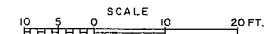
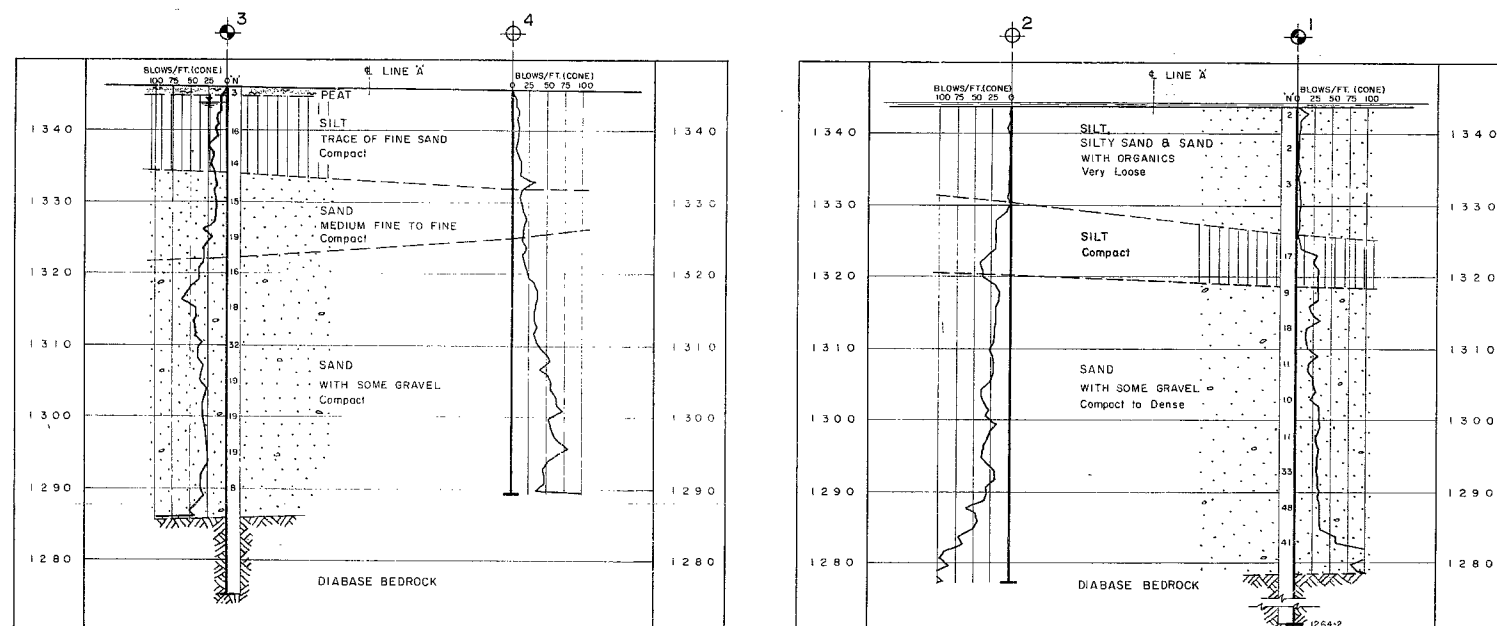
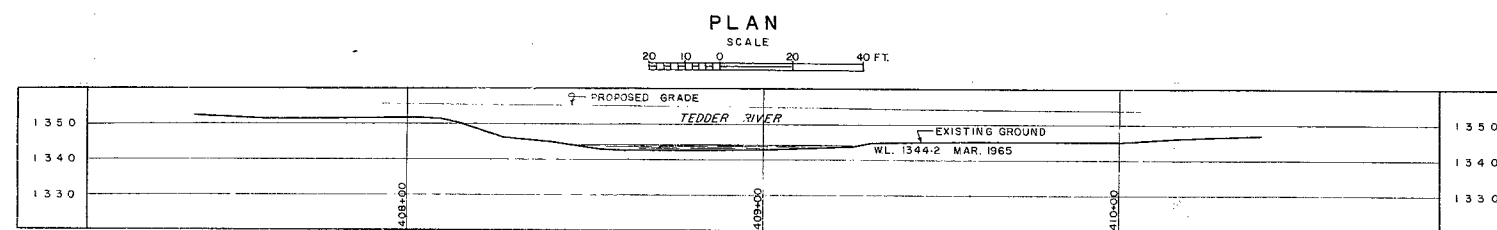
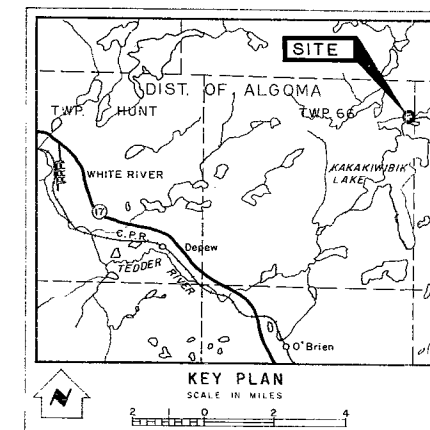
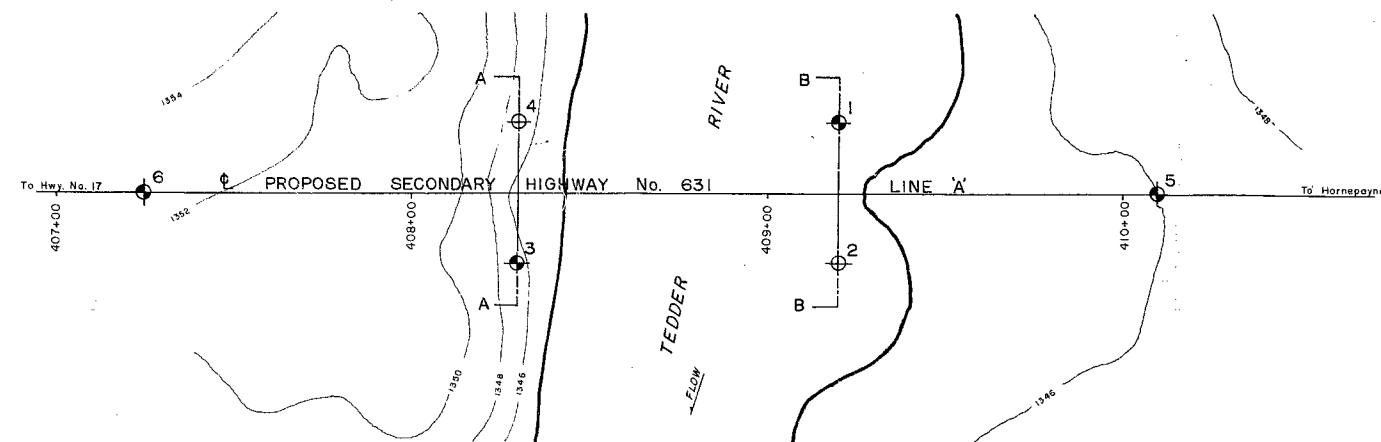


# 65-F-219





W.P. # 151-64

HWY. # 631 &

TEDDER RIVER  
BRIDGE



**LEGEND**

	Bore Hole
	Cone Penetration Hole
	Bore & Cone Penetration Hole
	Water Levels established at time of field investigation. (MAR. 1965)

NO.	ELEVATION	STATION	OFFSE
1	1344.2	409+20	20' LT
2	1344.3	409+20	20' RT
3	1346.1	408+30	20' RT
4	1345.8	408+30	20' LT
5	1346.7	410+10	E
6	1352.9	407+25	E

B.M. ELEV. 1350.28  
GEODETIC DATUM  
N. & W. in top of 0.4'  
Birch stump  
85-0' RT. of STA. 410 + 33

- 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.

[illegible]

GEOCON LTD  
DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION - FOUNDATION SECTION

TEDDER RIVER

(SEC.) HIGHWAY NO. 631 LINE A DIST NO 10

DISTRICT OF ALGOMA

TWP 66 LOT CON.

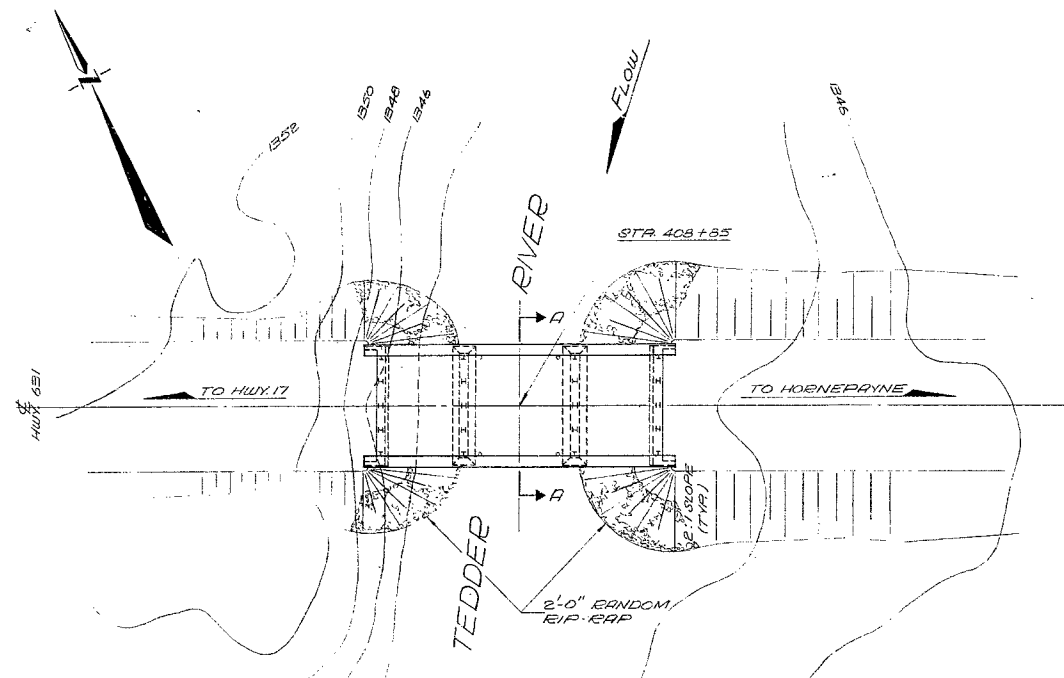
BORE HOLE LOCATIONS &amp; SOIL STRAT

SUBNO B.C.	CHECKED DBO.	AP NO	151-64	JAN 11 1964
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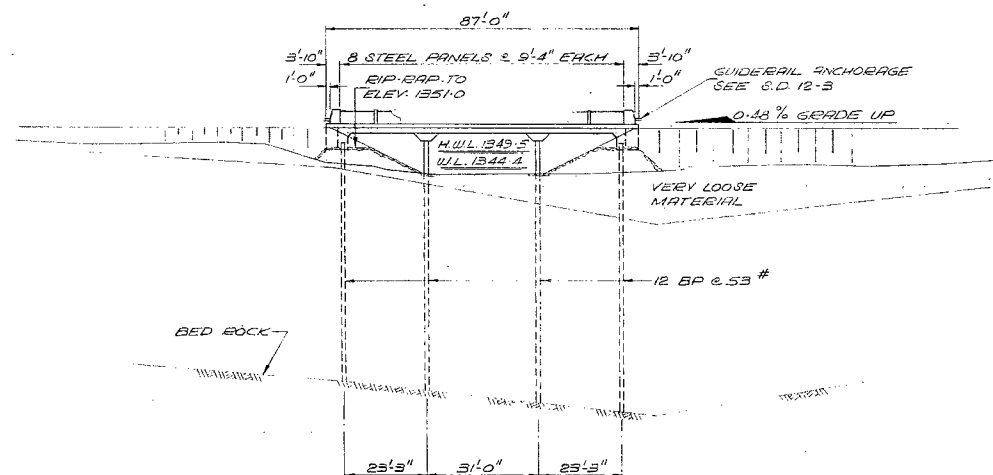
DRAWN A.E.L.	CHECKED DBO.	POS NO.	17725-1
DATE APRIL 15 1965	SITE NO.	38-000-100-1-1	

