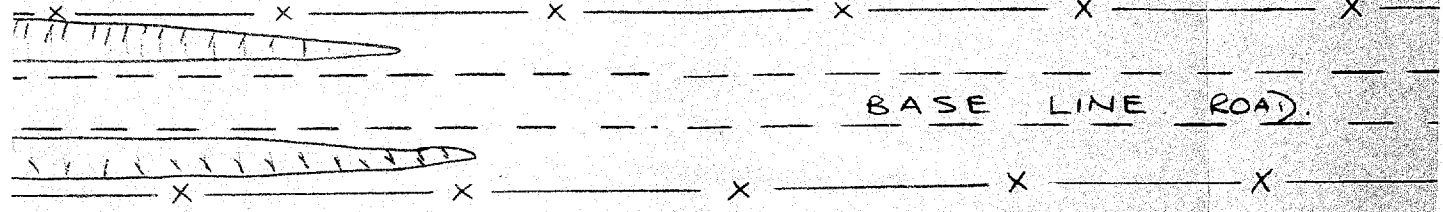
PLAN OF BRIDGE LOCATION.

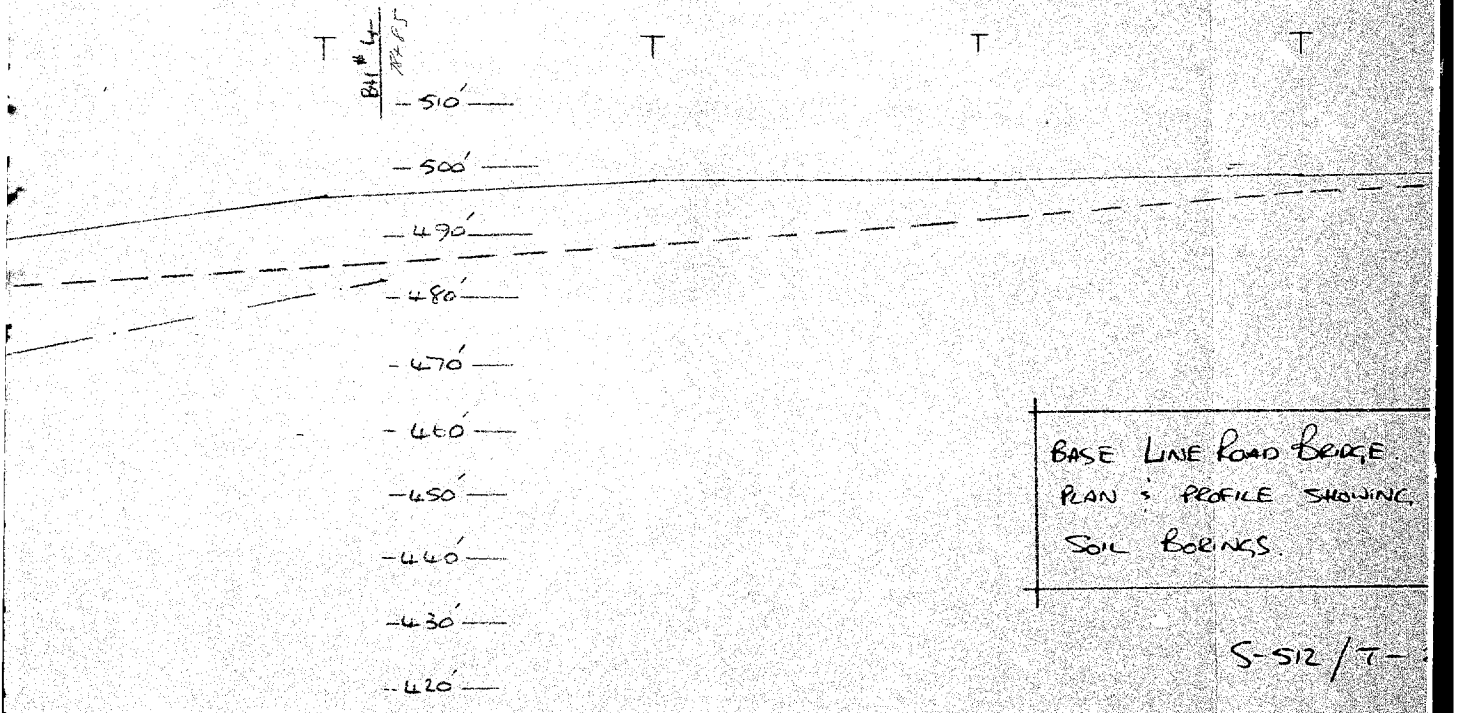


PROFILE ALONG BASE LINE ROAD ℄.

