

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

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

Attention: Mr. J. McClellan

September 11, 1964

FOUNDATION INVESTIGATION REPORT BY:
Geecon, Limited, Toronto, Ontario -
Proposed Blair Road Overpass, Ottawa
W.P. 911-64 -- District. No. 9

Attached, please find the foundation report for the above-mentioned site, prepared by the Consultant, Geecon, Ltd. of Toronto.

We have reviewed the report and believe that the contained information will be adequate for your future work. With respect to the approach embankment, we are of the opinion that adequate stability will also be assured if the embankment is built of any acceptable fill material that is adequately compacted.

Driving of steel sheet piling into the shale till may prove to be very difficult and would probably have to be discontinued after reaching this layer. It is our opinion that some other excavation shoring method could be used to enable the excavation of pier footings adjacent to the existing Hwy. 17, because the inflow of water should be relatively small and therefore, easily handled by ordinary sump pumps.

Should there be any other questions that you would like to discuss in connection with the foundations of this structure, please feel free to call our office.

AGS/MdeF
attach.

cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMillan
J. Ford
L. E. Walker
J. E. Gruspier
A. Watt

A. C. Stereac
A. C. Stereac,
PRINCIPAL FOUNDATION ENGINEER

Foundations Office
Gen. Files ✓

GEOCON LTD

HEAD OFFICE

420 MICHEL JASMIN, DORVAL, QUEBEC

TELEPHONE 631-9827

Rexdale, Ontario,
August 19th, 1964.

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,
Keele Street and Highway 401,
Downsview, Ontario.

Attention: Mr. A. G. Stermac, P. Eng.,
Principal Foundation Engineer.

Re: Soil Conditions and Foundations
Proposed Blair Road Overpass
W.P. 911-64
Ottawa, Ontario

Dear Sirs:

This letter accompanies our detailed report covering the investigation carried out at the above site.

We find that the site is covered by topsoil, loose to compact silty till and very dense shale till directly overlying shale bedrock. Strata thicknesses and engineering properties are given in the report. The ground water table at the time of the investigation was within 8 feet of ground surface.

Based on the findings of the investigation, spread footings founded on or in the very dense shale till stratum would be a suitable foundation for the proposed abutments and wing walls. Recommended allowable bearing values and lateral earth pressure coefficients for design are given in the report. With the use of 2:1 side slopes and select granular fill as discussed the overall stability of the approach embankment should be satisfactory.

We believe that this report presents all the information on the soil conditions required from this investigation. If you should wish to discuss this report in any way we would be pleased if you would give us a call.

Yours very truly,

GEOCON LTD

F. J. Heffernan
F. J. Heffernan, P. Eng.,
District Soils Engineer.

FJH/reb

ST. JOHN'S

HALIFAX

MONTREAL

TORONTO

VANCOUVER

ONTARIO

Distribution:

Downsview, Ontario.

August 19th, 1964

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DRAWING IN POCKET AT REAR OF REPORT.

INTRODUCTION

Geoccn Ltd has been retained by the Department of Highways, Ontario, by letter dated July 2nd, 1964 to investigate and report on the soil conditions 850 feet south-west of the existing Blair Road, Highway 17A intersection for the proposed Blair Road Overpass in District ⁹8, Township of Gloucester, County of Carleton.

The object of the investigation was to determine and interpret the soil and ground water conditions as they affect the design of foundations for the proposed overpass in this area.

SUMMARIZED SOIL CONDITIONS

The site is covered by between 3 and 6 feet of loose to compact silty till. The silty till is underlain by 7.5 to 13.5 feet of very dense shale till, which directly overlies a sound dark grey shale bedrock. The ground water level at the time of the investigation ranged from 3 to 8.5 feet below ground level.

DISCUSSION

It is understood that an overpass is to be constructed over Highway 17A, 850 feet south-west of the existing Blair Road, Highway 17A intersection. The Highway incorporating the overpass will be the proposed Blair Road Revision Line "A". The location of this structure as given to us is shown on Drawing T7644-1 at the rear of this report. It is understood that the overpass will be two-span simply-supported centre piered structure with the distance between the abutments

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being 115 feet; the abutments will act as retaining walls. The associated earth fill embankment for this overpass will have a maximum height of 30 feet. Typical dimensions for the piers and abutments would be approximately 69 feet long by 10 feet wide in plan. The Blair Road Line "A" road will have 4 traffic lanes each 12 feet wide with a maximum proposed vertical grade of 3 percent in the vicinity of the overpass at about elevation 270. The overpass will have 17 feet clearance.

The existing Highway 17A is a four lane concrete surfaced divided highway, with the two lanes in either direction being 24 feet wide and with a median of 30 feet. An additional 12 foot lane in either direction is proposed to be added to Highway 17A in conjunction with the construction of the overpass.

Foundations

The site conditions are suitable for the use of spread footings for the proposed abutments and wing walls. The surficial silty till which has a maximum thickness of up to about 6 feet is frost susceptible and therefore for frost protection requirements, it is recommended that the abutment foundations be at least 5 feet below ground level. It is suggested that since the loose to compact till stratum has a maximum thickness of 6 feet the abutment and wing wall foundations should be carried

Foundations (continued)

down to the very dense shale till stratum. This would place the foundations at an elevation of between 238 and 241; in order to found on the shale till and also satisfy frost protection requirements. An allowable bearing value of 4.0 tons per square foot may be used for design of footings founded on or within the very dense till stratum.

At the above allowable bearing value, total settlements should be less than 1 inch and differential settlements less than 3/4 of an inch. It is believed that these settlements are within tolerable limits.

It is recommended that the backfill immediately behind the abutments and wing walls consist of clean free draining well compacted granular material, and that this backfill be provided with positive drainage to avoid build-up of hydrostatic pressure behind the abutments. If this is done the abutment walls, and any retaining walls involved, should be designed for a lateral earth pressure coefficient of 0.4 with due allowance for any surcharge loads that may be involved.

With foundation elevations as above, construction will involve excavation at or near the observed groundwater level which varied from elevation 237 to 243 during the exploration period. At other times of the year such as in the Fall, the water table may actually be higher than noted above. Because of the relatively impermeable nature of both

Foundations (continued)

the silty till and the shale till, it is believed that the water inflow could be handled by the procedure of pumping from sumps. An open excavation with unsupported sides in the silty till should be cut on slopes of 2 horizontal to 1 vertical (2:1), for cuts left open for a short period of time, say, one or two weeks. If it is desired to leave these cuts open for longer periods the side slopes should be flattened to 3 horizontal to 1 vertical (3:1). The above slopes would probably make open excavation for the piers, using cut slopes, impractical in view of the proximity of Highway 17A which, it is understood, will remain in service during the construction of the overpass. Sheet piling, if used, should be taken down below the base of the excavation a distance equal to the maximum water head difference to avoid disturbance of the foundation soil by upward seepage of water into the excavation. It is recommended that the soil at foundation level be compacted and covered by a mud mat of lean concrete or a well compacted granular material, immediately after excavation to prevent disturbance by construction operations.

The abutments should be designed for a factor of safety of 1.5 against sliding based on a coefficient of friction of concrete to shale till of 0.45.

Embankments

The embankments will have a maximum height of 30 feet at the abutments. It is recommended that the organic silty surficial topsoil be stripped before construction of the embankment. It is recommended that the embankment be constructed of select granular fill which is understood to be readily available in this area. In this event, the sides of the embankment could have slopes of 2 horizontal to 1 vertical (2:1). An embankment of this height with side slopes of these dimensions would incorporate an adequate factor of safety with respect to stability against foundation failure due to the dense nature of the foundation material. It is recommended that the embankment fill be compacted in lifts not to exceed 12 inches, to 90 percent modified Proctor (A. A. S. H. O.) dry density except for the upper four feet where 95 percent modified Proctor density is recommended. It is suggested that embankment slopes be grassed to prevent erosion by surface runoff. Settlements will be induced in the underlying shale till stratum overlying bedrock, due to the surcharge loadings of the embankment. . However, it is considered that these settlements will be very small due to the high relative density of the stratum .