DATE APR 15, 1965	SITE NO
APPROVED <i>M. J. Quatrecas</i>	CONT NO

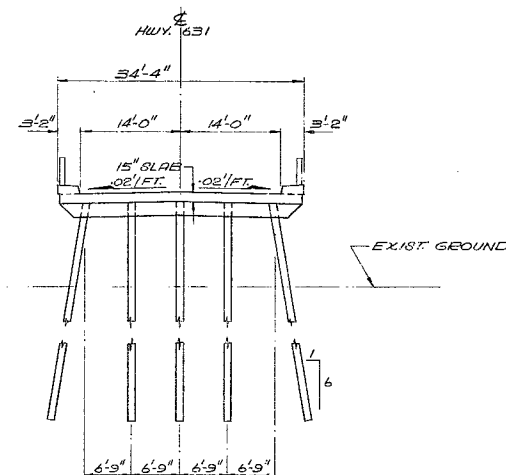
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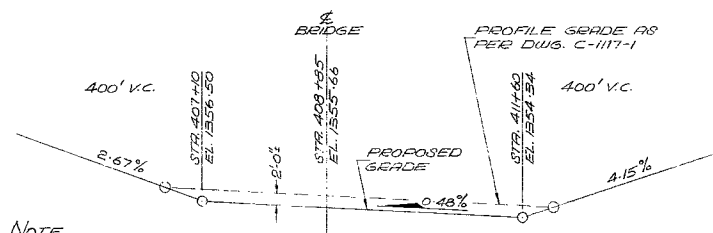
**SITE PLAN**  
SCALE 1" = 20'



**ELEVATION**  
SCALE 1" = 20'

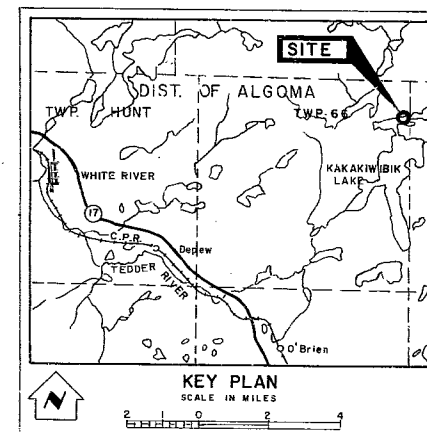


**SECTION A-A**  
SCALE 1" = 10'



**NOTE**  
ELEV. SHOWN REFERS TO PROPOSED GRADE

**PROPOSED PROFILE GRADE**  
N.T.S.



# **NOTES**

**CLASS OF CONCRETE**  
3000 P.S.I.

**CLEAR COVER ON REINFORCING STEEL**

ABUTMENTS - 3"  
CURBS - 2"  
DECK TOP - 1 1/2"  
DECK BOTTOM - 1"

**BEARING PILES**

REQUIRE 20-12 BP & 53 # DRIVEN TO BED ROCK. ANTICIPATED LENGTH = 75' ±

**BENCH MARK**

SEE D-5748-2

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
<b>TEDDER RIVER BRIDGE</b> 7.7 MILES NORTH OF HWY. #17			
KING'S HIGHWAY No. 631		DIST. No. 18	
DIST. OF ALGOMA STA. 408+85 LINE "A"			
TWP. 14S 46		CON. ---	
<b>GENERAL PLAN (PRELIM.)</b>			
APPROVED	DESIGNED	CONTRACT	W.P. No.
DESIGN	CHECK	No.	151-64
DRAWING	CHECK	No.	D-5748-P
DATE	LOADING	No.	

# GEOCON LTD

## HEAD OFFICE

420 MICHEL JASMIN, DORVAL, QUEBEC  
TELEPHONE 631-9827

Rexdale, Ontario,  
May 28th, 1965.

## DISTRICT OFFICES

14 HAAS ROAD  
REXDALE, TORONTO, ONT.  
TEL. 244-6476

1425 WEST PENDER ST.  
VANCOUVER 5, B.C.  
TEL. MU. 1-8926

Department of Highways, Ontario,  
Materials and Testing Division,  
Downsview, Ontario.

Attention: Mr. K. Y. Lo, P. Eng.,  
Supervising Foundation Engineer.

Re: Soil Conditions and Foundations  
Proposed Tedder River Bridge  
Township 66,  
District of Algoma, Ontario

Dear Sirs:

This letter accompanies our detailed report on the above investigation.

The site is underlain at the east side of the river channel by very loose silt sand and silty sand with organic material. Underlying this stratum and the surficial peat cover elsewhere is a stratum of very loose to compact silt which in turn is underlain in general by compact to dense sand with some gravel then bedrock. The actual soil conditions are described in detail in the report.

It is considered that the most suitable foundation types for the proposed bridge will be the uses of piles as discussed in the report. The stability of the approach embankments will be dependent on whether precautions are taken to prevent scour. In addition, it is recommended that precautions be taken during construction of the east approach embankment as discussed in the report.

Department of Highways, Ontario,  
Materials and Testing Division,  
May 28th, 1965,  
Page 2.

We believe that this report contains all the information required from this investigation, Should you wish to discuss any aspect of this report, or if we can be of further assistance otherwise, please do not hesitate to call us.

Yours very truly,

GEOCON LTD

  
M. A. J. Matich, P. Eng.,  
President.

MAJM/reb

T7725  
REPORT  
TO  
DEPARTMENT OF HIGHWAYS, ONTARIO  
MATERIALS AND RESEARCH DIVISION  
ON  
SOIL CONDITIONS AND FOUNDATIONS  
PROPOSED TEDDER RIVER BRIDGE  
TOWNSHIP 66  
DISTRICT OF ALGOMA                      ONTARIO

Distribution:

- 11 copies - Department of Highways, Ontario,  
Materials and Testing Division,  
Downsview, Ontario.
- 3 copies - Geocon Ltd,  
Rexdale, Ontario.

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    Site and Geology

    Soil Conditions

    Water Conditions

    Office Reports on Soil Exploration

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    Figures - Laboratory Testing

### APPENDIX III

    Progress Report

### DRAWING

    In pocket at rear of report.

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## INTRODUCTION

Geocon Ltd has been retained by the Department of Highways, Ontario by letter dated February 1st, 1965, Work Permit 151-64, to carry out a foundation investigation for the proposed crossing of Tedder River at Site 38C-21, Township No. 66, District of Algoma.

The purpose of the investigation was to determine the soil conditions at the site of the proposed crossing as required for the design of the proposed structure.

## SUMMARIZED SOIL CONDITIONS

A thin surficial peat layer at the site is underlain at the east side of the River Channel by about 18 feet by very loose silt, sand and silty sand with organic material. Underlying the organic sand and silty sand and the surficial peat layer elsewhere is a stratum of very loose to compact silt. In general however, the silt is compact. This silt stratum, which contained fine sand traces generally near the base of the stratum, has an average thickness of about 12 feet. The upper part of this stratum in the east half of the site has a very loose density. In the west half of the site and below the very loose surface section of the stratum in the east half the relative density is compact. The silt stratum is underlain in places by a stratum of loose to dense fine to medium sand which varied in thickness from 9 to 15 feet. This stratum is in turn overlain by 4

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feet of compact silty fine sand in the east part of the site. The above strata are underlain by compact to dense grey sand with some gravel which ranges in thickness from 30 to 40 feet within the limits of the proposed structure. Grey diabase bedrock was encountered within the limits of the proposed structure between elevations 1277 and 1289.

At the time of the investigation the river level was at elevation 1344.2. High river level is understood to be at about elevation 1349.5.

### DISCUSSION

It is understood that it is proposed to construct a crossing over the Tedder River, in Township 66, District of Algoma. The crossing will be located on the centre line of the proposed Secondary Highway No. 631 as shown on Department of Highways, Ontario Plan E-4179-1. The approximate grade for the new crossing will be at elevation 1354. The crossing, as presently proposed, will be a three span structure with approach embankments.

### Foundations

The investigation indicates that the depth of overburden ranges from 56 to 67 feet within the area of the proposed structure. Further, the surface peat layer at the site is underlain at the east

Foundations (continued)

side of the river channel by about 18 feet of very loose organic silt, sand and silty sand which is in turn underlain by compact silt. At the west side of the river channel, the peat layer is underlain by compact silt.

Because of the considerable depth of very loose soil at the east side of the river channel, the use of spread footings is not considered practical at this site for the type of structure proposed. It is recommended therefore, that consideration be given to founding the proposed structure on piles.

If piles were used, a number of different possibilities would be available. One possibility would be to use a non-displacement type pile such as a steel H pile, driven to bedrock. Another possibility would be the use of expanded base, cast-in-place type concrete piles where the base is formed in the sand and gravel below elevation 1320. The third possibility would be the use of treated timber, steel tube, or concrete displacement type piles deriving their load carrying capacity from embedment in the sand and gravel stratum. The actual choice of pile would be dependent on the scour protection measures utilized and on a study of comparative economics.

Foundations (continued)

It is recommended that at least 6 feet of protective earth cover be provided for all foundations subject to frost action. Since the subsoil in the upper 20 feet below river bottom is very susceptible to scour, it is recommended that protective measures be applied to prevent undermining of the bridge foundations generally. One possibility would be to carry all foundations a safe distance below maximum possible scour depth. However, since scour depth in this instance is, by inference from the subsurface data, about 20 feet in extreme cases, difficulties may be encountered due to stability of the approach embankments, as discussed later. The most suitable scour protection measures therefore would probably be the application of adequate rip-rap around foundation elements, approach embankments and on river bottom at the bridge site. The rip-rap should be underlain by a granular layer filter graded with respect to the underlying silt and the rip-rap itself.

