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G-1-30 SEPT 1976

GEOCRES No. 30M5-99

DIST 4 REGION Central

W.P. No. 22-69-03

CONT. No. 78-31

W. O. No. _____

R. SITE No. _____

HWY. No. _____

LOCATION Tansley Bridge Over
Bronte Creek

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 4

REMARKS: photos enclosed



Memorandum

To: Mr. C.S. Grebski
Structural Design Engineer
Structural Design Section
West Building, Downsview

From: Soil Mechanics Section
Engineering Materials Office
West Building, Downsview

Attention: Mr. W. Lin

Date: 77 07 07

Our File Ref.

In Reply to

Subject: Re: Additional Subsurface Investigation
Tansley Bridge Over Bronte Creek
(New W/B Bridge)
W.P. 22-69-03, Site No. 10-111
District #4, Hamilton

This Section submitted on 75 02 28 a foundation report for the proposed W.B.L. four span structure adjacent to and on the north side of the existing Hwy. 5 structure over Bronte Creek, known as Tansley Bridge. At the time of writing our report, it was not known if the W.B.L. structure footings would be independent or an integral part of the existing structure. The recent preliminary Bridge Dwg. P1 A submitted by the Structural Office indicated that footings will be independent and the abutments will be supported on piles. After an analytical discussion about the abutment foundation design, it was agreed by this Section and the Structural Office, that in order to substantiate the possibility of supporting the east abutment on spread footings, additional subsurface investigation will be carried out. In order to facilitate this investigation the Structural Office submitted a plan and section of the exact location of the east abutment. This Section carried out a subsurface investigation between the period of May 4th to May 7th, 1977.

The recent investigation revealed that the bedrock was excavated to a certain depth in the area of the W.B.L. east abutment footing location during the time of construction of the existing structure. At one location (B.H. #8) adjacent to the existing east abutment immediately beneath the existing fill, mass concrete up to 5 feet thick was encountered immediately above the shale bedrock. Further, it was concluded that the excavated bedrock surface varies from elevation 497 to elevation 481 in the proposed east abutment footing location. The pertinent details are shown on our enclosed, revised foundation drawings #226903A and #226903B. The additional Record of Borehole Sheets #8 and #9 are also enclosed.

The recent subsurface investigation data, together with bedrock conditions, were presented to the Structural Office immediately after the completion of the fieldwork. Based on this data it was concluded that the most appropriate type of foundation for the W.B.L. structure east abutment footing would be to support this footing on concrete columns founded on sound shale bedrock. It should be noted during construction that all fill material must be removed down to the elevation of bedrock prior to placing concrete columns.

cont'd.....

We believe that the above mentioned information will be adequate for you to complete the foundation design of the east abutment footing. This memorandum and the enclosed drawings, together with the Record of Borehole Sheets should be included in the original foundation report W.P. 22-69-03 submitted to you on 75 02 28. This Section will, however, provide additional comments if required upon the receipt of the revised Preliminary Bridge Drawings.

Should you require any further information on this project, please contact this office.


V. Korlu
Project Engineer

For: M. Devata
Supervising Engineer

Enclosures

VK/gs

cc: G.C.E. Burkhardt (3)
R.D. Gunter
M.R. Ernesaks
D.E. Thrasher (2)

G.A. Wrong
B.J. Giroux
R.S. Pillar

R. Hore

Files



Memorandum

To: FILE

From: G. Pearce,
Planning & Design Section,
Central Region.

Attention:

Date: 1977-11-18

Our File Ref.

In Reply to

Subject: MINUTES OF TECHNICAL REVIEW
WORK PROJECT 22-69-01 & 03 Hwy. 5
1.90 MILES WEST OF HWY. 25
DISTRICT 4 - HAMILTON

Date: November 16, 1977 at 9:00 a.m.

Place: Conference Room 'A' Second Floor
3501 Dufferin Street

Attendees:

J. Cullen,	Planning & Design - Central Region
A. Sulavella,	" "
G. C. E. Burkhardt,	Structural Section "
R. Jeffries,	" "
J. Doi,	Cole Sherman & Associates
J. Siu,	MTC Electrical Design
L. Wedgbury,	Engineering Audit
G. Greene,	Estimating Office
D. Mullet,	Geotechnical Office
P. F. Weber,	Geotechnical Office
Doug Waller,	Area Construction Engineer
J. J. Regan,	Hamilton Area Construction
R. Jasper,	Hamilton Area Construction
G. Groen,	William L. Sears & Associate Limited
W. Lin	Structural Office
G. Albazi,	Structural Office
M. Divata,	Foundations Section
V. Korlu,	Foundations Section
G. Pearce,	Contract Review Section

Electrical

D. Waller questions the method of Grounding (3 piers versus abutments at each end) Cole Sherman to discuss with Head Office Electrical Section.