CONCLUSIONS AND RECOMMENDATIONS

6

- 1) The site is covered by topsoil, loose to compact silty till, then very dense shale till which directly overlies shale bedrock. The total thickness of overburden is about 15 feet.
- 2) The ground water level at the time of the investigation was within 8 feet of ground surface.
- 3) It is recommended that the foundations for the overpass be carried on spread footings located in or on the shale till stratum at an allowable bearing value of 4.0 tons per square foot, as discussed in the report.
- 4) No stability problems are envisaged for the proposed Blair Road Line "A" embankment. Suitable granular material for the embankment are available in the area. Topsoil should be removed as discussed.

PERSONNEL

The field work was carried out under the technical supervision of Mr. J. M. Paquin. This report was written by Mr. B. T. Darch, checked by Mr. F. J. Heffernan, P. Eng. and reviewed by Mr. M. A. J. Matich, P. Eng.,

BTD/reb

B.T. Darch per RBC.

B. T. Darch, P. Eng.
Soils Engineer.

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APPENDIX I

PROCEDURE

SITE AND GEOLOGY

SOIL CONDITIONS

WATER CONDITIONS

OFFICE REPORTS ON SOIL EXPLORATION

PROCEDURE

The field work was carried out between July 6th and July 11th, 1964, inclusive. A total of 5 boreholes, each with accompanying dynamic cone penetration tests was put down in BX size using a rented diamond drill rig. Two inch split spoon samples were taken in the overburden and bedrock was proven by rock core drilling in AXT size in 4 of the boreholes for depths varying from 4 to 10.5 feet. Piezometers were installed in all the boreholes.

Detailed logs of the boreholes are presented on the Office Reports on Soil Exploration in this Appendix. The location of the boreholes together with the inferred soil stratigraphy are shown on drawing T7644-1 located at the rear of this report.

The laboratory testing of selected soil samples was carried out in the Soil Mechanics Laboratory of Geocon Ltd in Toronto. The results of the laboratory tests are plotted on the Office Reports on Soil Exploration in this Appendix and Figure I in Appendix II. The soil samples remaining after testing will be stored until July 31st, 1965 at which time you will be contacted for instructions regarding their disposal.

All elevations given in this report are referred to Geodetic datum. The local bench mark referred to Geodetic datum was the south root of a 2 foot diameter elm tree 138 feet right of Station 13+62. The elevation of this bench mark was given as 250.98. The boreholes were

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located by our field personnel and the elevations were obtained on our behalf by De Leuw Cather and Company of Canada Limited.

SITE AND GEOLOGY

The proposed Blair Road Overpass is located 850 feet southwest of the existing Blair Road, Highway 17A intersection in the Township of Gloucester, County of Carleton at Ottawa, Ontario. The ground surface is grass covered and gently undulating in the vicinity of Highway 17A rising slightly to the east and west to flat lying farm land.

From available geological information it is known that the area was covered by moranic glacial till deposits during the last advance of glaciation in the Cenozoic Era. The bedrock is a dark grey shale of the Billings Formation of Ordovician period. The shale is horizontally bedded with some jointing noticed particularly along bedding plains.

SOIL CONDITIONS

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

Topsoil

The surficial coverage of the site is a dark brown organic silty topsoil supporting grass cover. The thickness of the topsoil is from 6 to 12 inches.

Loose to Compact Silty Till

Underlying the topsoil is a stratum of dark grey silty till. The till is composed of organic clayey silt near the surface and becomes more granular with depth containing a large proportion of angular gravel sizes of hard resistant rock. This stratum may be partly fill material from construction of the nearby Queensway Expressway. The thickness of the dark grey silt till is 2.5 feet in borehole 5 to 5 feet in borehole 2.

Five standard penetration tests carried out in the till gave "N" values ranging from 3 to 8 blows per foot with an average of 7 blows per foot. The dynamic cone penetration tests penetrated the till stratum in all cases and gave values ranging from 3 to 46 blows per foot with an average of 19 blows per foot. From these results it is estimated that the relative density of the till stratum varies from loose at the surface to compact with depth.

Very Dense Brown to Dark Grey Shale Till

Directly underlying the silty till in all boreholes is a stratum of brown to dark grey shale till. The surface elevation of the stratum varies from 238 in boreholes 5 to 243 in borehole 1 while the thickness of the stratum varies from 7.5 feet in borehole 4 to 13.5 feet in bore-

Very Dense Brown to Dark Grey Shale Till (continued)

hole 1 with an average of 10 feet. The material forming this stratum is derived from the underlying bedrock showing a grain size distribution varying from silt sizes to gravel sizes. The material near the surface of the stratum is in a weathered condition and tends to be finer grained than that found at the lower depths of the stratum; the material at these lower depths is in a more consolidated form with rock fragments in evidence. The shape of the granular component is subangular which is characteristic of glacial deposits of this nature. It is believed that this stratum has been transported by glacial action and the material is derived from shale bedrock similar to the underlying bedrock. The till stratum is generally brown for the top 2 to 3 feet and becomes dark grey with depth; however, the whole stratum has the same geological origin and the colour change is believed to be an indication of the oxidation and desiccation which has occurred since deposition.

Mechanical analyses were carried out on five typical samples from this stratum and the results are shown on Figure I of Appendix II. The grain size distribution curves indicate that the material varies from 4 to 11 percent clay sizes, 11 to 25 percent silt sizes, 24 to 46 percent sand sizes and 21 to 55 percent gravel sizes. These results indicate that the material is a well graded till with sand and gravel sizes predominating but with enough fine sizes to give the stratum cohesion. It should be

Very Dense Brown to Dark Grey Shale Till (continued)

noted that since the till contains shale fragments all the coarser sizes could be broken down under abrasive action to material with grain sizes in the fine range.

Thirteen standard penetration tests gave "N" values ranging from 68 to greater than 100 blows per foot with the average being greater than 100 blows per foot. The five dynamic cone penetration tests carried out met practical refusal within the stratum. Based on these values the relative density of the stratum is estimated to be very dense. In three of the boreholes AX casing could only be advanced through the stratum by diamond drilling techniques; this confirms the results given above that the relative density of the stratum is very dense.

For design purposes the following parameters may be used, where appropriate:

| | |
|------------------------------|---------------------------|
| Wet unit weight | 140 pounds per cubic foot |
| Submerged unit weight | 78 pounds per cubic foot |
| Angle of shearing resistance | 38 degrees |

Dark Grey Shale Bedrock

Directly underlying the till stratum in all boreholes is a dark grey shale bedrock. The bedrock was proven by diamond core drilling in AXT size in four of the boreholes for depths varying from 4 to 10.5

Dark Grey Shale Bedrock (continued)

feet. All the boreholes were terminated in the bedrock. The bedrock is sound as evidenced by the high core recovery, and the appearance of the core.

The bedrock has horizontal bedding planes with jointing common mainly along the bedding planes. It is a hard shale variety with an estimated hardness of 5 on the Moh's hardness scale.

WATER CONDITIONS

Groundwater levels were observed in the piezometers installed in all the boreholes on July 11th and July 12th, 1964. The water level depths varied from 2.5 feet in borehole 1 to 8.5 feet in borehole 3 with an average depth of 6 feet below ground surface level. These water levels correspond to elevations varying from 237 in borehole 5 to 242 in borehole 1. The water levels are plotted on the stratigraphy on drawing T7644-1.

It is believed that the ground water table at the time of investigation was at, or slightly above, the contact of the brown and the dark grey glacial till.