Once preliminary design is advanced to the stage that structural considerations, scour information, and preliminary cost estimates, have delineated the probable pile choice and length, we would be pleased to provide an estimate of pile carrying capacity. It is recommended however, that a loading test be carried out on a pile representative of the type chosen, to establish the working load to be used in design.

Approach Embankments

It is understood that proposed grade will be at elevation 1354. At this elevation, a maximum of about 11 feet of fill will be required with respect to existing ground level and river bottom.

It is recommended that the surficial peat layer be removed from beneath the approach embankments prior to construction.

As discussed earlier the soil conditions at the east side of the river channel consist of about 18 feet of very loose organic silt, silty sand and sand. The presence of this stratum will mean that the east approach embankment will undergo settlements as discussed later, due to the compression of organic material contained within the stratum. The depth of this stratum is such that complete removal is not considered feasible. Further, construction of the embankment by displacement methods assisted by remoulded by blasting is also not considered economically feasible because of the depth of stratum and reinforcing effect that would be provided by the sand layers. It is believed therefore, that the most economical approach would be to construct the east embankment on this layer directly, allowing for any displacement that may occur during fill placement. Settlements could be accommodated as discussed later.

Approach Embankments (continued)

It is believed that the surface silty stratum was probably formed by redeposition after scour and consequently its composition in terms of defined individual layers is complex. It is difficult therefore to assign properties to the stratum for use in computations of stability of the embankment. In such analyses, an effective angle of internal friction of 30 degrees and submerged unit weight of 40 pounds per cubic foot have been used for the stratum, together with the conservative assumption that there would be no dissipation of pore pressure during construction.

With the above assumptions and assuming embankment side slopes of 1 vertical to 2 horizontal, the computed maximum height of single lift of approach fill on the west side of the river is about 7 feet, or to about elevation 1350. With this height of fill the computed factor of safety is slightly under 1.3. However, in view of the conservative nature of the above assumption concerning the rate of pore pressure dissipation during construction, it is quite possible that the embankment could safely be raised to full planned height in one operation. Never-the-less as a precaution, it is recommended that the embankment be raised in two or more lifts, using normal compaction procedures. The effect of pore pressures set up during pile driving, and possible temporary increase of overall height of the embankment due to scour in the river were not allowed for in the above calculations.

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Approach Embankments (continued)

It is recommended that the stability of the embankment at the abutment be checked as part of design, taking into account possible adverse stability conditions which may be present during construction or subsequently due to scour of the river bed if this is permitted to occur.

In view of the lesser height of fill involved at the east abutment and the compact relative density of the silt, it is considered that the stability of the east embankment would be satisfactory if a one stage construction operation was used, and if adequate scour protection is provided.

It is recommended that the backfill to abutments consist of free draining, well compacted, clean granular material, in which case a lateral earth pressure coefficient of 0.45 could be used in design of abutments carried on piles. Negative skin friction effects due to consolidation of the very loose surficial silty stratum under the load of the west approach embankment should be allowed for in pile design, using the soil properties given above.

Under the weight of the east approach embankment it is estimated, based on experience with similar deposits, that primary settlements will be about 6 inches. It is estimated that the majority

Approach Embankments (continued)

of the settlement will be complete in about one month after construction. Further settlement will result from secondary consolidation of organic layers within the stratum but is expected that these settlements will be small. It is recommended that if rockfill is used in construction of the embankment a blanket of sand and gravel of minimum thickness one foot be placed directly on the natural soil.

Construction

Should excavations be required below water level at the pier or abutment locations, they will involve excavation generally within compact silt on the east side of the river and the very loose silt, silty sand or sand stratum on the west side. The grading of the compact silt at the lower limit of the range permitting successful use of a "sanded-in" vacuum well point system and it is suggested therefore that excavation within the silt be sheeted and dewatered by pumping from filter equipped sumps maintained below excavation level. The sheeting should be carried down below excavation level a distance at least equal to the maximum head differential. At the west side of the river the method of deposition is such that the silt, sandy silt and sand probably exists in the form of irregular layers. The customary criteria for the required penetration as given above may not in this case be sufficient to prevent uplift of the base of excavation since after

Construction (continued)

dewatering the sheeted enclosure, ingress of pore pressure into the permeable layers may still occur through the interlocks of the sheet piling. It would be advisable therefore to install relief wells to bleed off excess pressures which might build up in the sand layers below base of excavation. In this case, a vacuum well point system with points properly "sanded-in" would be suitable.

CONCLUSIONS AND RECOMMENDATIONS

- 1)           The east part of the site is covered by about 18 feet of very loose organic silt, sand and silty sand. Underlying this stratum where it occurs and the thin surficial peat cover elsewhere is very loose to compact silt. The site is in places underlain by 9 to 15 feet of loose to dense sand. All of the above strata are underlain by 30 to 40 feet of compact to dense sand with some gravel which in turn overlies bedrock.
- 2)           At the time of investigation river level was at elevation 1344.2. High river level is understood to be at elevation 1349.5.
- 3)           As discussed in the report, it is considered that the most suitable foundation types for the proposed bridge would be the use of piles. A variety of pile types could be used, although the displacement or expanded base cast-in-place types have advantages from



the point of view of soil conditions.

4) It is recommended that precautions be taken during construction of the approach embankment to the east side of the bridge, as discussed.

5) It is important that scour protection should be provided for the embankments and structure, as discussed.

PERSONNEL

The field work was carried out under the supervision of Mr. M. R. Lipsett and Mr. B. Coleman with overall supervision by Mr. D. B. Oates. This report was written by Mr. D. B. Oates and reviewed by Mr. M. A. J. Matich, P. Eng.

DBO/reb

*D B Oates*  
D. B. Oates, P. Eng.,  
District Engineer.



APPENDIX I

PROCEDURE

SITE AND GEOLOGY

SOIL CONDITIONS

WATER CONDITIONS

OFFICE REPORTS ON SOIL EXPLORATION

**GEOCON**

## PROCEDURE

Our field forces were mobilized to White River on February 15th, 1965 after completion of the work for the Department of Highways, Ontario in Chapleau. The actual drilling program required for the proposed Crossing of the Tedder River was carried out between March 16th and March 31st, 1965. The intervening time was spent in taking the equipment into the site. As discussed in letter dated March 8th, 1965 to the Department of Highways, Ontario, it was necessary to construct a winter road by bulldozer for a distance of about 8 miles through heavy bush and deep snow before the equipment could be taken in. Information on the work progress between February 15th and March 16th is given in Appendix III of this report.

Four boreholes with accompanying dynamic penetration tests and two additional dynamic penetration tests were put down using a skid mounted diamond drill rig. The locations of the boreholes is given on Drawing T7725-1, at the rear of this report. A detailed log of each borehole is given on the Office Reports on Soil Exploration in this Appendix.

The laboratory testing of soil samples was carried out in the Soil Mechanics Laboratory of Geocon Ltd, in Toronto. The results are plotted on the Figures on Appendix II. The soil samples remaining after testing will be stored until May 1st, 1966

at which time you will be contacted for instructions regarding their disposal.

All elevations are referred to Geodetic datum.

The bench mark used is a nail and washer in the top of an 0.4 foot diameter Birch stump located 85 feet right of Station 410+33. The Geodetic elevation of the bench mark is 1350.28. The location of this bench mark is shown on the Department of Highways, Ontario Drawing E-4179-1.

#### SITE AND GEOLOGY

The proposed Tedder River Crossing is to be located on the proposed access road, Line A, between approximate stations 408 and 409, in Township 66, in the District of Algoma. The road will provide a link between Highway 17 in the west and Hornepayne in the east. The bridge site is located about 300 feet north of the inlet of the Tedder River to Lake Carribou which connects with Lake Kakakiwibik. At the proposed bridge located the river is approximately 90 feet wide and about 8 inches deep. Information obtained locally indicates that during the Spring and Fall the depth of water in the river is about 4 to 5 feet. Ground level at the site is relatively flat with a maximum variation of about 6 feet on the west side of the river.

Available geological information indicates that the overburden cover is composed of sands and silts of post glacial fluvial origin. The bedrock in the area is generally igneous intrusive, however, diabase dykes are known to occur.

### SOIL CONDITIONS

The principal soil strata encountered in the investigation are as follows:

#### Peat

The ground surface is generally covered by a thin layer of peat. The thickness of the peat ranged from 1 to 2 feet at the borehole locations.

#### Very Loose Grey Silt, Silty Sand and Sand with Organics

The surface stratum at borehole 1 and probably at penetration test 2 was found to consist generally of grey silt, silty sand and sand with organics. The thickness of this stratum at the borehole was 18 feet. The stratum has random layering with the organic content being erratic in concentration. The upper part of the stratum contained a relatively high organic content providing slight plasticity to the sample recovered. This stratum was encountered only at the east side of the river channel and is probably indicative of scour.

Very Loose Grey Silt, Silty Sand and Sand  
with Organics (continued)

A mechanical analysis test was carried out on four samples from this stratum and the results plotted on Figure 1 in Appendix II. The samples graded from a medium sand to a silt containing about 35 percent fine sand.

Standard penetration tests carried out in this stratum gave "N" values ranging up to 3 blows per foot, indicating a very loose relative density.

Very Loose to Compact Grey Silt

Underlying the sand and silty sand stratum in borehole 1 and the peat in the remaining boreholes is a stratum of grey silt. The thickness of the silt ranged from 7-1/2 feet in borehole 1 to 18 feet in borehole 6, with an average thickness of about 12 feet. The silt was observed to contain traces of fine sand, generally towards the base of the stratum. In borehole 5, the silt contained a slight root content, near ground surface.

A mechanical analysis was carried out on a sample from this stratum and the results plotted on Figure 2 in Appendix II. The sample contained 93 percent silt sizes and 7 percent clay sizes.

Very Loose to Compact Grey Silt (continued)

Standard penetration tests carried out in this stratum gave "N" values ranging from 14 to 19 blows per foot indicating a compact relative density. However, one sample was obtained in borehole 5 by pushing the sampler, indicating a very loose relative density. This low value was confirmed by a corresponding low resistance to the adjacent penetration test.

Loose to Dense Grey Fine to Medium Sand

Underlying the silt stratum in boreholes 3, 5 and 6 is a stratum of fine to medium sand. The thickness of this stratum ranged from 9 feet in borehole 5 to about 15 feet in borehole 6.

A mechanical analysis test was carried out on a sample from this stratum and the results plotted on Figure 3 in Appendix II. The sample contained 58 percent medium sand sizes and 34 percent fine sand and 8 percent silt sizes.