Cont'd...../2



Grading, Drainage

Remove soils profile numbers from title sheet. Soil borings to be placed on the drawings.

Sheet 5-

Indicate saw cut line and depth of cut.
Show existing C.B. and indicate that it is to be removed.
Remove property line.

Sheet 6-

Indicate size and flow of new sewers.
Section A-A to be revised to maintain the existing ditch on the south side.
Change 10" ϕ sewers to 12" ϕ
Revise note in stage III to read "One lane in each direction on both structures".
Rockline to be indicated between MH 3 and 4.
Stage II remove note "North Half"
Revise depth of sewer pipes between MH 1 & 2 start with minimum cover at MH 1
Revise sewer notation to current policy.
On completion of construction both structures will carry traffic.
Check area of sodding on the south side.

Sheet 7-

Indicate saw cut line and depth of cut.
Remove property line.
Remove all guide rail and indicate if it is 1 cable or 3 cable.

Sheet 8-

Remove sewer system MH 5 to MH6
Extend sedimentation basin to right-of-way limits
Indicate granular line on section A-A
Add to granular 'A' note "On Widening"

Sheet 10-

On legend indicate type of rip-rap (random)
Meeting to be held between Foundation Office, Structural Office, Geotechnical Office and Area Construction Office to decide the type of slope protection under the structure. Meeting will be at the job site on Thursday November 17, at 2:00 p.m.

Sheet 13-

Revise notes to read H. L. 6 padding and provide for 5½" hot mix
Add standards for - R. P. Bedding
- V. C. and AC. alternatives
- DD-717-A

Bridge Drawings WP 22-69-03Sheet 1-

Note on section no. 2 6" mass concrete to be placed within 24 hours of excavating all piers.

General Notes - After deck slab add curbs and sidewalks.

Add note to staging drawings that bridge deck waterproofing and paving must be completed before traffic permitted on the bridge.

Sheet 14-

Section no. 2 - indicate asphalt.

Sheet 12-

Clarify the pouring sequence.

WP 22-69-01

District expressed concern in the shifting of 2 lanes of traffic to the south side of the existing structure because of the poor condition of the deck. Structural Office feel that the structure is adequate as long as only two lanes of traffic are permitted.

Stream protection to be shown on grading drawings.

All existing bridge drawings to be included.

D 4

Combine items 1 & 2 to read clearing and grubbing - L. S.
Combine items 3 & 4

Item - 7 Granular 'A' - add bedding for culverts

Item - 8 Remove spec. 405

Item - 9 Remove Spec. 421B and S. P. item to read "Granular 'B'
Backfill to Bridge Abutments."

Remove the item No. 13 H. L. 2 and include the quantity in H. L. 6 item no. 14.

Item - 19 Revise quantity to 130 lf. items 20, 21, 22, 23 and 24 - Revise item descriptions to current MTC policy.

Remove items - 26, 27 and 28

Item 25 - Remove "Including Excavation"

Item 29 - Check the number of anchor blocks

Item 32 - To be split into two items guide rail with and without channel.

Items 33 and 34 - Geotechnical Office to check on the necessity of filter fabric.

Combine items 40 and 41 into one item

Item 54 - add SP. material to be supplied by contractor.

Remove Item 55

Item 58 to be split into two items earth and rock excavation for bridge foundations.

Item 59 Remove S. P.

Change Item 61 to Read "Driving Shoes" quantity revised to 49.

Change Item 62 to read "Placing Steel 'H' Piles add S. P. and revise quantity to 1671.

Combine items 65 and 66 into one item.

Item 76 quantity of rip rap to be revised.

Materials Supplied by MTC.

Add asphalt cement and trap rock.

Sundry

Zone printing - \$1500.00

Permanent Signs - \$500.00

Seeding and mulching - Unit price \$700.00

Total - \$1400.00

Force Account and Contingencies

Add - Structure repair from damage during construction lump sum \$20,000.00

Clean out sedimentation basin lump sum \$3,500.00

Utilities and Work by others

Relocation of Gas Main - No cost to MTC

List of Standard Special Provisions

Remove the following specials

109, 110, 123, 151, 154, 184, 190, 193, 194

197, 601, 900, 901, 904, 915

Proposed Special Provisions (DB-RD-90)

Item No. 2 Earth Excavation (Grading)

Subtitle - Siltation Basin

1977-11-18

Add - No further payment will be made for the filling of the siltation basin upon completion of construction.