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 T7644 BORING # DATUM GEODETIC CASING BX & AX
 BORING DATE JULY 6-7, 1964 REPORT DATE AUG. 11, 1964 COMPILED BY AEL CHECKED BY B.T.O.
 SAMPLER HAMMER WT. 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

SAMPLE CONDITION



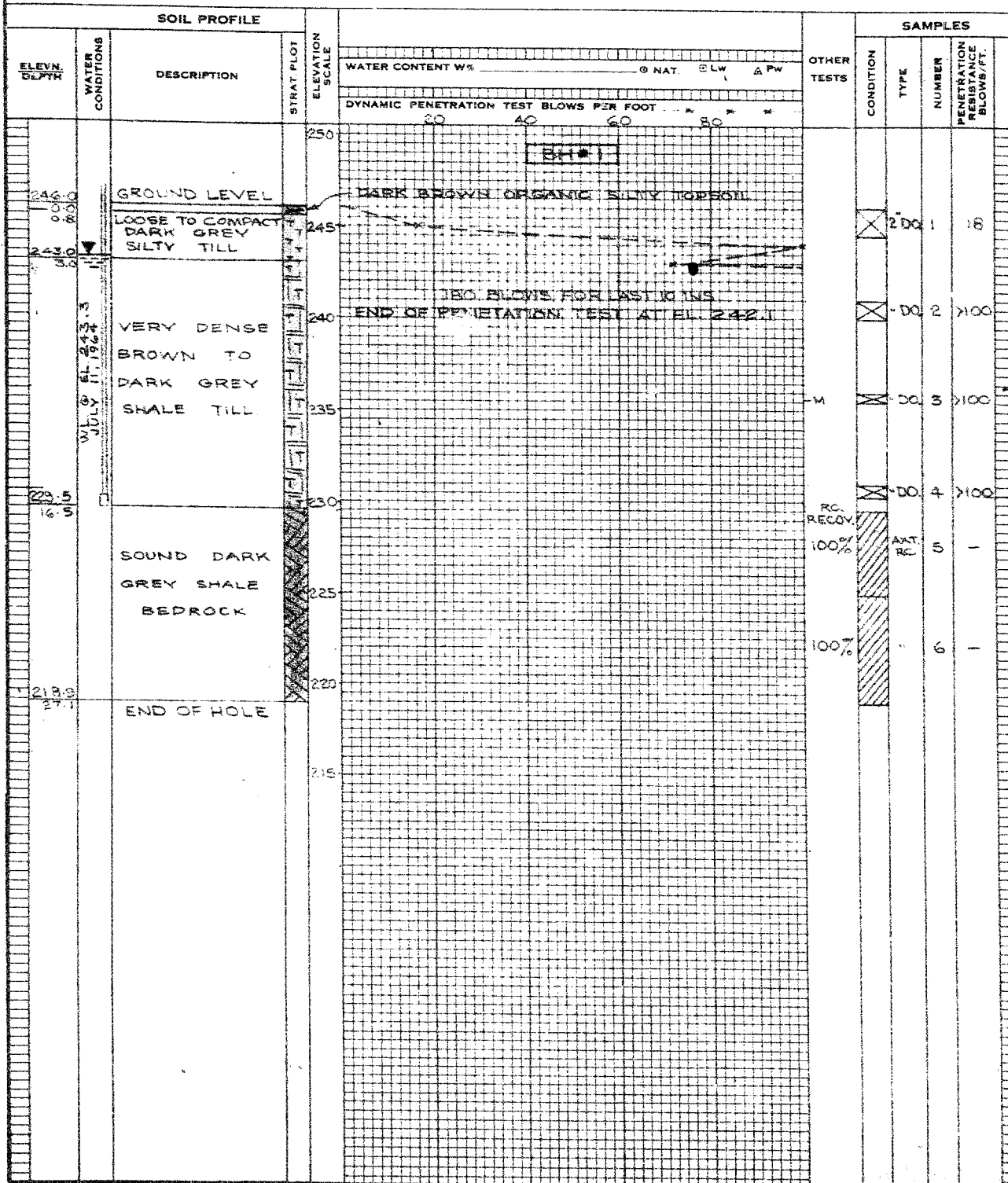
A.S. - AUGER SAMPLE
 S.T. - SLOTTED TUBE
 W.S. - WASHED SAMPLE
 D.O. - DRIVE-OPEN
 D.F. - DRIVE-FOOT VALVE
 C.S. - CHUNK SAMPLE

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
 γ - WET UNIT WEIGHT
 K - PERMEABILITY
 C - CONSOLIDATION
 WL - WATER LEVEL IN CASING
 WT - WATER TABLE IN SOIL

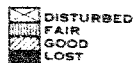


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OFFICE REPORT ON SOIL EXPLORATION

CONTRACT I 7244 BORING 2 DATUM GEODETIC CASING BX 4 AX
 BORING DATE JULY 7 1964 REPORT DATE AUG 11 1964 COMPILED BY AEL CHECKED BY B. H. D.
 SAMPLER HAMMER WT 140 LBS DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. LBS. ENERGY)

SAMPLE CONDITION



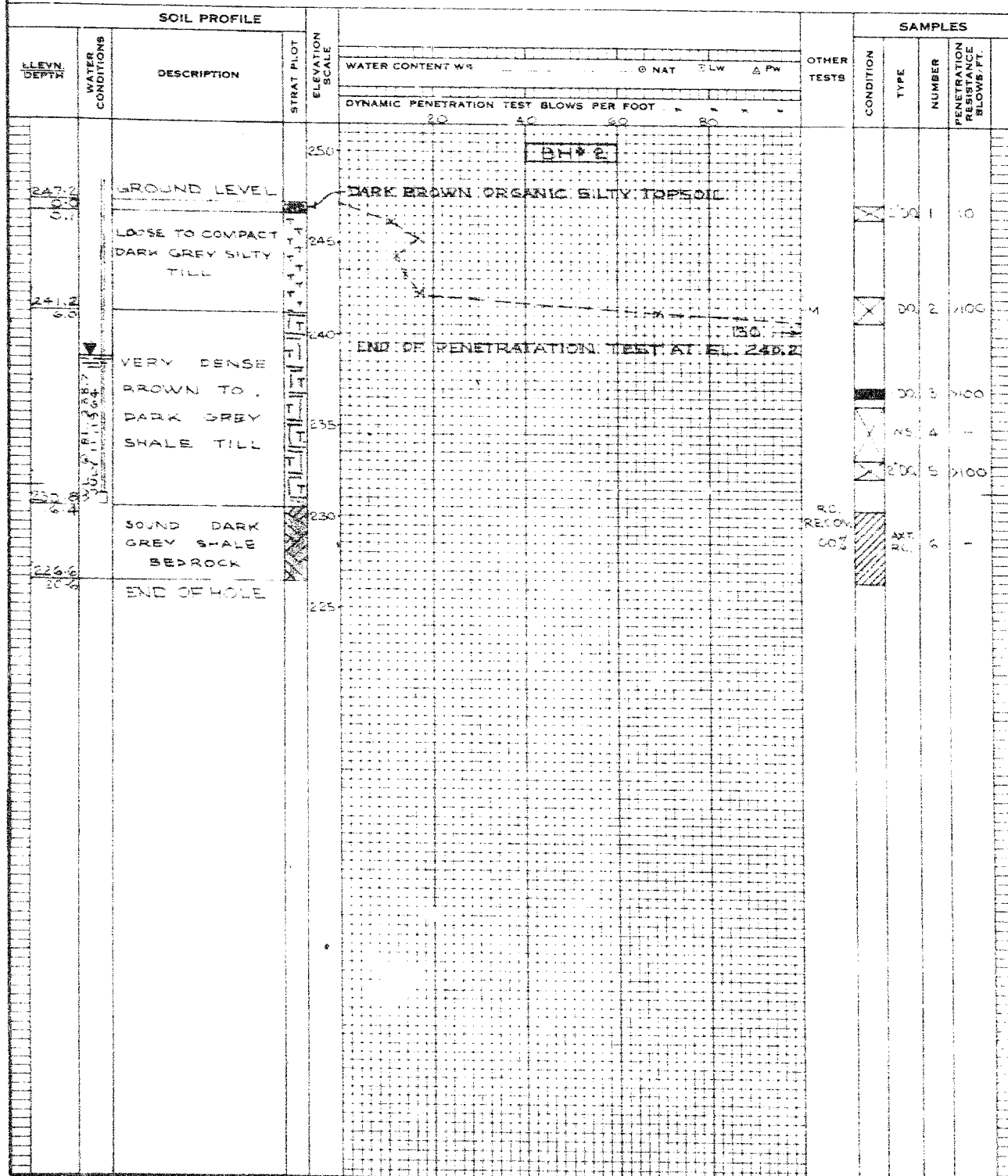
A.S. - AUGER SAMPLE
 S.T. - SLOTTED TUBE
 W.S. - WASHED SAMPLE
 D.O. - DRIVE-OPEN
 D.F. - DRIVE-FOOT VALVE
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 γ - WET UNIT WEIGHT
 K. - PERMEABILITY
 C. - CONSOLIDATION
 WL - WATER LEVEL IN CASING
 WT - WATER TABLE IN SOIL



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OFFICE REPORT ON SOIL EXPLORATION

CONTRACT I7644 BORING # 3 DATUM GEODETIC CASING BX
 BORING DATE JULY 8-9, 1964 REPORT DATE AUG. 12, 1964 COMPILED BY AEL CHECKED BY 3-1-5
 SAMPLER HAMMER WT 140 LBS. DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. LBS. ENERGY)