Standard penetration tests carried out in this layer gave "N" values ranging from 5 to 39 blows per foot, with an average value of 17 blows per foot. The relative density ranges from loose to dense and is generally compact.

Compact Grey Silty Fine Sand

Underlying the fine to medium sand in borehole 5 is a thin layer of silty fine sand. This layer was only encountered in borehole 5 where the thickness was about 4 feet.

A standard penetration test carried out in this stratum gave an "N" value of 11 blows per foot indicating a compact relative density.

Compact to Dense Grey Sand with some Gravel

Underlying the silt in borehole 1, the fine to medium sand in boreholes 3 and 6 and the silty fine sand in borehole 5 is a stratum of grey sand. The layer thickness ranged from 36 to 40 feet in boreholes 1 and 3, which penetrated the stratum. The composition of the stratum was variable ranging from a medium sand to a well graded sand having trace of gravel.

A mechanical analysis was carried out on one sample from this stratum and the results plotted on Figure 4 in Appendix II. The sample contained 4 percent gravel sizes, 46 percent coarse sand, 42 percent medium sand and 8 percent fine sand sizes.



Compact to Dense Grey Sand with some Gravel (continued)

Standard penetration tests carried out in this stratum gave "N" values ranging from 8 to 48 blows per foot with an average of 19 blows per foot. The relative density of this stratum ranges from compact to dense and is generally compact.

Bedrock

Bedrock was proven in boreholes 1 and 3 by coring in AXT size for depths of 14 and 11 feet. The bedrock surface was encountered in the above boreholes between elevations 1278 and 1284. It is believed that in each case the dynamic penetration tests achieved refusal on or close to the bedrock surface and that the bedrock surface ranges between elevations 1277 and 1289 within the area of the proposed structure.

The bedrock was identified as a grey diabase. Based on the high core recovery the bedrock is believed to be sound.

WATER CONDITIONS

At the time of the investigation the river level was at elevation 1344.2. Information taken from Department of Highways, Ontario Drawing E-4179-1 indicates that high river level is at elevation 1349.5. At high river level, the land east of the river would be flooded.

## EXPLANATION OF THE FORM "OFFICE REPORT ON SOIL EXPLORATION"

The object of this form is to enable a comprehensive study of the soil to be made by combining on one sheet all of the information obtained from the boring. An explanation of the various columns of the report follows.

### ELEVATION AND DEPTH

This column gives the elevation and depth of boundaries between the various soil strata. The elevation is referred to the datum shown in the general heading.

### WATER CONDITIONS

In this column the water level in the casing at the time of boring or the water table in the ground, determined by a series of observations in a piezometer or standpipe, is indicated to scale by a horizontal line with the symbol W.L. or W.T. above the line. A notation of any complicated groundwater conditions will be made in this column.

### DESCRIPTION

A description of the soil, using standard terminology, is contained in this column. The consistency of cohesive soils and the relative density of non-cohesive soils are described by the following terms:

<u>Consistency</u>	<u>U-Strength Tons/sq. ft.</u>	<u>Relative Density</u>	<u>Standard Penetration Resistance. Blows/ft.</u>
Very soft	0.03 to 0.25	Very loose	0 to 4
Soft	0.25 to 0.5	Loose	4 to 10
Firm	0.5 to 1.0	Compact	10 to 30
Stiff	1.0 to 2.0	Dense	30 to 50
Very stiff	2.0 to 4.0	Very dense	over 50
Hard	over 4.0		

### STRATIGRAPHIC PLOT

The stratigraphic plot follows the standard symbols of the National Research Council, Canada.

### ELEVATION SCALE

The information in all columns is plotted to a true elevation scale which is shown in this column.

### GRAPHS

The main body of the report forms a graph which is used to plot to correct elevation the important soil properties which are obtained through field and laboratory tests. The scales and symbols for the plotting are shown at the head of the column.

### OTHER TESTS

In this column are shown, by symbol, the other field or laboratory tests which have been performed on the soil and for which the results have not been plotted on the above graph.

### SAMPLES

The first three columns describe the condition, type and number of each sample obtained from the boring. The location and extent of each sample is plotted to scale.

In the last column is shown the penetration resistance in blows of 4200 inch-pounds required to drive one foot of the sampler into the ground. When a 2 inch Drive Sampler is used the result obtained is termed the "Standard Penetration Resistance".

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## OFFICE REPORT ON SOIL EXPLORATION

CONTRACT T77.25 BORING # 1 DATUM GEODETTIC CASING EX. & AX.  
 BORING DATE MAR. 24-25/65 REPORT DATE MAR. 22, 1965 COMPILED BY AEI CHECKED BY DBO  
 SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. LBS. ENERGY)

## SAMPLE CONDITION



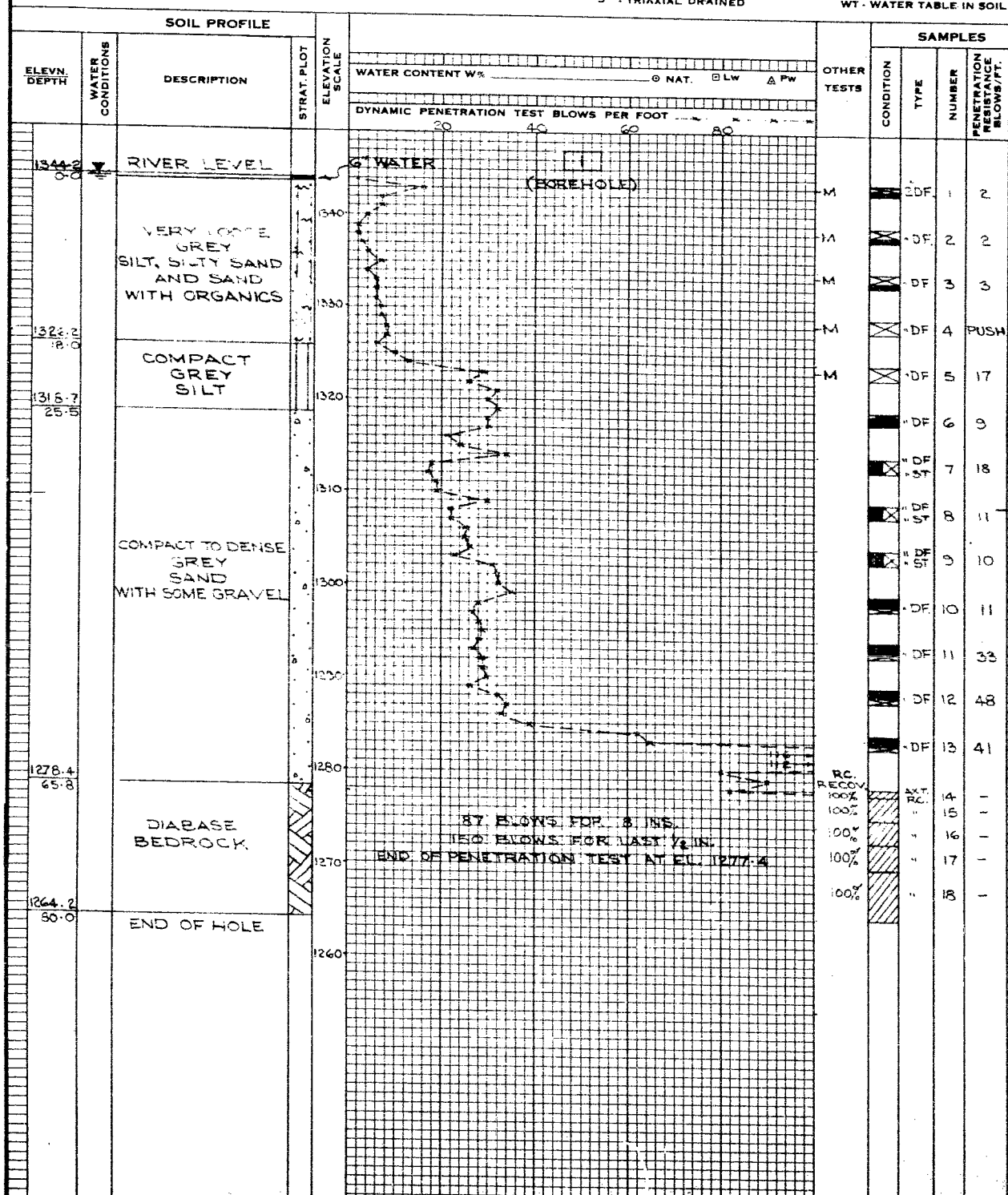
A.S. - AUGER SAMPLE  
 S.T. - SLOTTED TUBE  
 W.S. - WASHED SAMPLE  
 D.O. - DRIVE-OPEN  
 D.F. - DRIVE-FOOT VALVE  
 C.S. - CHUNK SAMPLE

## SAMPLE TYPES

F.S. - FOIL SAMPLE  
 S.O. - SLEEVE-OPEN  
 S.F. - SLEEVE-FOOT VALVE  
 T.O. - THIN WALLED OPEN  
 R.C. - ROCK CORE

## ABBREVIATIONS

V - IN-SITU VANE TEST  
 M - MECHANICAL ANALYSIS  
 U - UNCONFINED COMPRESSION  
 QC - TRIAXIAL CONSOLIDATED UNDRAINED  
 Q - TRIAXIAL UNDRAINED  
 S - TRIAXIAL DRAINED  
 W - WET UNIT WEIGHT  
 K - PERMEABILITY  
 C - CONSOLIDATION  
 WL - WATER LEVEL IN CASING  
 WT - WATER TABLE IN SOIL



## GEOCON

## OFFICE REPORT ON SOIL EXPLORATION

CONTRACT T7725 PEN. TEST 2 DATUM GEODETIC CASING         
 BORING DATE MAR. 23, 1965 REPORT DATE MAR. 23, 1965 COMPILED BY AEL. CHECKED BY DBO  
 HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