Cleaning of the siltation basin during construction will be by force account.

Item No. 38 - Removal of structure

No. (1) Part (e) specify the method of removal

Area Construction Office to check with maintenance to see if salvage of the handrail and post is necessary.

Include the special provision used in contract 76-60 re: Debris Falling into the River during construction.

Working Days - 140 - Estimating Office Requests an early spring award.

Engineering - \$172,000.00

Area Construction Office (Hamilton)

Contract Size Books - 30

Large Size Drawings - 6

Region Requires - 10 sets contract size



GP:mk

G. Pearce,
Contract Review Officer.

cc's

All attendees

J. E. Callaghan



FEB 28 1975

Memorandum

To: G. C. E. Burkhardt (2)
Regional Str. Plan. Eng.
Central Region
3501 Dufferin Street
Downsview, Ontario

Attention:

Our File Ref. W.P. 22-69-03

From: Soil Mechanics Section
Geotechnical Office
West Building, Downsview

Date: February 26, 1975

In Reply to

Subject:

FOUNDATION INVESTIGATION REPORT
for

Proposed New W.B.L. Structure
over Bronte Creek
Town of Burlington, District No.4 (Hamilton)
Hwy. No.5, W.P. 22-69-03, Site 10-111

Cont. 78-031

30M5-99

GEOCREC No.

Attached we are forwarding to you our detailed foundation investigation report on the subsoil conditions existing at the above mentioned site.

We believe that the factual data and recommendations contained therein will prove adequate for your design requirements. Should additional information be required, please do not hesitate to contact our Office.

M. DEVATA
Supervising Engineer.

c.c. E. J. Orr
B. R. Davis
R. S. Pillar
C. R. Robertson
B. J. Giroux
D. Gunter
G. A. Wrong
P. Lewycky

Files ✓
Record Services

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FOUNDATION INVESTIGATION REPORT

for

Proposed New W.B.L. Structure over Bronte Creek
Town of Burlington, District No.4 (Hamilton)
Hwy. No.5, W.P. 22-69-03, Site 10-111

1. INTRODUCTION

The Soil Mechanics Section was requested to carry out a subsurface investigation for the proposed W.B.L. structure adjacent to and on the north side of the existing Hwy. No.5 structure over Bronte Creek known as Tansley Bridge. The request was contained in a memo from the Central Region, Structural Planning Office (Mr. G. C. E. Burkhardt, Regional Structural Planning Engineer) dated November 25, 1974.

A field investigation was subsequently carried out by the Soil Mechanics Section of the Geotechnical Office to determine the subsoil, bedrock and groundwater conditions at the site. This report contains the results of this investigation as well as recommendations pertaining to the design of the proposed structure foundations, and related stability of the approach embankments.

2. DESCRIPTION OF THE SITE AND GEOLOGY

The site is located approximately 2 miles west of Palermo (Hwy. No.5 and Hwy. No.25 junction).

The physiography of the area is referred to as "South Slope". Bronte Creek is one of the many creeks that drains "Peel Plain" into Lake Ontario. At the bridge site Bronte Creek cuts a 100 ft. deep and 700 ft. wide ravine. The valley walls show in places exposed shale sections. The east valley wall under the existing structure has been eroded (cuts up to 5 ft.). It appears that the main reason for this erosion may be attributed to a blocked manhole outlet situated at the south east corner of the existing structure. The bedrock is referred to as Queenstone shale of Palaeozoic glacial age and the lower few feet of the formation contain greenish and reddish limestone and sandy layers. The Queenstone shale rapidly breaks down on exposure

to the atmosphere and forms a fine reddish clay soil. Shale samples of the area show uniform successions of red shale with frequent green moltings.

Existing Structure

The existing 2-lane or 44 ft. wide structure is 700 ft. long and consists of four spans (150' - 200' - 200' - 150'). The structure consists of a structural steel superstructure with reinforced concrete piers and abutments. With the exception of weathered sections of the bridge deck, the structure appears to be in satisfactory condition. Renovations to the bridge deck were being carried out by District Maintenance Crews during the course of the field investigation.

On the south side of the existing structure can be seen the remains of concrete piers and abutments of an old one-lane structure.