Scale: Horiz — 1" to 40'
Vert — 1" to 20'.

ENCLOS

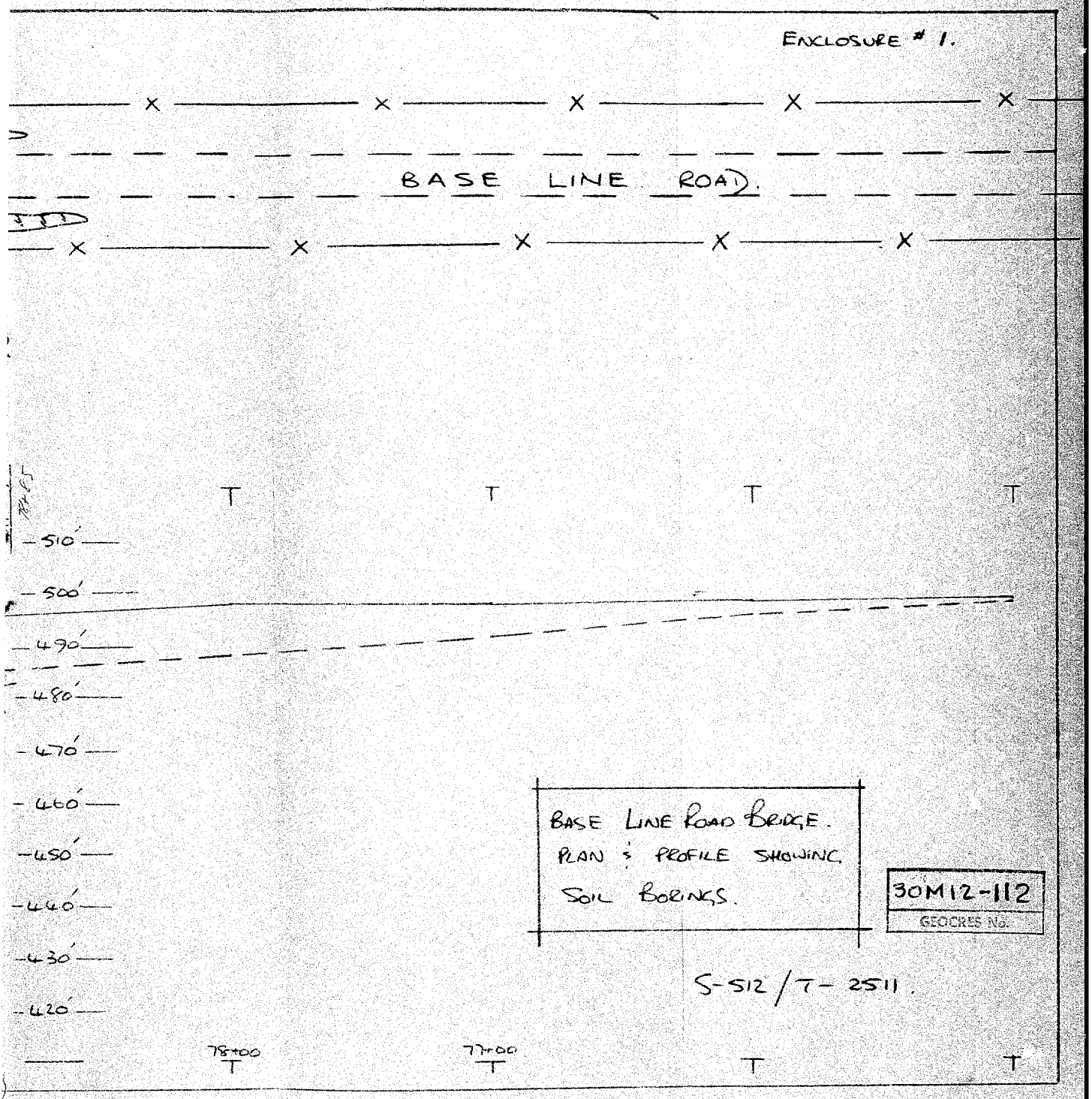




BASE LINE ROAD BRIDGE.
PLAN & PROFILE SHOWING
SOIL BORINGS.