## SAMPLE CONDITION

☒ DISTURBED  
☐ FAIR  
☐ GOOD  
☐ LOST

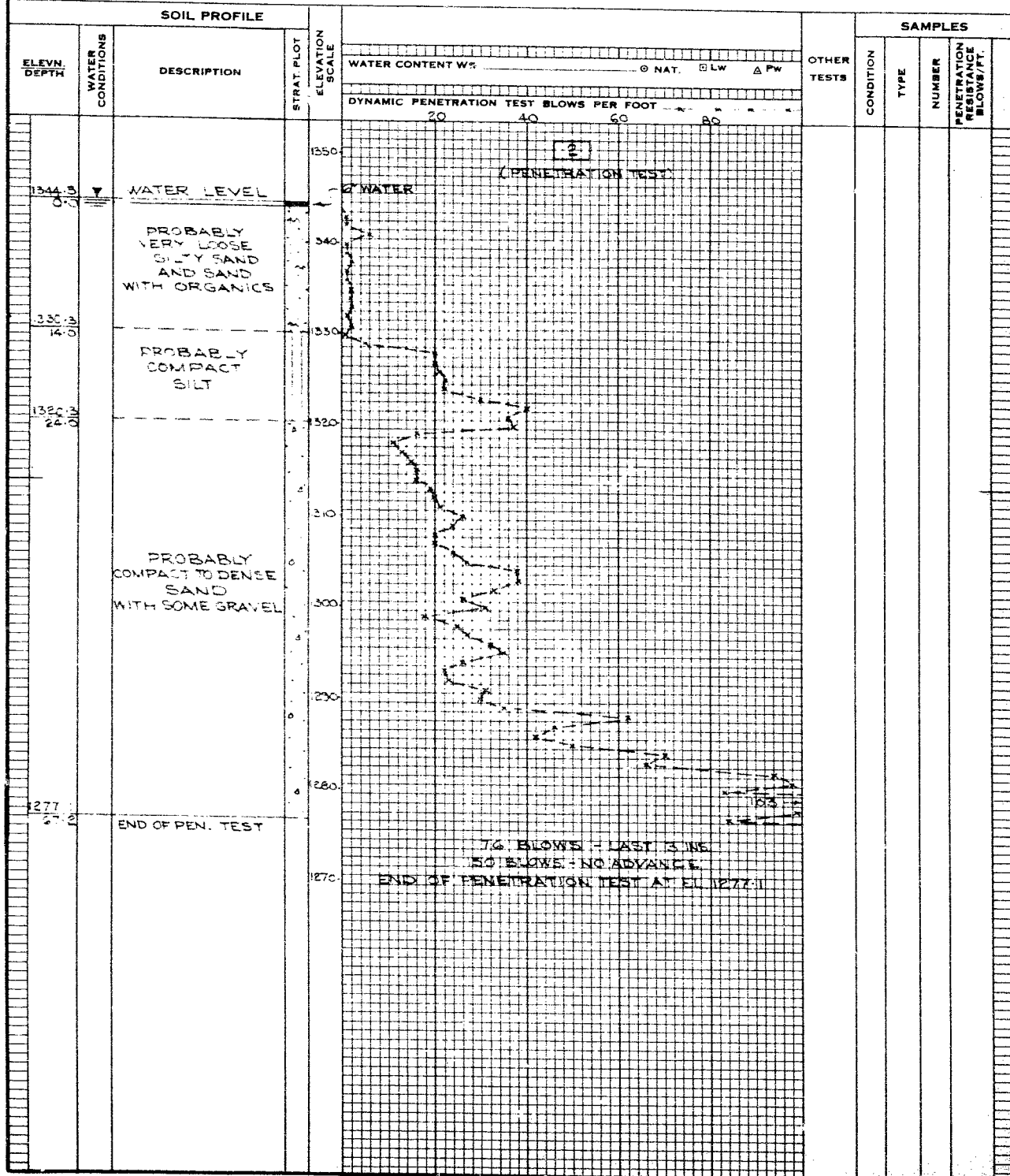
## SAMPLE TYPES

A.S. - AUGER SAMPLE  
 S.T. - SLOTTED TUBE  
 W.S. - WASHED SAMPLE  
 D.O. - DRIVE-OPEN  
 D.F. - DRIVE-FOOT VALVE  
 C.S. - CHUNK SAMPLE

F.S. - FOIL SAMPLE  
 S.O. - SLEEVE-OPEN  
 S.F. - SLEEVE-FOOT VALVE  
 T.O. - THIN WALLED OPEN  
 R.C. - ROCK CORE

## ABBREVIATIONS

V - IN-SITU VANE TEST  
 M - MECHANICAL ANALYSIS  
 U - UNCONFINED COMPRESSION  
 GC - TRIAXIAL CONSOLIDATED UNDRAINED  
 Q - TRIAXIAL UNDRAINED  
 S - TRIAXIAL DRAINED  
 γ - WET UNIT WEIGHT  
 K - PERMEABILITY  
 C - CONSOLIDATION  
 WL - WATER LEVEL IN CASING  
 WT - WATER TABLE IN SOIL



## GEOCON

## OFFICE REPORT ON SOIL EXPLORATION

CONTRACT T7725 BORING # 3 DATUM GEODETIC CASING BX  
 BORING DATE MAR. 10-22-65 REPORT DATE MAR. 23, 1965 COMPILED BY AEL CHECKED BY DBD  
 SAMPLER HAMMER WT 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS ON 1400 IN. - LBS. ENERGY)

## SAMPLE CONDITION



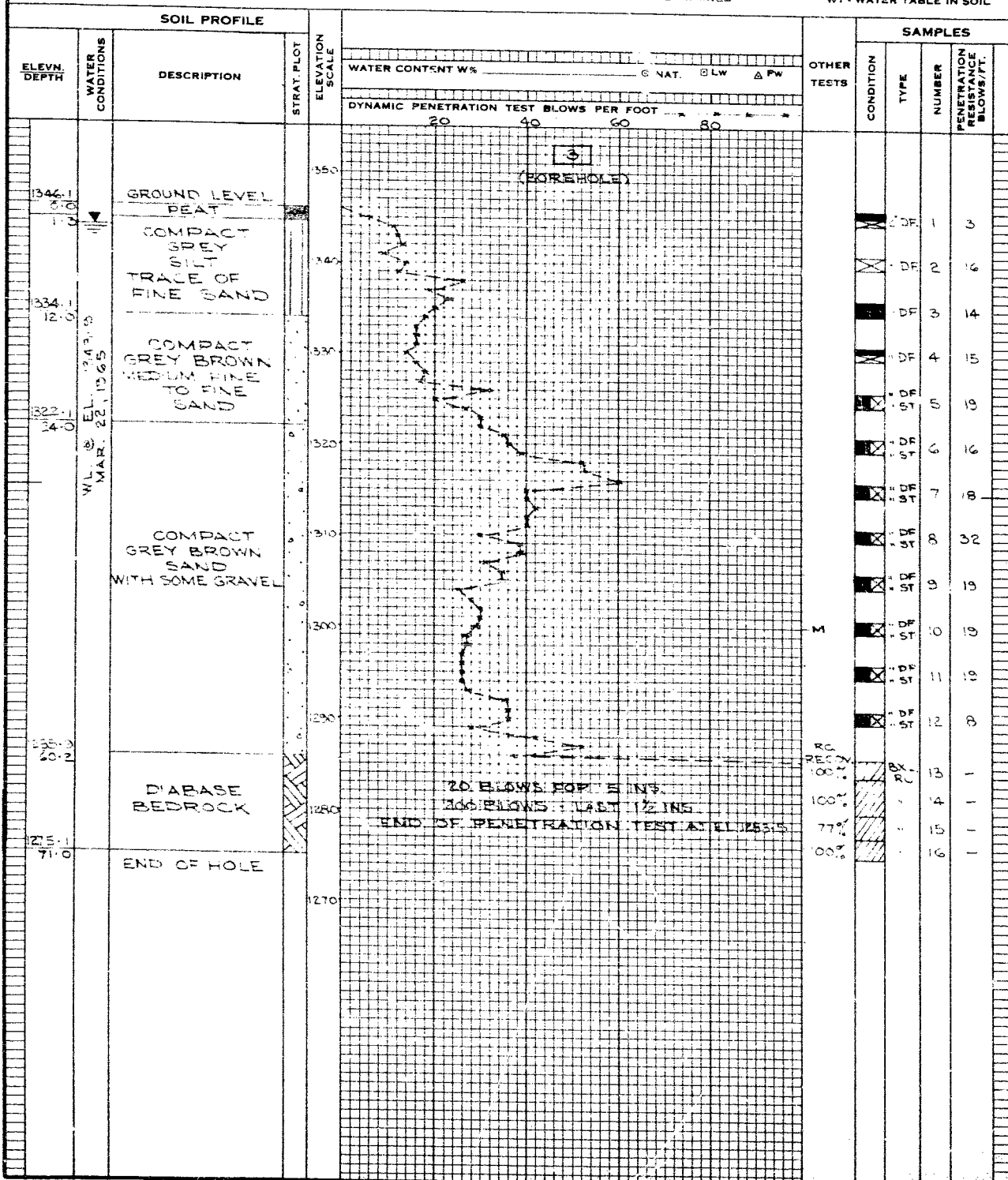
A.S. - AUGER SAMPLE  
 S.T. - SLOTTED TUBE  
 W.S. - WASHED SAMPLE  
 D.O. - DRIVE-OPEN  
 D.F. - DRIVE-FOOT VALVE  
 C.S. - CHUNK SAMPLE

## SAMPLE TYPES

F.S. - FOIL SAMPLE  
 S.O. - SLEEVE-OPEN  
 S.F. - SLEEVE-FOOT VALVE  
 T.O. - THIN WALLED OPEN  
 R.C. - ROCK CORE

## ABBREVIATIONS

V - IN-SITU VANE TEST  
 M - MECHANICAL ANALYSIS  
 U - UNCONFINED COMPRESSION  
 QC - TRIAXIAL CONSOLIDATED UNDRAINED  
 C - TRIAXIAL UNDRAINED  
 S - TRIAXIAL DRAINED  
 W - WET UNIT WEIGHT  
 K - PERMEABILITY  
 C - CONSOLIDATION  
 WL - WATER LEVEL IN CASING  
 WT - WATER TABLE IN SOIL



## GEOCON

## OFFICE REPORT ON SOIL EXPLORATION

CONTRACT T7725 PEN TEST # 4 DATUM GEODETIC CASING         
 BORING DATE MAR. 19/65 REPORT DATE MAR. 29, 1965 COMPILED BY AEL CHECKED BY DBO  
 HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