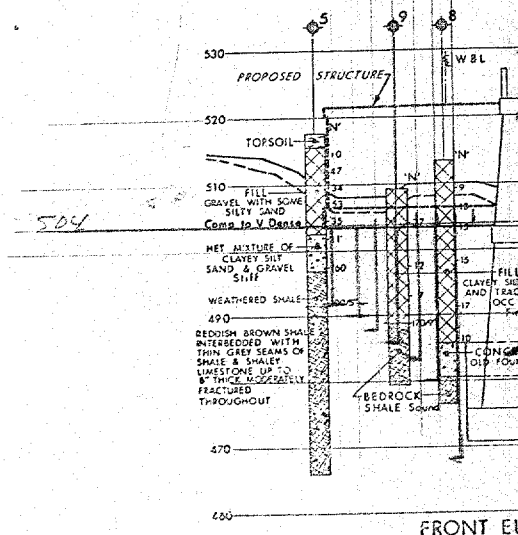
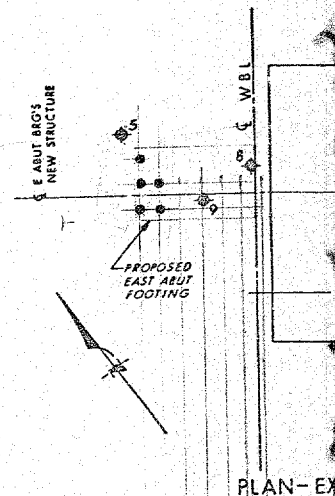
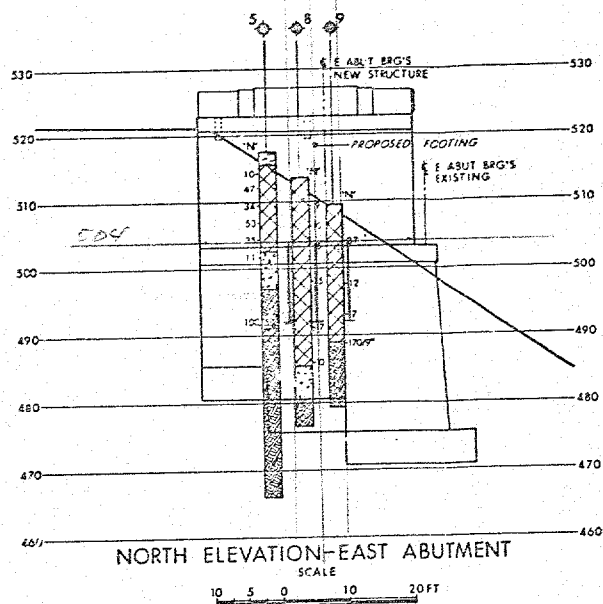
In the vicinity of the existing structure the water level in the creek, at the time of our field investigation, was at elev. 401 ft. Water marks on the piers as well as on the creek banks indicate that at the peak flow, the water level rises an additional 5 ft. (to an elev. 406 ft.).

3. FIELD AND LABORATORY INVESTIGATION

Seven sampled boreholes were put down during the course of the field investigation. The borings were advanced by means of a C.M.E.-36 or C.M.E.-55 auger drilling machine (Muskeg Vehicle Mounted) adapted for soil sampling purposes.

Samples were recovered at required depths by a 2-inch O.D. split-spoon sampler, which was hammered into the soil in accordance with the specifications for the Standard Penetration Test. Bedrock was proven at all seven borehole locations by obtaining BXL size rock core samples.

The groundwater level conditions across the site were determined by recording the water level in the open boreholes during the course of the investigation.



CONT No
WP No 22-69-03



TANSLEY BRIDGE over BRONTE CR
NEW W.B. BRIDGE
BORE HOLE LOCATIONS & SOIL STRATA

SHEET

SEE DWG 226903-A

KEY PLAN

LEGEND

- ◆ Bore Hole
- ⊕ Dynamic Cone Penetration Test (Cone)
- ⊕ Bore Hole & Cone
- W' Blow/ft (Std Pen Test 350ft lbs energy)
- CONE Blow/ft (60° Cone, 350ft lbs energy)
- W/L at time of investigation
- NO Water in Bore Hole @ E & S
- W/L Not Established in BH'S