S-512/7

ENCLOSURE # 1.



BASE LINE ROAD BRIDGE.
PLAN & PROFILE SHOWING
SOIL BORINGS.

30M12-112
GEOCRES No.

S-512 / T-2511.

Order No. S-512/T-2511 Enclosure No. 2

RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 1

Project: BASE LINE ROAD BRIDGE
Location: BASE LINE ROAD - TORONTO TOWNSHIP
Hole Location: See Enclosure No 1.
Hole Elevation and Datum: 497.9 feet
Field Supervisor: E.C. Prep.: M.I.B.
Driller: R.L. Checked: Date:

LEGEND
Shear Strength (C)
Unconfined compression
Vane test and sensitivity (S) $\oplus_{+s}$
Penetration Resistance (P)
2" Split tube
2" Dia. Cone
Casing

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	Ground Surface	497.9	0
	Dense to very dense grey-brown sandy silt till. Some scattered gravel and boulders.		
	Shale slabs	485.4	
	Shale in fair to poor condition Occasional clayey silt layers. Much machine breakage.	484.4	15
	End of Borehole	475.4	25

STRENGTH AND PENETRATION RESISTANCE
C P.S.F.
P BLOWS/FT.
20 40 60 80 100
0 5 10 15 20 25
SS-1 SS-2 SS-3

Order No. S-512/T-2511 Enclosure No. 3

RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 2

Project: BASE LINE ROAD BRIDGE
Location: BASE LINE ROAD - TORONTO TOWNSHIP
Hole Location: See Enclosure No 1.
Hole Elevation and Datum: 461.4 feet
Field Supervisor: E.C. Prep.: M.I.B.
Driller: R.L. Checked: Date:

LEGEND
Shear Strength (C)
Unconfined compression
Vane test and sensitivity (S) ⊕ 4.5
Penetration Resistance (P)
2" Split tube ⊖⊖
2" Dia. Cone
Casing

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	Ground Surface	461.4	0
	Loose to medium dense brown sandy silt till, some clay. Scattered gravel.	444.0	5
	Shale with 1 foot limestone layers. Occasional thin clayey silt layers. Shale in poor condition and much machine breakage.	433.4	10
	End of Borehole		15
			20
			25
			30

STRENGTH AND PENETRATION RESISTANCE
C P.S.F.
P BLOWS/FT.
20 40 60 80 100

SS-1
SS-2
SS-3

Order No. S-512/T-2511 Enclosure No. 4

RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 3

Project: BASE LINE ROAD BRIDGE
Location: BASE LINE ROAD - TORONTO TOWNSHIP
Hole Location: See Enclosure No 1.
Hole Elevation and Datum: 459.9 feet
Field Supervisor: E.C. Prep.: M.I.B.
Driller: R.L. Checked: Date:

LEGEND
Shear Strength (C)
Unconfined compression
Vane test and sensitivity (S) ⊕ $+^{S}$
Penetration Resistance (P)
2" Split tube ⊖⊖
2" Dia. Cone
Casing

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	Ground Surface	459.9	0
	Medium dense brown grey sandy silt till, some clay. Scattered gravel.		
	Shale slabs in poor condition	444.9	15
	Shale with limestone layers. Shale in poor condition and much machine breakage.	441.9	20
	End of Borehole	433.9	30

STRENGTH AND PENETRATION RESISTANCE
C P.S.F.
P BLOWS/FT.
0 20 40 60 80 100
5 10 15 20 25 30
SS SS SS

Order No. S-512/T-2511 Enclosure No. 5

RACEY MacCALLUM AND ASSOCIATES LTD.

Foundation Engineering Division

Engineering Data Sheet for Borehole: 4

Project: BASE LINE ROAD BRIDGE
Location: BASE LINE ROAD - TORONTO TOWNSHIP
Hole Location: See Enclosure No 1.
Hole Elevation and Datum: 496.3 feet
Field Supervisor: E. C. Prep.: M. I. B.
Driller: R. L. Checked: Date:

LEGEND
Shear Strength (C)
Unconfined compression
Vane test and sensitivity (S)
Penetration Resistance (P)
2" Split tube
2" Dia. Cone
Casing