SAMPLE CONDITION



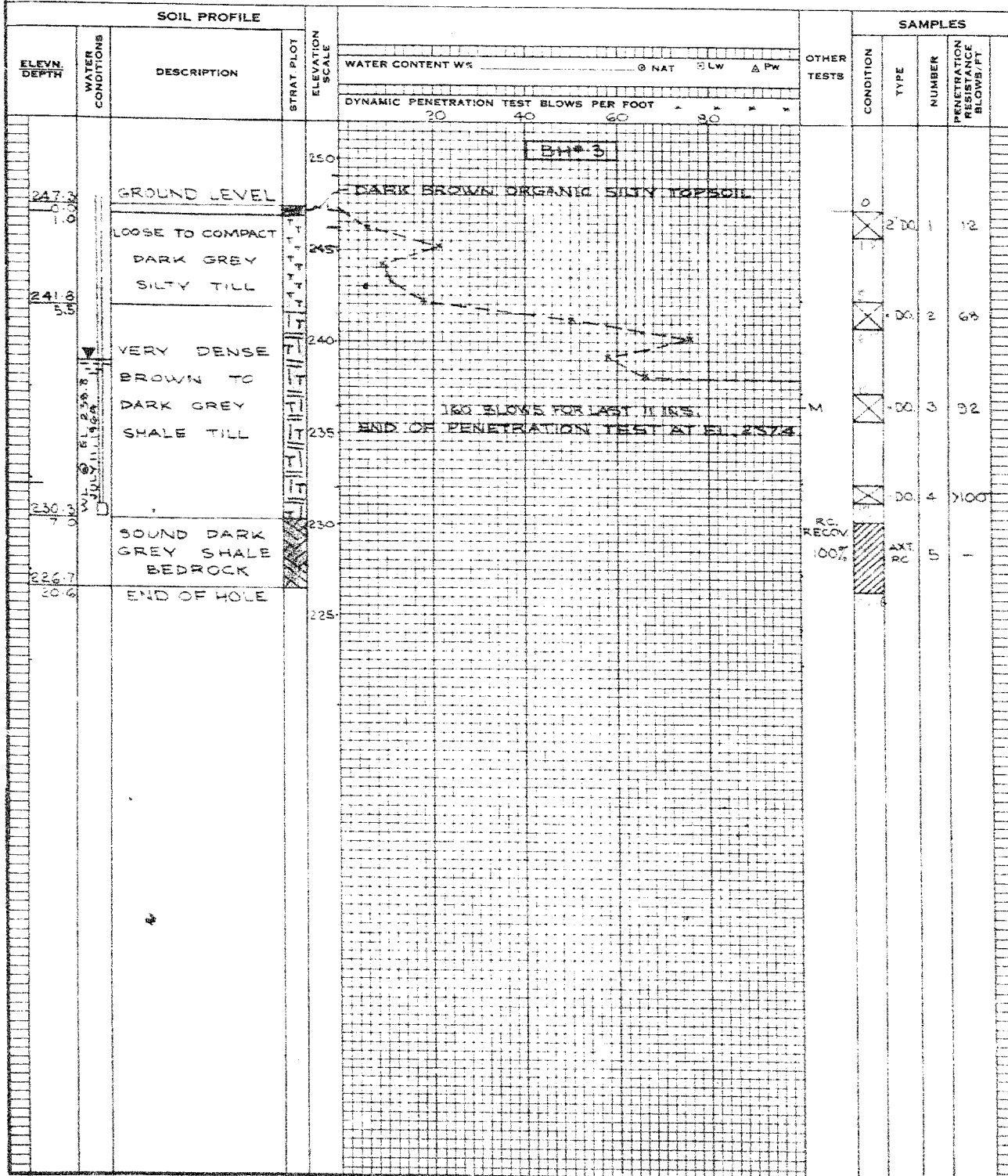
AS - AUGER SAMPLE
 ST - SLOTTED TUBE
 WS - WASHED SAMPLE
 DO - DRIVE-OPEN
 DF - DRIVE-FOOT VALVE
 CS - CHUNK SAMPLE

SAMPLE TYPES

FS - FOIL SAMPLE
 SO - SLEEVE-OPEN
 S - SLEEVE-FOOT VALVE
 TO - THIN WALLED OPEN
 RC - ROCK CORE

ABBREVIATIONS

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 C - CONSOLIDATION
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 WT - WATER TABLE IN SOIL



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OFFICE REPORT ON SOIL EXPLORATION

CONTRACT I7644 BORING # 4 DATUM GEODETIC CASING BX
 BORING DATE JULY 10, 1964 REPORT DATE AUG. 2, 1964 COMPILED BY AEL CHECKED BY BTD
 SAMPLER HAMMER WT. 40 LBS DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN. LBS. ENERGY)

SAMPLE CONDITION



A S - AUGER SAMPLE
 ST - SLOTTED TUBE
 WS - WASHED SAMPLE
 DO - DRIVE-OPEN
 DF - DRIVE-FOOT VALVE
 CS - CHUNK SAMPLE

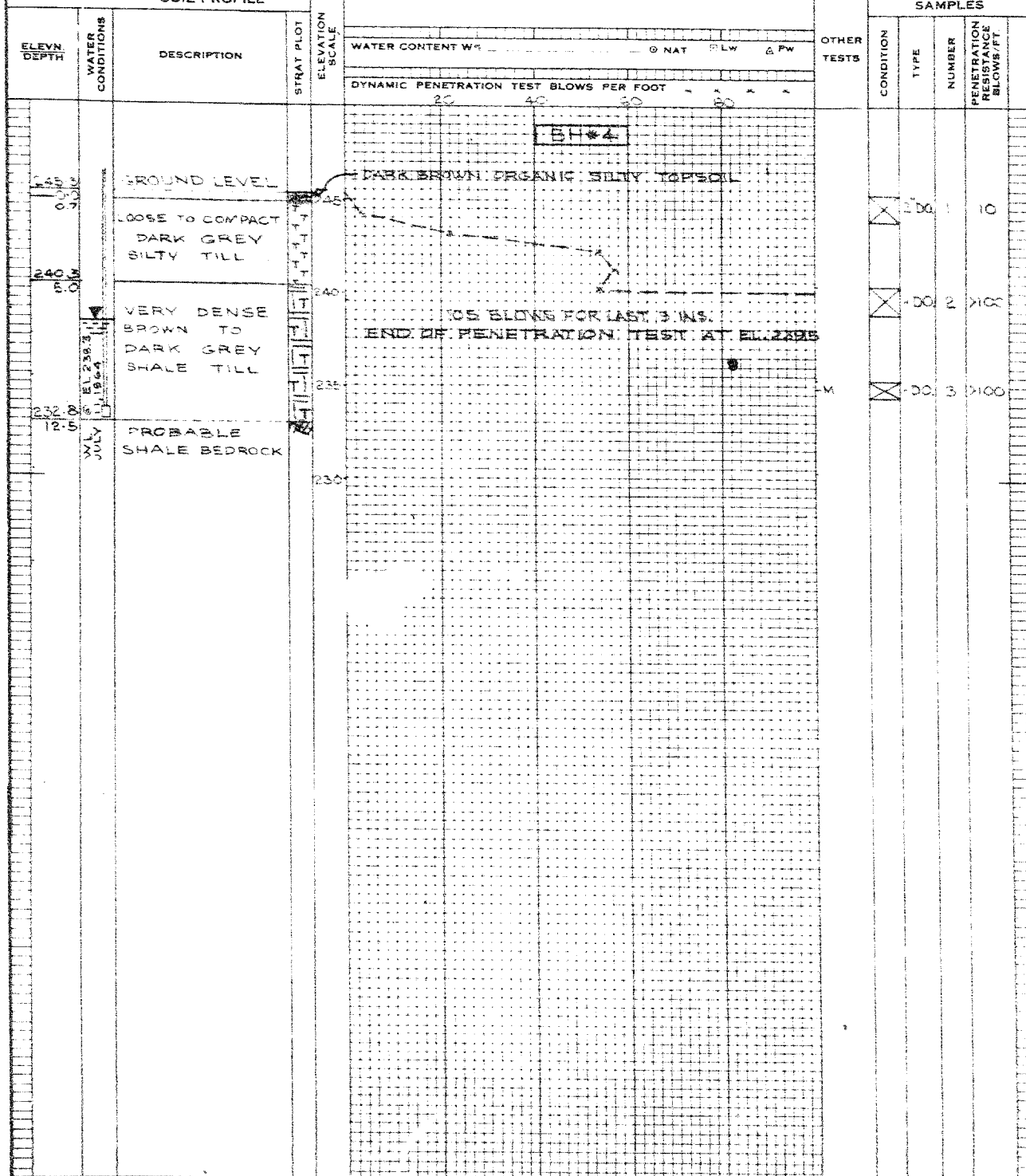
SAMPLE TYPES

FS - FOIL SAMPLE
 SO - SLEEVE-OPEN
 SF - SLEEVE-FOOT VALVE
 TO - THIN WALLED OPEN
 RC - ROCK CORE

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 WT - WATER TABLE IN SOIL

SOIL PROFILE



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OFFICE REPORT ON SOIL EXPLORATION