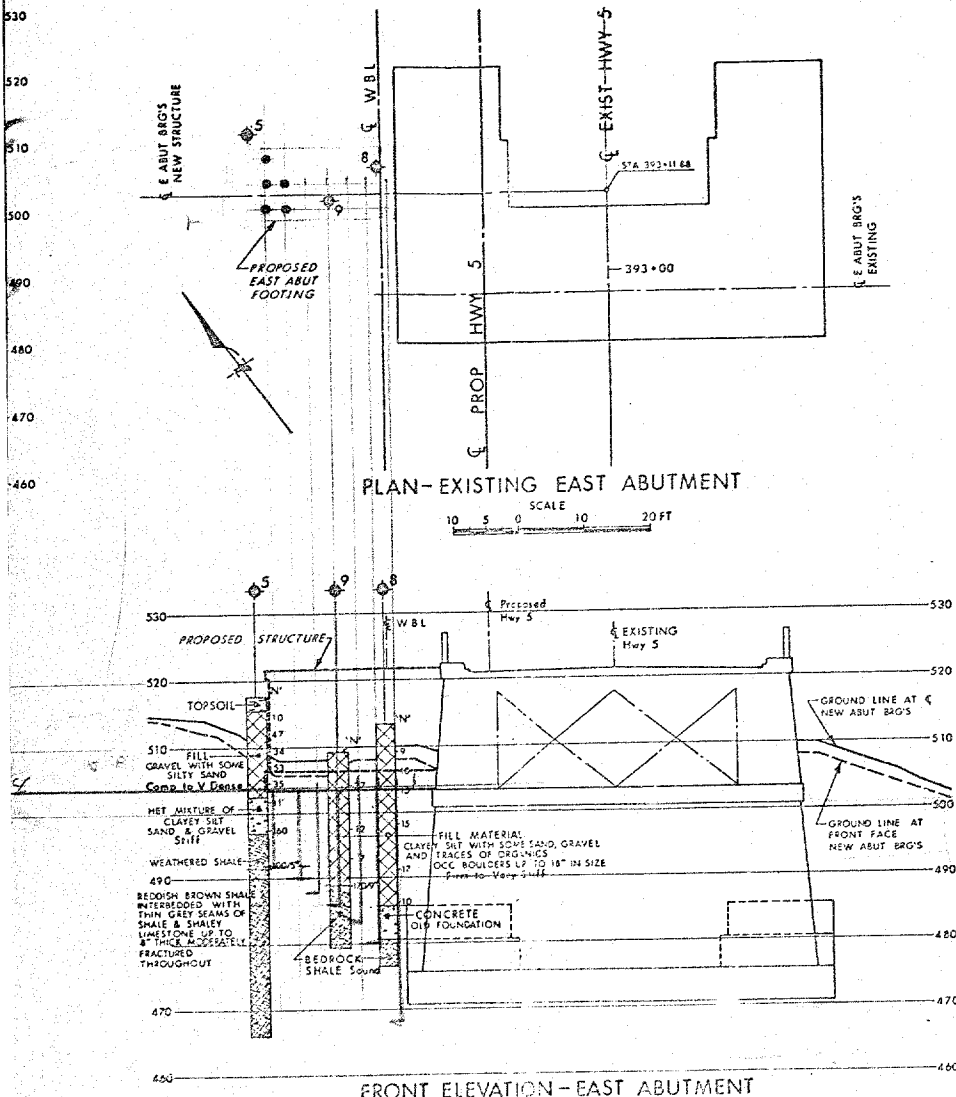
No	ELEVATION	STATION	OFFSET E HWY 5
5	517.5	393+21	54' LT
8	513.5	393+16	35' LT
9	509.4	393+11	42' LT

-NOTE-

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.



DATE	5
BY	6
CHECKED	
APPROVED	
DATE	June 22, 1977
PROJECT	226903-B



The locations and elevations of all the boreholes are shown on Drawing No.296903-A. Estimated stratigraphical sections are also presented on respective drawings. The surveying was carried out by personnel from Central Region Engineering Surveys Section. All elevations given in the report are referenced to a geodetic datum. All samples were subjected to a careful visual examination in the field and subsequently in the laboratory. Following this inspection, laboratory tests were carried out on selected representative samples to determine the physical properties of the subsoil, namely:

Natural Moisture Contents
Atterberg Limits
Grain Size Distributions
Organic Contents

The results of the above laboratory tests are plotted on the "Record of Borehole" sheets which are included in the Appendix of this report.

4. SUBSOIL AND BEDROCK CONDITIONS

(4.1) General

The valley floor is surficially covered by a layer of heterogeneous mixture of clayey silt, sand and gravel. At some places this layer contains traces of organics at the surface. In B.H. 5, which is located at about road elevation, north of the east abutment, the upper 15 ft. of the material is fill and consists of gravel with some silty sand, followed by about 10 ft. of cohesive material. Underlying the overburden across the area is shale bedrock.