## SAMPLE CONDITION

☐ DISTURBED  
☐ FAIR  
☐ GOOD  
☐ LOST

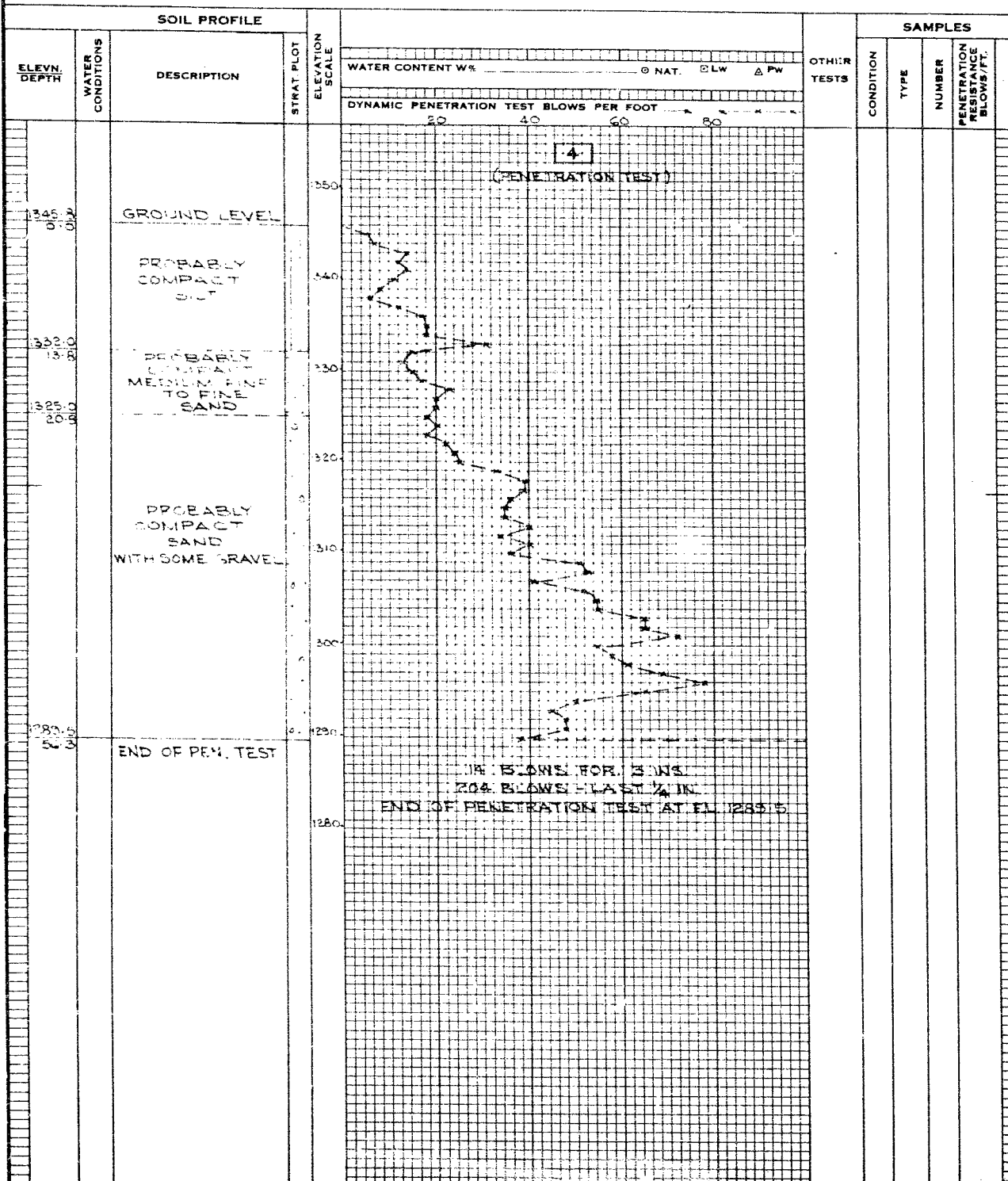
## SAMPLE TYPES

A.S. - AUGER SAMPLE  
 S.T. - SLOTTED TUBE  
 W.S. - WASHED SAMPLE  
 D.O. - DRIVE-OPEN  
 D.F. - DRIVE-FOOT VALVE  
 C.S. - CHUNK SAMPLE

F.S. - FOIL SAMPLE  
 S.O. - SLEEVE-OPEN  
 S.F. - SLEEVE-FOOT VALVE  
 T.O. - THIN WALLED OPEN  
 R.C. - ROCK CORE

## ABBREVIATIONS

V - IN-SITU VANE TEST  
 M - MECHANICAL ANALYSIS  
 U - UNCONFINED COMPRESSION  
 QC - TRIAXIAL CONSOLIDATED UNDRAINED  
 Q - TRIAXIAL UNDRAINED  
 S - TRIAXIAL DRAINED  
 γ - WET UNIT WEIGHT  
 K - PERMEABILITY  
 C - CONSOLIDATION  
 WL - WATER LEVEL IN CASING  
 WT - WATER TABLE IN SOIL



**GEOCON**

# OFFICE REPORT ON SOIL EXPLORATION

CONTRACT 77725 BORING # 5 DATUM GEODETIC CASING BX  
BORING DATE MAR. 28-29/65 REPORT DATE APR. 15, 1965 COMPILED BY AEL CHECKED BY DEO  
SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. - LBS. ENERGY)

### SAMPLE CONDITION



**DISTURBED  
FAIR  
GOOD  
LOST**

A.S. - AUGER SAMPLE  
S.T. - SLOTTED TUBE  
W.S. - WASHED SAMPLE  
D.O. - DRIVE-OPEN  
D.F. - DRIVE FOOT VALVE  
C.S. - CHURN SAMPLE

## SAMPLE TYPES

F.S. - FOIL SAMPLE  
S.O. - SLEEVE-OPEN  
S.F. - SLEEVE-FOOT VALVE  
T.O. - THIN WALLED OPEN  
R.C. - ROCK CORE

## ABBREVIATIONS

**ABBREVIATIONS**

V - IN-SITU VANE TEST	γ - WET UNIT WEIGHT
M - MECHANICAL ANALYSIS	K - PERMEABILITY
U - UNCONFINED COMPRESSION	C - CONSOLIDATION
QC - TRIAXIAL CONSOLIDATED UNDRAINED	
Q - TRIAXIAL UNDRAINED	WL - WATER LEVEL IN CASING
S - TRIAXIAL DRAINED	WT - WATER TABLE IN SOIL

SOIL PROFILE				SAMPLES					
ELEV. DEPTH	WATER CONDITIONS	DESCRIPTION	STRAT. PLOT	ELEVATION SCALE	OTHER TESTS	CONDITION	TYPE	NUMBER	PENETRATION RESISTANCE BLOW/FT.
				WATER CONTENT W% _____ NAT. LIV PW					
				DYNAMIC PENETRATION TEST BLOWS PER FOOT					
				20 40 60 80					
				5					
				(FOREHOLE)					
1346.7		GROUND LEVEL		1350					
1340.0		PEAT							
2.0		VERY LOOSE TO COMPACT GREY SILT WITH TRACE OF FINE SAND		1340				5	
1332.7								2	PUSH
14.0		LOOSE GREY FINE TO MEDIUM SAND		1330				3	19
1323.7								4	5
23.0		COMPACT GREY SILTY FINE SAND		1320				5	8
1319.7								6	11
27.0								7	14
		COMPACT GREY SAND WITH SOME GRAVEL		1310				8	10
				1300				9	10
								10	9
1295.2								11	25
51.5		END OF HOLE							
1282.2		END OF PEN. TEST							
54.5		PROBABLY COMPACT SAND WITH SOME GRAVEL		1290					
				1280					
				10 BLOWS FOR 1/2 IN.					
				150 BLOWS FOR LAST 1/2 IN.					
				END OF PENETRATION TEST AT EL. 1282.2					

## GEOCON

## OFFICE REPORT ON SOIL EXPLORATION

CONTRACT T7725 BORING # 6 DATUM GEODETIC CASING BX  
 BORING DATE MAR. 16-18/65 REPORT DATE MAR. 23, 1965 COMPILED BY AEL CHECKED BY DSO  
 SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

## SAMPLE CONDITION

☐ DISTURBED  
☐ FAIR  
☐ GOOD  
☐ LOST

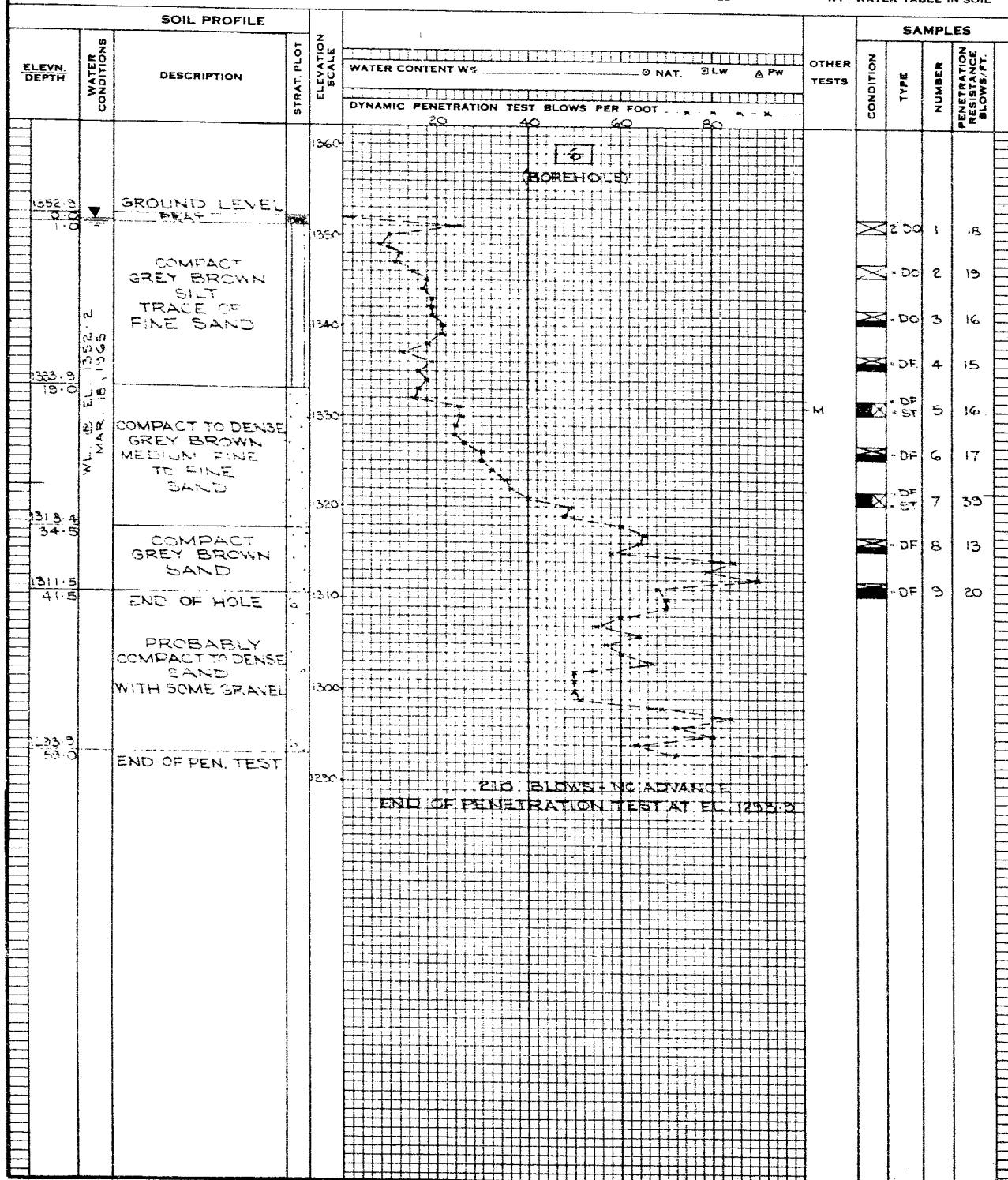
## SAMPLE TYPES

A.S. - AUGER SAMPLE  
 S.T. - SLOTTED TUBE  
 W.S. - WASHED SAMPLE  
 D.O. - DRIVE-OPEN  
 D.F. - DRIVE-FOOT VALVE  
 C.S. - CHUNK SAMPLE