CONTRACT 11644 BORING # 5 DATUM GEODETIC CASING BX
 BORING DATE JULY 2, 1964 REPORT DATE AUG. 12, 1964 COMPILED BY AEL CHECKED BY B.T.D.
 SAMPLER HAMMER WT. 140 LBS DROP 30 INCHES (PENETRATION RESISTANCES CONVERTED TO BLOWS OF 4200 IN - LBS. ENERGY)

SAMPLE CONDITION

DISTURBED
 FAIR
 GOOD
 LOST

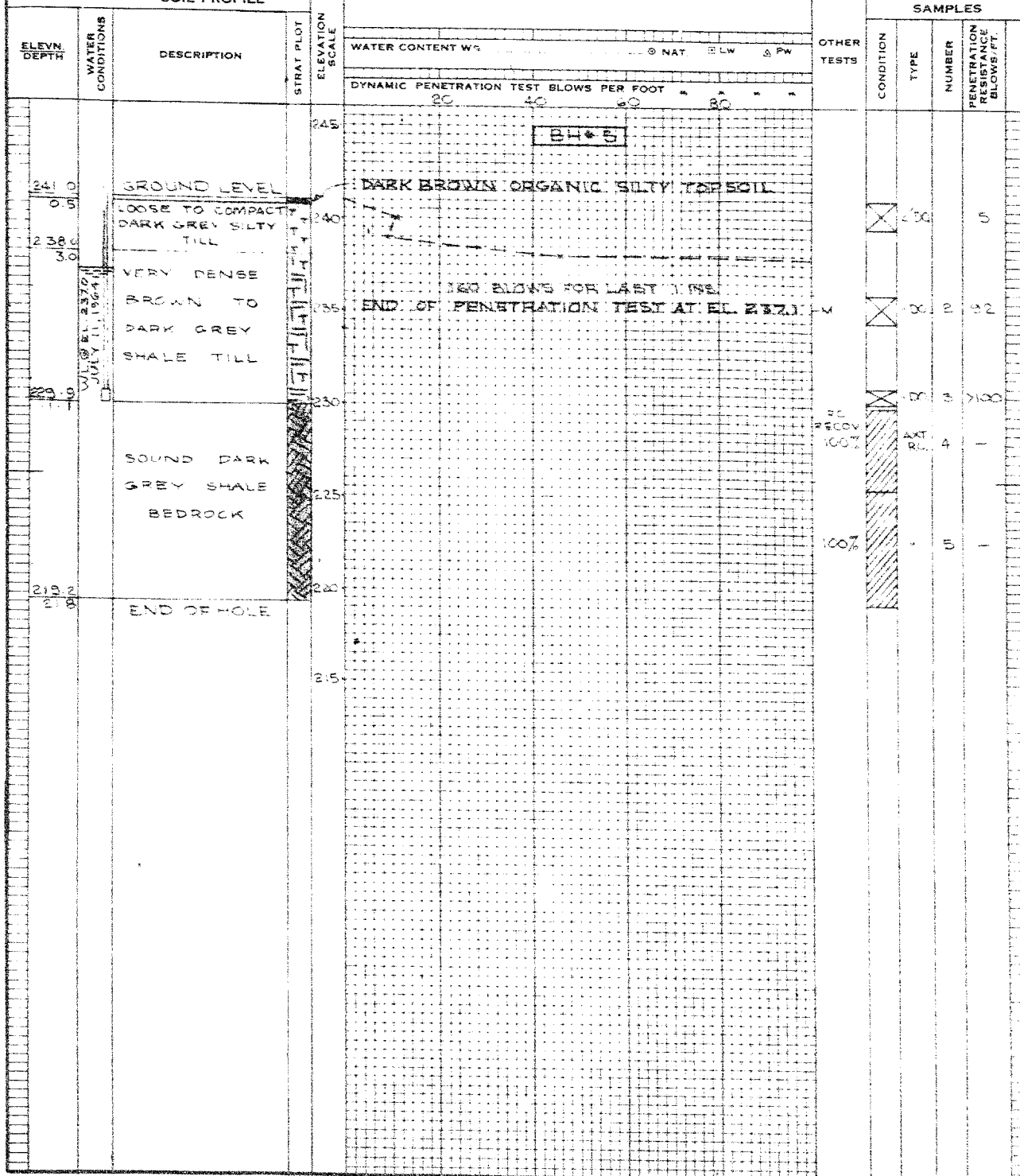
SAMPLE TYPES

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
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 W - WET UNIT WEIGHT
 K - PERMEABILITY
 C - CONSOLIDATION
 WL - WATER LEVEL IN CASING
 WT - WATER TABLE IN SOIL