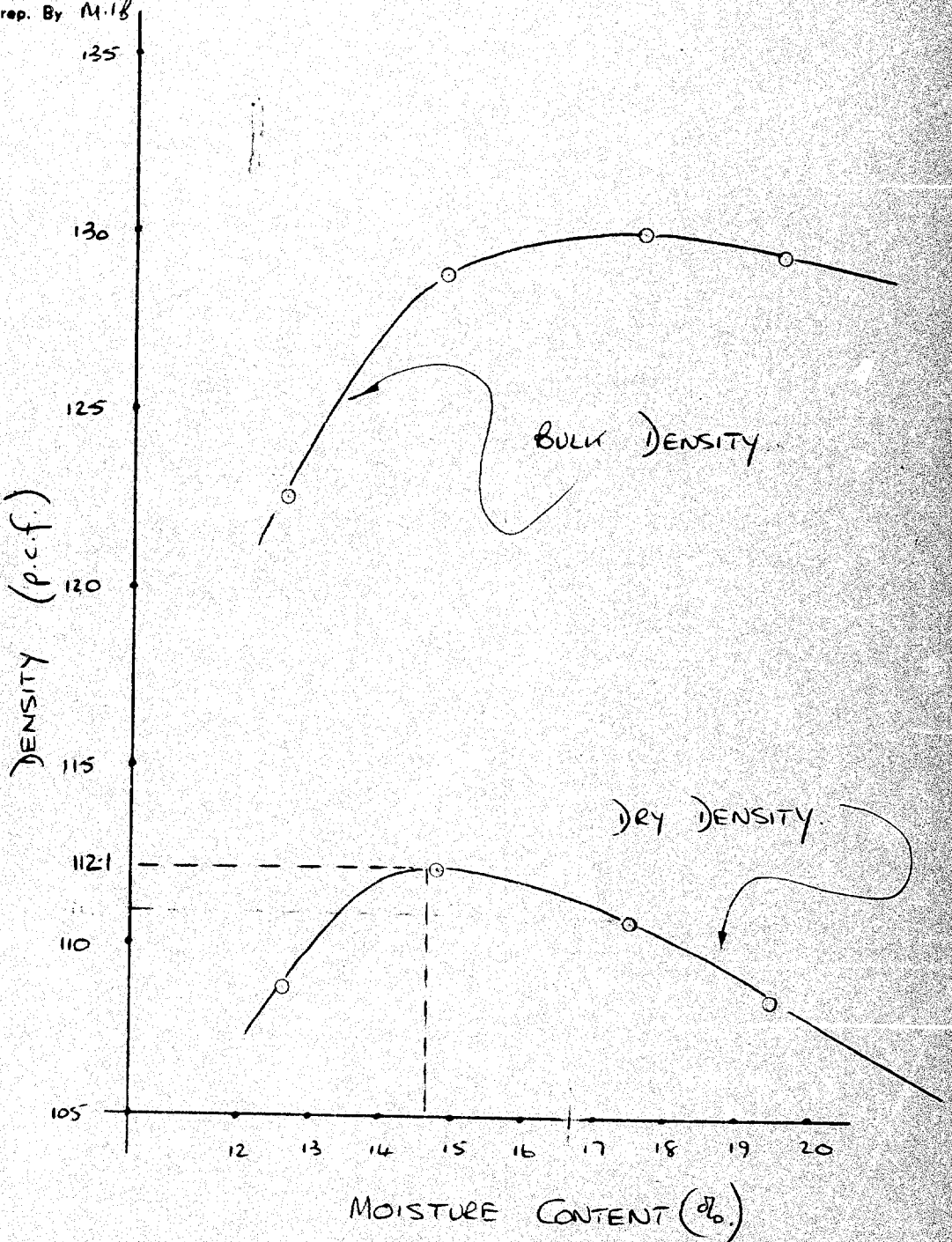
SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	Ground Surface	496.3	0
	Dense grey brown sandy silt, trace of clay. Occasional gravel.	483.3	13
	Shale in poor condition. Fractured and machine broken.	475.3	21
	End of Borehole		

STRENGTH AND PENETRATION RESISTANCE
C P.S.F.
P BLOWS/FT.
0 20 40 60 80 100
5 10 15 20 25
SS-1
SS-2

Order No. S-512/T-2511

Enclosure No. 6

Prep. By M.I.B



STANDARD PROCTOR COMPACTION.

Racey, MacCallum & Associates Ltd.