F.S. - FOIL SAMPLE  
 S.O. - SLEEVE-OPEN  
 S.F. - SLEEVE-FOOT VALVE  
 T.O. - THIN WALLED OPEN  
 R.C. - ROCK CORE

## ABBREVIATIONS

V - IN-SITU VANE TEST  
 M - MECHANICAL ANALYSIS  
 U - UNCONFINED COMPRESSION  
 QC - TRIAXIAL CONSOLIDATED UNDRAINED  
 Q - TRIAXIAL UNDRAINED  
 S - TRIAXIAL DRAINED  
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APPENDIX II

FIGURES - LABORATORY TESTING

**GEOCON**

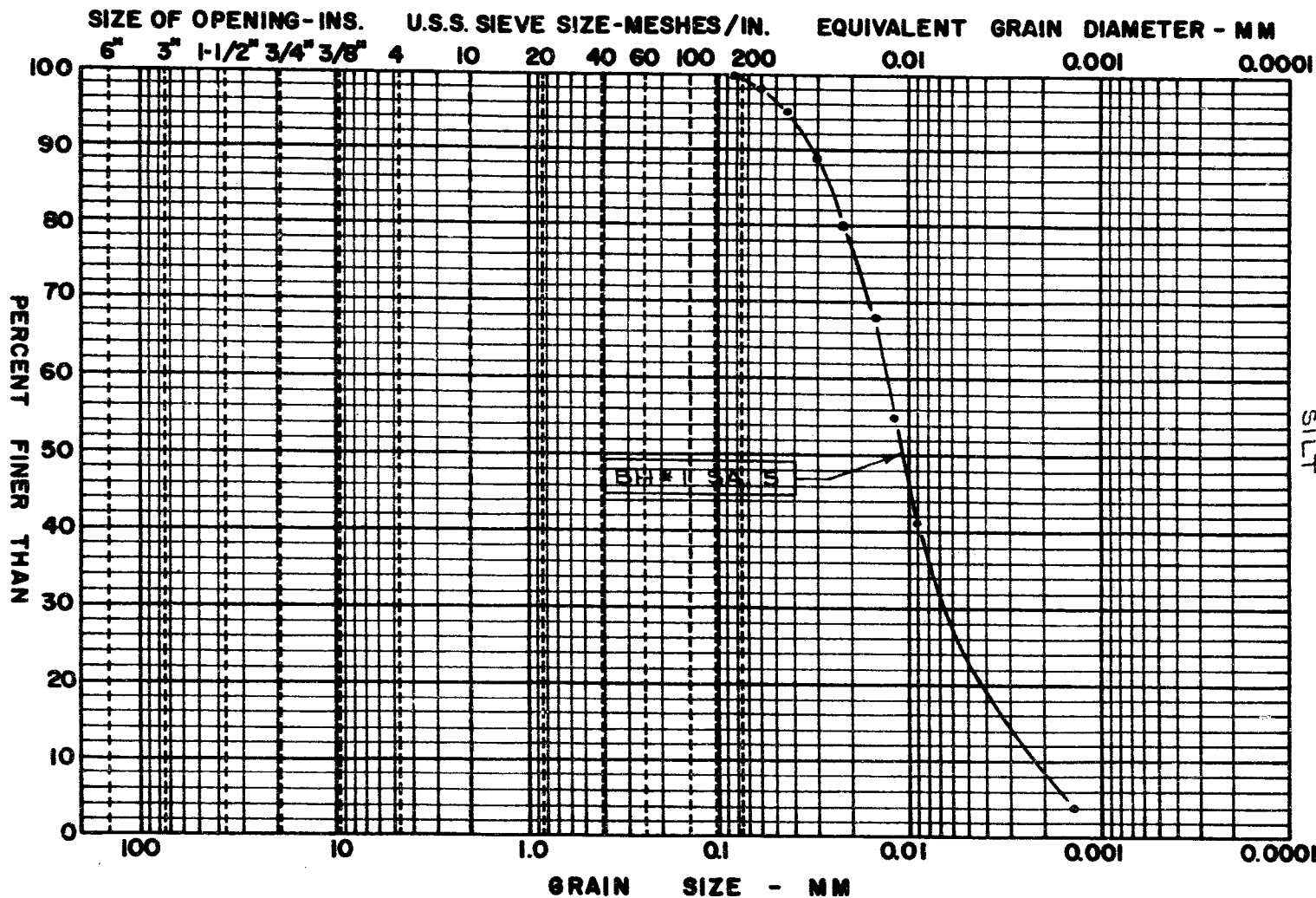
APPENDIX II  
FIGURE 1  
PROJECT T7725



# GRAIN SIZE DISTRIBUTION

APPENDIX II  
FIGURE 2  
PROJECT T7725

COBBLE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
← SIZE	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE →



**FIGURE 3**

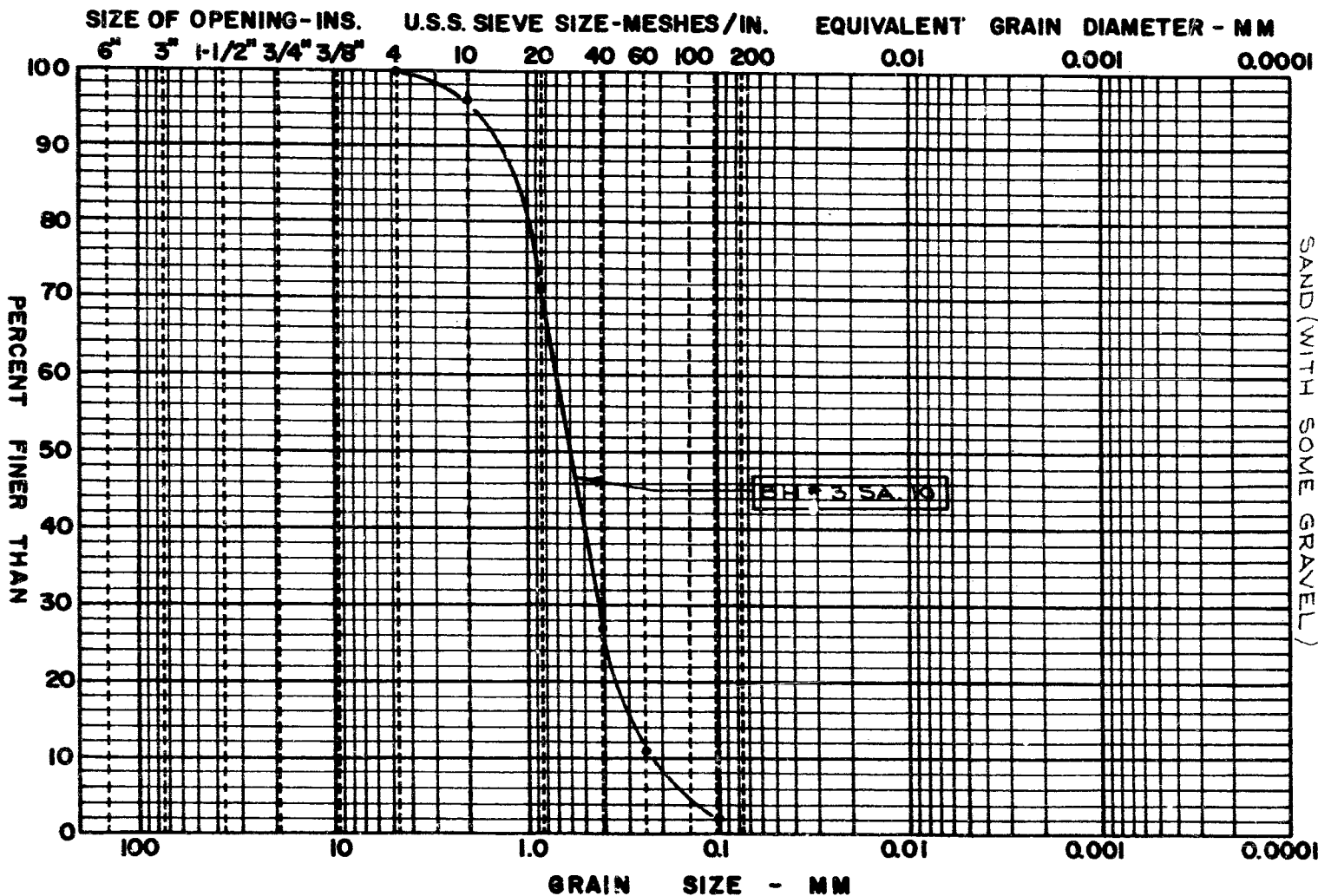
T-7725



# GRAIN SIZE DISTRIBUTION

APPENDIX 11  
FIGURE 4  
PROJECT T7725

COBBLE - SIZE	GRAVEL SIZE			SAND SIZE			FINE GRAINED	
	COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT SIZE	CLAY SIZE →



APPENDIX III

PROGRESS REPORT

**GEOCON**

# PROGRESS REPORT

## DATE

February, 1965:

15th                      Geocon Crew, Engineer and equipment mobilized from Chapleau to Wawa

16th                      Geocon Engineer, Mr. G. Carrier contacted Mr. A. Sitch, Wawa, regarding availability of Bombardier or Bulldozer.      Mr. Sitch had contacted the following people:

Ward Bros.	-	Wawa
Robinson Construction	-	Sault Ste. Marie
Mr. M. Saurior	-	Port Arthur
Mr. F. Breu	-	Marathon
General enquiries	-	White River

Mr. G. Carrier contacted following people:

Mr. A. W. Waluk	-	c/o Abitibi Power and Paper Company, Sault Ste. Marie
Dubre Bros.	-	Dubreville
Mr. White	-	Robinson Construction Sault Ste. Marie
Mr. Grant Hill	-	Wawa

(no suitable equipment)

17th                      Mr. G. Carrier, Geocon  
Mr. P. Brazeau (Driller) + Helper, Geocon  
Mr. A. Sitch, Wawa (owner of skidoo)

The four men using snowshoes and 2 skidoos attempted to reach bridge site. In 5 hours had proceeded about 2 miles (chainage 104-Drawing F-839-1) and had to return to Highway.