SOIL PROFILE



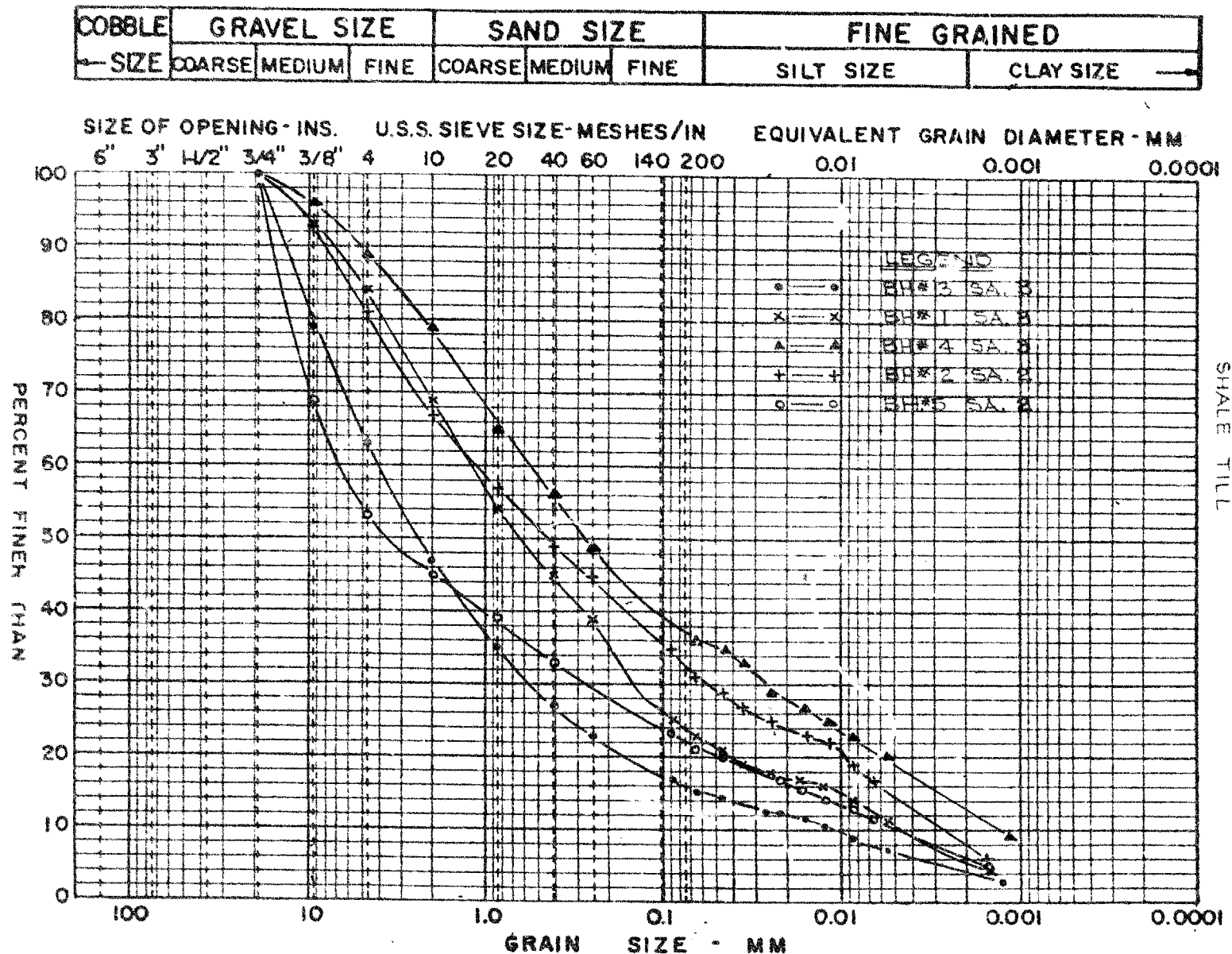
APPENDIX II

FIGURES - LABORATORY TESTING

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GRAIN SIZE DISTRIBUTION

APPENDIX II
FIGURE 1
PROJECT T 7644



M.I.T. GRAIN SIZE SCALE

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MEMORANDUM

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

FROM: Bridge Division,
Downsview, Ontario.

DATE: June 19, 1964.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 911-64
Bridge Site 3-221
Blair Rd. Interchange Underpass
Highway #17 - District #9

Would you kindly arrange to have a foundation investigation conducted at the above location. I have enclosed one copy of the site plan number E 4269-1 with the probable footing locations marked in red.

Would you also check the approach stability of the structure.

A. P. Watt

APW/es

A. P. Watt,
Regional Bridge Location Engineer.

cc. N. D. Smith
cc. R. Fitzgibbon

Materials and Testing Division

July 2, 1964

Geecon, Limited,
Consulting Engineers,
14 Hans Road,
Bendale, Ontario.

Attention: Mr. F. J. Haffernan

Re: M.P. 911-64, Hwy. 17, Blair Rd. Interchange,
District #9, Ottawa, Ontario.

Dear Sir:

Please consider this your authority to carry out a foundation investigation at the above site. Plans and profiles were provided to your representative on June 29, 1964.

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

Ten copies of the completed foundation report, with one additional copy of each subsoil profile, should be submitted to the Foundation Section prior to September 2, 1964. 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 D.E.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 D.E.C. with Cronaflex copies of the drawings.

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

RDS/MLP

Yours very truly,

cc: Messrs. D. McCubie
J. Ford
L. E. Walker
J. E. Graspier
Mrs. T. Tate
M. D. Smith (2)

A. L. Liska
A. Liska,
MATERIALS & TESTING ENGINEER

-- Gen. Files (2)

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

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

Attention: Mr. J. McCamble

September 11, 1964

FOUNDATION INVESTIGATION REPORT BY:
Geocon, Limited, Toronto, Ontario -
Proposed Blair Road Overpass, Ottawa
S.P. 911-64 -- District No. 9

Attached, please find the foundation report for the above-mentioned site, prepared by the consultant, Geocon, Ltd. of Toronto.

We have reviewed the report and believe that the contained information will be adequate for your future work. With respect to the approach embankment, we are of the opinion that adequate stability will also be assured if the embankment is built of any acceptable fill material that is adequately compacted.

Driving of steel sheet piling into the shale till may prove to be very difficult and would probably have to be discontinued after reaching this layer. It is our opinion that some other excavation shoring method could be used to enable the excavation of pier footings adjacent to the existing Hwy. 17, because the inflow of water should be relatively small and therefore, easily handled by ordinary sump pumps.

Should there be any other questions that you would like to discuss in connection with the foundations of this structure, please feel free to call our office.

afternoon

A. C. Sterner,
PRINCIPAL FOUNDATION ENGINEER

103/1005
Attach.

cc: Kenans. A. N. Toye (2)
E. A. Trepachuk
H. D. McMillan
J. Ford
A. E. Walker
J. E. Grunpiper
A. Watt

Foundations Office
Can. Files

Geocon

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

From: Bridge Division,
Downsview, Ontario.

Date: January 17, 1966.

Our File Ref.

In Reply To

SUBJECT: W.P. 911-64 Site #3-221
Blair Road Interchange Underpass
East of Ottawa East Limits
Highway #17 District #9.

Enclosed please find one copy of the preliminary plan
D-5607-P1 for the above structure.

Would you kindly review the bridge foundations
proposed and inform us if they are satisfactory.



APW/kp
Encl.

A.P. Watt,
Regional Bridge Location Engineer.

North Abut. Ftg Bottom :- el. 241.0
South Abut Ftg. Bottom :- el. 237.0

Mr. S. McCombie,
Bridge Planning Engr.,
Bridge Division.

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

Attention: Mr. G. Scott,
Reg. Bridge Location
Engr.

March 24, 1966

W.P. 911-64, Site #3-221,
Blair Road Interchange Underpass,
East of Ottawa East Limits,
Hwy. #17, District #9 (Ottawa).

We have reviewed the proposed bridge foundations
for Blair Road interchange underpass.

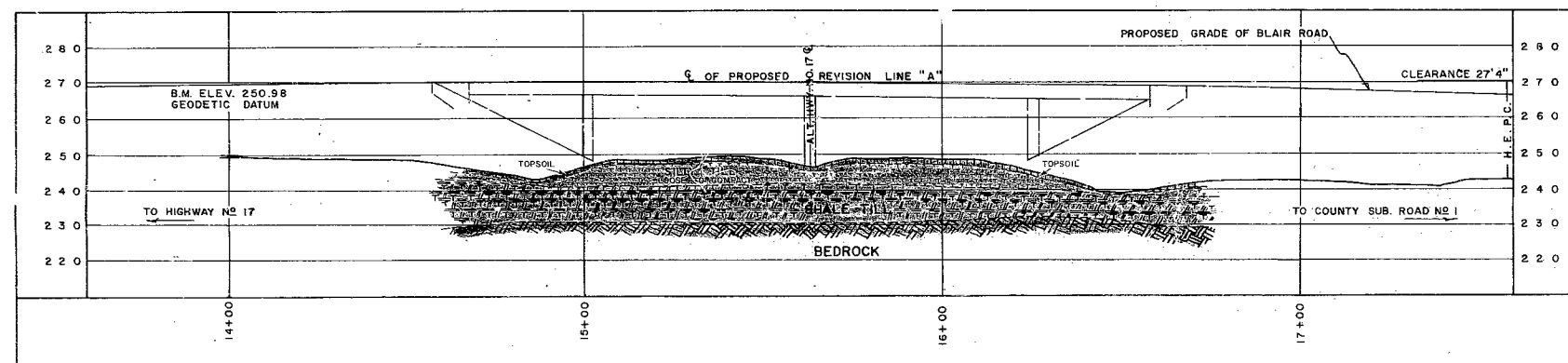
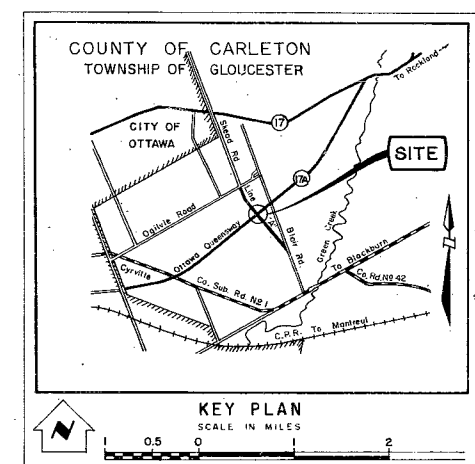
The designed footings are in accordance with the
recommendations. It is understood that the bottom elevation
of the North abutment footing is at El. 241.0, and the South
abutment footing is at El. 237.0.