Observations of route covered:

- 3 to 4 feet of snow
- much of area covered by trees - diameter 8 to 9 inches
- generally flat with occasional hills
- swamp (chainage 37 to 40) between two small lakes
- heavy bush

**GEOCON**

PROGRESS REPORT (continued)

II

DATE

February, 1965:

18th

Using a Beaver Plane appeared most suitable

\$35. /trip for equipment (estimate of 4 trips)

\$25. /trip for personnel

Hunters Camp available for emergency

White River Airways were familiar with area and could land on the lake at the inlet of the Tedder River.

Arranged for reconnaissance trip on 19th.

---

19th

Unloaded all equipment, except drill, at Airport. Took Beaver into site. When the plane came to a stop, nose dropped through the ice. Waited in Hunters Camp for about 3-1/2 hours. Light plane landed down the lake and took personnel back to Wawa.

Observations:

- Tedder River not frozen
- condition of ice within 400 feet of shore, weak and covered by slush
- heavy bush at edge of lake

Necessary to take drill into site overland

---

20th

Mr. M. R. Lipsett, Driller Superintendent - Geocon Ltd travelled to White River to take charge of trail construction.

---

21st

Mr. M. R. Lipsett and P. Brazeau search for bulldozer in White River and Wawa - located 2 machines about 9 miles from Wawa.

Mr. Lipsett surveyed route from air.

---



PROGRESS REPORT (continued)

III

DATE

February, 1965:

22nd	Mr. Lipsett, G. Carrier, P. Brazeau, L. Bertrand (helper) + 2 bulldozers cutting trees and breaking trail for about 1/2 mile.
23rd & 24th	As on February 22nd, breaking trail Temperature on 24th was -40 degrees F. Mr. Carrier had to return to Montreal on 24th because of illness.
25th	Trail broken to small ravine about 3 miles out. Second bulldozer not used after 24th.
26th	Trail broken to approximate chainage 225. Temperature -30 degrees F. Re-loaded part of equipment onto truck at airport. Little production with bulldozer -mechanical trouble (ignition)
27th	Constructed small bridge over 6 foot wide creek at about chainage 225 using cut logs and packed snow. Temperature was 0 degrees F.
28th	Trail broken for about 5 miles. Stick through bulldozer radiator.
March, 1965:	
1st	Radiator repair Improving trail - tree cutting to widen trail
2nd	Trail broken to chainage 300. Bulldozer straddled log and threw both tracks-repaired

**GEOCON**

DATE

March, 1965:

- |       |  |
|-------|--|
| 3rd   | Moved some equipment into chainage 225<br>Slight thaw - bulldozer and sleight cutting in - trail breaking.   |
| <hr/> |  |
| 4th   | Bridge at chainage 225 weakened by thaw - reinforced.<br>Moved more equipment into chainage 225 - trail breaking.<br>Mr. B. Coleman mobilized to White River to replace Mr. G. Carrier.  |
| <hr/> |  |
| 5th   | Moved more equipment into chainage 150 - threw track - tree cutting to widen trail.  |
| <hr/> |  |
| 6th   | Trail breaking - about 2000 feet from site<br>Open creek at chainage 360, 10 feet wide   |
| <hr/> |  |
| 7th   | Improving trail - had to construct a new route at chainage 360.  |
| <hr/> |  |
| 8th   | Improving trail - tree cutting.<br>Employed cook for Camp - obtained supplies  |
| <hr/> |  |
| 9th   | Constructing crossing over Tedder River at site.<br>Cook and food supplies taken into Camp near site by air.<br>Mr. M. R. Lipsett left at 3:00 a.m. to return to Toronto.  |
| <hr/> |  |
| 10th  | Clearing site.<br>Plan distance to site = approximately 41,000 feet (due to tortuous trail, actual distance further). Due to terrain, the trail separated from survey line by about 1/4 mile at approximate chainages 160 and 370-400. |
| <hr/> |  |

PROGRESS REPORT (continued)

V

DATE

March, 1965:

11th	Moved drill from White River to Bush Road, about 8 miles on Highway 17. Moved drill about 2 miles into site.
<hr/>	
12th	Moved drill into site
<hr/>	
13th	Moved equipment, pump from chainage 250 to site
<hr/>	
15th - 29th	(reported temperatures: March 20-27; -25 <sup>o</sup> to -40 <sup>o</sup> F.) March 28-29; snow and mild)  Carried out borehole program. - 4 boreholes and 6 dynamic penetration tests Plane used for servicing Camp and collecting samples
<hr/>	
30th	Due to snow fall on 29th, ancillary equipment will be taken out by plane, landing down lake. Took equipment onto ice. Loaded sleigh with drill Tractor arrived at 4:00 p. m. All day required to reach site because of poor trafficability. Loaded sleigh.
<hr/>	
31st	Took drill to Highway 17, arrived too late to unload sleigh. Plane took out ancillary equipment in 4 trips.
<hr/>	
April, 1965	
1st	Loaded the drill on the truck. Pick-up equipment at Airport in White River.
<hr/>	

WORK COMPLETED

**GEOCON**

MEMORANDUM

To: Mr. A. G. Stermac,  
Principal Foundation Engineer,  
Room 107, Lab. Bldg.

FROM: 208 Simpson Street,  
FORT WILLIAM, Ontario.

DATE: January 25, 1965.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 151-64 Site 38 C-21  
Tedder River Structure  
Proposed Hwy. 631 - Dist. 18

Enclosed please find a print of plan E-4179 -1,  
on which is shown the proposed footing lay-out.

Would you please have a foundation investigation  
carried out, in order to establish the type of footings  
that is required, as well as the stability of the  
approach fills, particularly at the east end of the  
structure.

The site is not readily accessible but can be  
reached from White River using a bombardier type  
vehicle.

FDeV/sp

*S M Combie*  
for F. DeVisser,  
Regional Bridge Location Engineer.

cc. R. Fitzgibbon  
N. D. Smith  
S. McCombie

*ECORON*

*Given to Person  
Jan 26/65 ag*

Rwy. 401 & Reels St.,  
Downsview, Ontario.

February 1, 1965

Materials and Testing Division

Cocoon, Limited,  
14 Main Road,  
Bramale, Ontario.

Attention: Mr. B. Bates

Re: W.P. 151-64, Rwy. 631, Tadder River Bridge,  
Site 183-21, District 16, Gault Sta. Paris.

Dear Sir:

NEAR WHITE RIVER

Please consider this your authority to carry out a foundation investigation at the above site. Plans and profiles were provided to your representative on January 23, 1965.

It is understood that a qualified Soils Engineer will be in charge of the field work at all times.

Eleven copies of the completed foundation report, with one additional copy of each subsoil profile, should be submitted to the Foundation Section prior to March 24, 1965. Previous requirements as to preliminary borehole information and laboratory testing program, should be followed.

Because the drawings accompanying the foundation reports, showing the location of borings, the inferred subsoil conditions, etc., are to become contract drawings, you are requested to prepare them in accordance with the B.M.C. standards. To enable you to do this, we are supplying you with sample drawings with all the necessary explanations, together with linen sheets for your drawings. You are also requested to provide the B.M.C. with Crenaflex copies of the drawings.

Charges for the work performed will be in accordance with your Schedule of Rates, dated March 4, 1960, and invoices to be addressed to the attention of the undersigned.

RM/maF

Yours very truly,

cc: Messrs. J. McCombie  
F. DeVissser  
H. Neathur  
A.W. Ward  
E. B. Saint

Mrs. I. Tate

M. B. Smith (2)  
Foundations Office

*A. L. Latta*

A. L. Latta,  
Materials and Testing Engineer

Gen. Files (2)

Mr. A. M. Toye,  
Bridge Engineer,  
Bridge Division.

Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

June 7, 1965

FOUNDATION INVESTIGATION REPORT BY:  
Geocon, Ltd., Consulting Engrs., Toronto.  
Proposed Tedder River Structure on Sec. Hwy. 631,  
Line 'A', Twp. 66, District 18, (Sault Ste. Marie).  
W.P. 151-64

We have reviewed the foundation report prepared by Geocon, Ltd., for the above-mentioned job, and submit the following comments:

The Soil Consultant has recommended piled foundations for the proposed structure and suggested different types of piled foundations. In our opinion, the most suitable type of piled foundation would be end-bearing piles driven to bedrock. For design purposes, a safe load of 70 tons per pile may be used for 14 BF 73 steel H-piles driven to bedrock.

Your attention is drawn to the Consultant's comments pertaining to dewatering. However, since the structure will be founded on piles, we believe this to be a construction problem only. If steel sheeting is required for hydrological requirements, this may be incorporated in the dewatering scheme.

Since the subsoil consists of fine-grained granular material, no stability problems are anticipated for the standard 2:1 side slopes, provided the surface peat layer is removed prior to the placing of embankment fill material.

Should additional information be required regarding the above-mentioned project, please contact this office.

RD/ndf  
attach.

cc: Messrs. A. M. Toye (2)  
R. A. Gregathos  
D. W. Farran  
E. C. Hurrell  
J. A. Ward  
E. S. Saint  
P. De Visser  
A. Watt

Foundations Office  
Gen. Files

*M. Devata*  
M. Devata,  
SENIOR FOUNDATION ENGR.  
For:  
K. Y. Lo,  
SUPERVISING FOUNDATION ENGR.

Sub:- Proposed Tedder River Structure on Sec Hwy 631  
Line A, Trp 66, Dist 18 (Sault Ste Marie)  
WP 151-61, Foundation Report by Gecon

Q:- Bill Hashizumi asked this section about the stability problem of the revised grade of Sec Hwy 631. The new grade will be some 3 ft higher than the one shown on the sub-soil drawing.

Ans:- Since the subsoil consists of fine grained granular material, no stability problems are anticipated for standard 2:1 side slopes, provided the surface peat layer is removed prior to placing of embankment fill.

M. Devata  
Dec 6th /68.

MEMORANDUM

To: Mr. A. Stermac,  
Principal Foundation Engineer,  
Administration Bldg.,  
DOWNSVIEW, Ontario.

FROM: Bridge Division,  
208 Simpson Street,  
Fort William, Ontario.

DATE: January 5, 1966.

OUR FILE REF.

IN REPLY TO

SUBJECT:

Site 38C-21, W. P. 151-64,  
Tedder River Bridge  
7.7 miles north of Hwy. 17,  
Highway 631, District 18.

Enclosed is one print of  
preliminary plan D-5748-P for the subject  
structure.

If you have any comments you  
should contact me before January 14, 1966.

FDV/mcr  
Enc.



F. DeVISSER,  
Regional Bridge Location Engineer.