KGS/MdeF

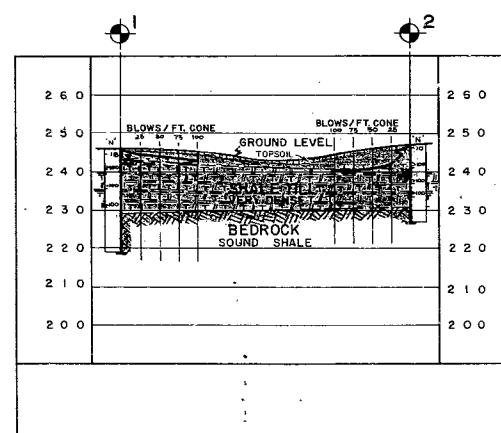
K. G. Selby
K. G. Selby,
SENIOR FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Foundations Office ✓
Gen. Files

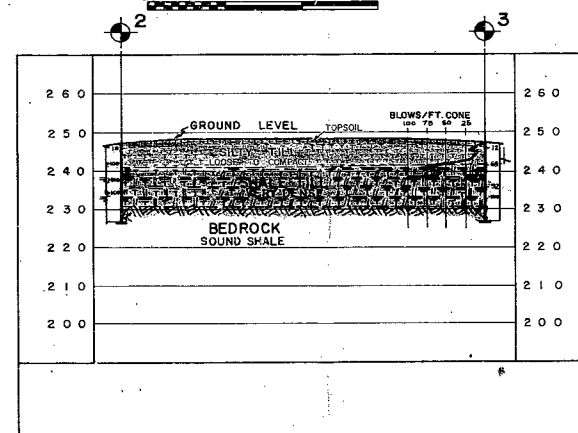
64-F-216C
W.P. #911-64
HWY #17
BLAIR ROAD
OVERPASS



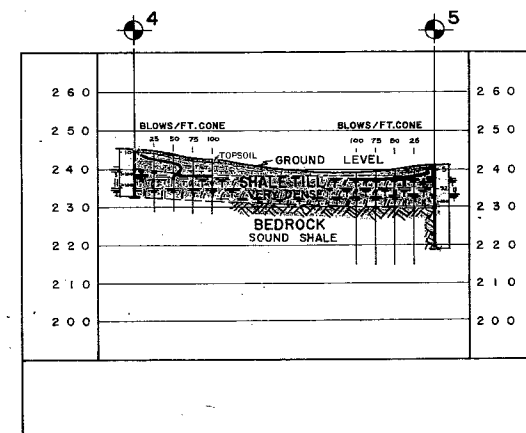
Q PROFILE OF LINE "A"







A — A



B — B


$$\text{C} \text{ --- } \text{C}$$

| LEGEND | | | |
|---|--|--|--|
|  | Bore Hole | | |
|  | Cone Penetration Hole | | |
|  | Bore & Cone Penetration Hole | | |
|  | Water Levels established at time of field investigation. | | |

| NO. | ELEVATION | STATION | OFFSET |
|-----|-----------|-----------|--------|
| 1 | 2 4 6.0 | 14 + 64.5 | 35 LT. |
| 2 | 2 4 7.2 | 15 + 00 | 35 RT. |
| 3 | 2 4 7.3 | 15 + 62.8 | 35 LT. |
| 4 | 2 4 5.3 | 16 + 25.5 | 35 RT. |
| 5 | 2 4 1.0 | 16 + 60.9 | 35 LT. |
| | | | |
| | | | |

- 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.

| | | | |
|------------------|-------------|-----------|--------------------|
| REVISIONS | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | DATE | BY | DESCRIPTION |

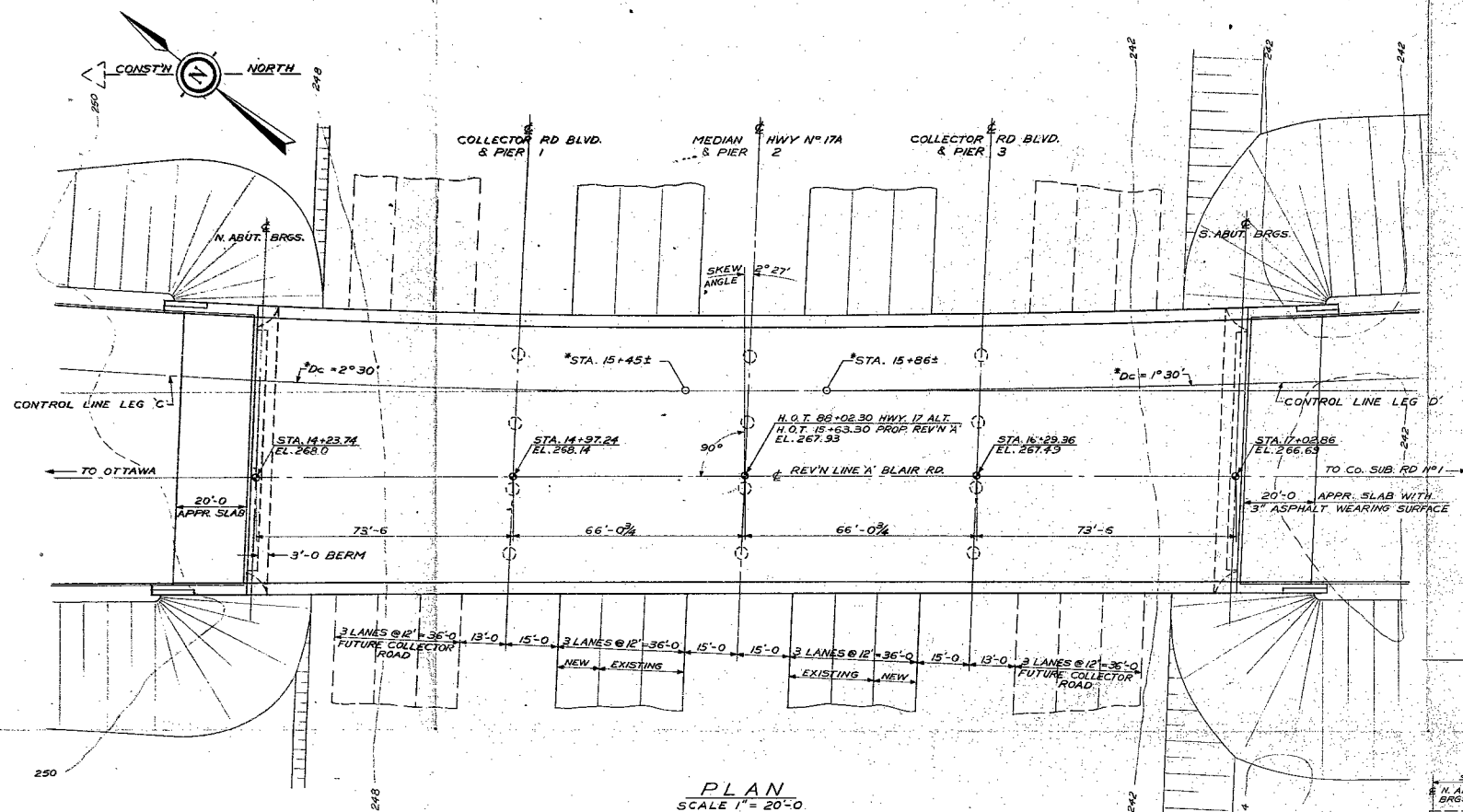
| | | | |
|--|------|-----------|---------------|
| DEPARTMENT OF HIGHWAYS - ONTARIO | | | |
| MATERIALS & RESEARCH DIVISION - FOUNDATION SECTION | | | |
| PROPOSED CROSSING AT | | | |
| HIGHWAY 17A & BLAIR ROAD - REV'N LINE "A" | | | |
| KING'S HIGHWAY NO. 17 | | ALTERNATE | DIST. NO. 9 |
| CO. CARLETON | | | |
| TWP. GLOUCESTER | | LOT 21 | CON. II |
| BORE | HOLE | LOCATIONS | & SOIL STRATA |

GEOCON LTD.

DRAWING NO.
T 76

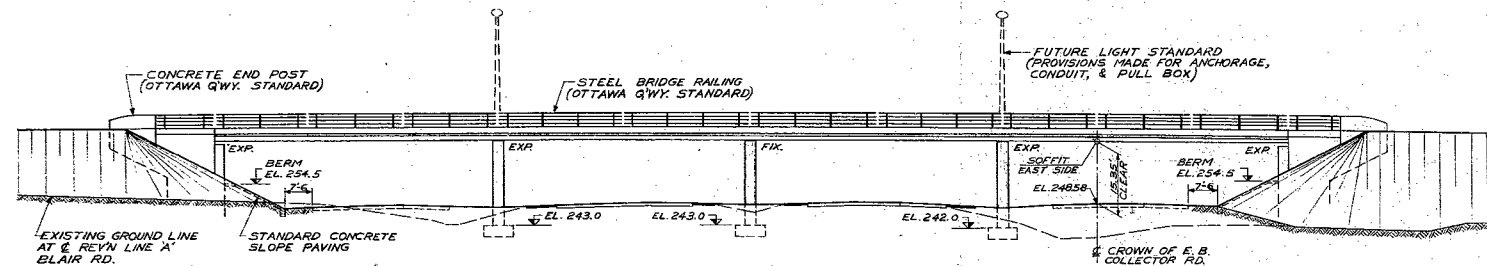
| | | | |
|------------|--------------------|-----------------|--------------------|
| SUBM'D BTD | CHECKED FJH | W.P. NO. 911-64 | M.B.R. DRAWING NO. |
| DRAWN GEM | CHECKED BTD | JOB NO. | |
| DATE | AUG 20, 1964 | SITE NO 3-221 | BRIDGE DRAWING NO. |
| APPROVED | <i>M. J. M. J.</i> | CONT. NO. | |

[illegible]

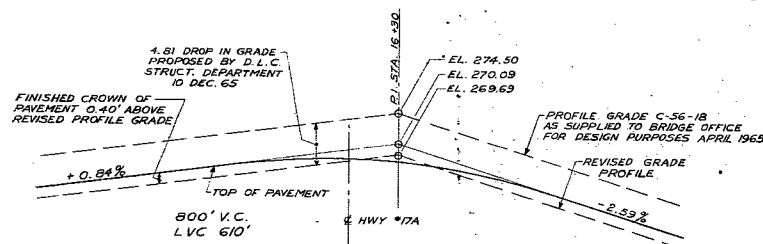


PLAN
SCALE 1" = 20'-0"

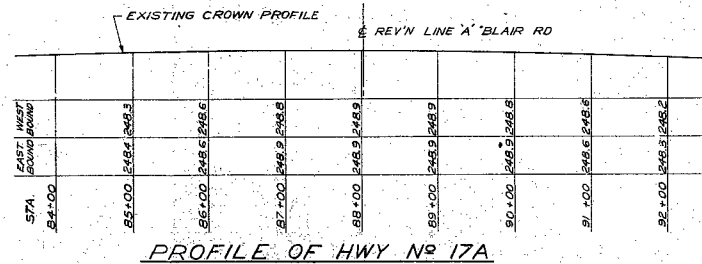
* FROM INTERSECTION DESIGN
PLAN D.M. 4868-2
TO BE CONFIRMED OR REVISED
BY REGIONAL ROAD DESIGN.



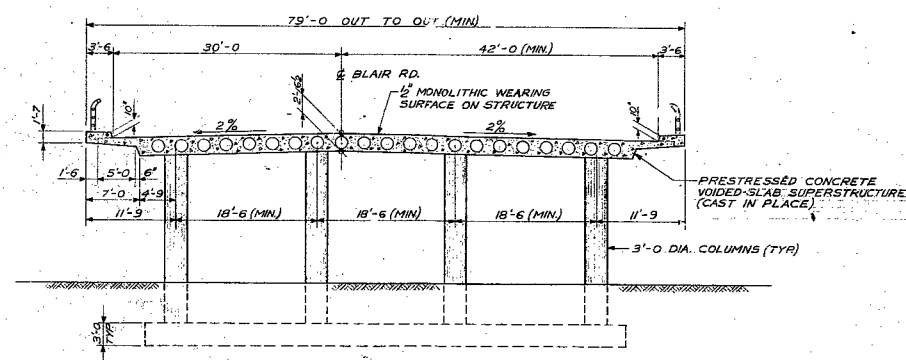
ELEVATION
SCALE 1" = 20'-0"



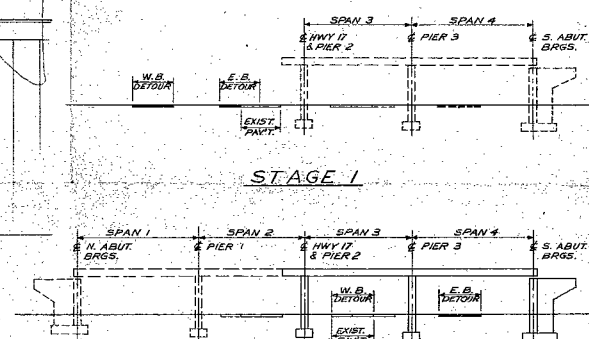
PROFILE OF REV'N LINE 'A' BLAIR RD.



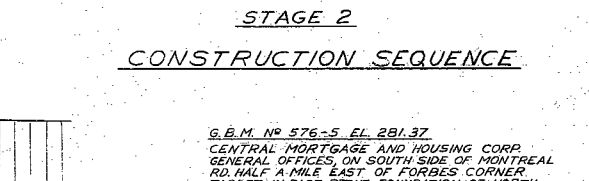
PROFILE OF HWY NO 17A



TYPICAL SECTION AT PIERS
SCALE: 1" = 10'-0"



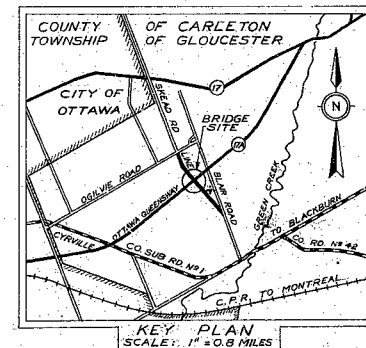
STAGE 1



STAGE 2

CONSTRUCTION SEQUENCE

G.B.M. NO 576-5 EL. 281.37
CENTRAL MORTGAGE AND HOUSING CORP.
GENERAL OFFICES, ON SOUTH SIDE OF MONTREAL
RD. HALF A MILE EAST OF FORBES CORNER
TABLET IN EAST STONE FOUNDATION OF NORTH
WING, 2 FEET SOUTH OF NORTHEAST CORNER
AND 6 INCHES BELOW BRICKWORK
PUBLICATION NO. 13 OTTAWA



KEY PLAN
SCALE: 1" = 0.8 MILES

- DESIGN NOTES**
1. DESIGN SPECIFICATIONS: AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES '961 AS AMENDED OR SUPERCEDED BY THE INTERIM SPECIFICATION (1961, 1962, 1963 & 1964) & AS GOVERNED BY THE D.H.O. BRANCH MEMORANDA.
 2. DEAD LOAD: 38 P.S.F. IS INCLUDED FOR FUTURE WEARING SURFACE.
 3. LIVE LOAD: HS20-44.
 4. IMPACT: AS PER AASHTO SPECIFICATIONS.
 5. CONCRETE: MINIMUM STRENGTH AT 28 DAYS
DECK & CURBS - 5,000 P.S.I.
PIER COLUMNS - 4,000 P.S.I.
REMAINDER - 3,000 P.S.I.
 6. FOUNDATIONS: SPREAD FOOTINGS ON DENSE SHALE TILL. ALLOWABLE BEARING PRESSURE 4 TONS PER SQ. FT.
 7. SERVICES: PROVISION WILL BE MADE IN THE STRUCTURE FOR THE FUTURE LIGHTING OF BLAIR RD. & HWY NO 17. PROVISION WILL INCLUDE EMBEDDED DETAILS ONLY.
 8. PRELIMINARY ESTIMATE OF COST: \$ 300,000.

| | |
|--|--------------------------------|
| DATE: BY: DESCRIPTION: | |
| DE LEUW CATHER & CO. OF CANADA LTD. CONSULTING ENGINEERS | |
| DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION | |
| BLAIR ROAD INTERCHANGE UNDERPASS EAST OF OTTAWA EAST LIMITS | |
| KING'S HIGHWAY No. 17 | DIST. No. 9 |
| CO. OF CARLETON | |
| TWP. OF GLOUCESTER | CON. II OTTAWA FR. |
| PRELIMINARY PLAN | |
| APPROVED: BRIDGE ENGINEER | SITE No. 5-221 W.P. No. 911-64 |
| DESIGN: D.H.O. CHECK: G.S.S. | CONTRACT No. |
| DRAWING: G.H. CHECK: G.S.S. | DRAWING No. |
| DATE: DEC. 65 | LOADING: HS20-44 |
| D5607-P-1 | |