The boundaries of the various deposits, as determined in the boreholes, are shown on the individual Record of Borehole Sheets. The stratigraphical sections, shown on Drawing No. W.P. 22-69-03 have been inferred from this data. From groundsurface downward, the various soil and bedrock types encountered are described in the subsections below.

(4.2) Granular Fill: Gravel and some Silty Sand (B.H. 5)

The granular fill which is about 15 ft. was intersected in B.H. 5 immediately below the thin layer of topsoil. The fill material consists of gravel with some silty sand. This material is the backfill used in connection with the construction of the existing metal culvert outlet which exists in the vicinity of the B.H. 5. The "N" value range in this granular deposit was found to be 34 to 53 blows per foot. Based on these results, it is estimated that the relative density of the granular deposit varies from dense to very dense. Grain size distribution results are shown on the Record of Borehole Sheets and are plotted on Fig. No. 1.

(4.3) Heterogeneous Mixture of Clayey Silt, Sand and Gravel

In all 7 boreholes, immediately below the ground level (in B.H. 5 below the granular fill), the material consists of a heterogeneous mixture of clayey silt, sand and gravel or shale fragments. The thickness of this material varies from 2.5 ft. in B.H. 7 to 15 ft. in B.H. 3. Grain size distribution tests were carried out on several samples of this stratum and the results are shown on the Record of Borehole Sheets and are plotted in Fig. No. 2.

The engineering properties of the deposit, as determined by field and laboratory tests, are presented below:

	<u>Range</u>	<u>Average</u>
Liquid limit (W_L) %	23 - 40	32
Plastic limit (W_p) %	17 - 23	20
Natural Moisture Content (W) %	5 - 15	10
"N" value - blows per foot	6 to over 100 blows/ft.	
Organic content	0.1% to 0.8%	

The Atterberg limit test results, given in the table above, are also summarized on the Plasticity Chart, Fig. No. 3. The testing indicates that the matrix of the soil is essentially inorganic

with a low to medium plasticity range. The "N" values ranged from 6 to over 100 blows per foot. The cohesive material has a consistency generally ranging from stiff to hard, with the exception of B.H. 4, where it ranges from firm to very stiff.

(4.4) Shale Bedrock

The overburden is underlain by shale bedrock. The bedrock was proven in all boreholes by augering into the upper weathered portion and by obtaining BXL cores in the sound portion. It was possible to auger into the weathered shale bedrock for a distance of 2 to 20 ft. and to obtain samples by means of a split spoon hammered into it. In the sound portion, the bedrock was cored for a distance of 10.0 to 34.3 ft. The rock coring extended to a level of about 10 ft. below the base of the respective footing.

In the valley floor (Boreholes 3, 4 & 6), close to Bronte Creek, the bedrock surface ranges from elevation 400 ft. to elevation 397.3 ft. The upper 2.0 to 7.5 ft. of the rock is weathered. However, on the west bank, the existing ground gradually rises from elevation 448 ft. to elevation 501 ft., with a bench or level surface in the vicinity of Pier No. 1 (average ground elevation 458 ft.). On this bank, the bedrock surface rises from elevation 442 ft. to elevation 490 ft., of which the upper 12 to 20 ft. is extensively weathered. The east bank of the valley, in the vicinity of the structure, has an average slope of $1\frac{1}{2}$ horizontal to 1 vertical. The bedrock in Borehole 5 near the top of the east bank is at elevation 497.5 ft., and the upper 6 ft. is weathered.

The rock core samples below the weathered zone were examined by the Geologist (Mr. B. K. Glassford. Ministry of Transportation and Communications) whose complete report, containing a detailed description of the shale bedrock as intersected in each borehole, is attached at the end of this report in the Appendix.

It is inferred that the bedrock is reddish brown, fine textured shale. It is interbedded with thin grey shale seams and

and grey shaly limestone seams up to 8" in thickness. The shale is moderately fractured throughout. The bedrock is identified as Queenstone shale of Palaeozoic period. This shale is known to rapidly break down on exposure to the atmosphere and becomes a fine reddish clay soil. For this reason, it is difficult to establish the exact boundary of transition between the overburden and the weathered shale with an accuracy greater than ± 1 ft.

5. GROUNDWATER CONDITIONS

Groundwater level observations were carried out during the course of the field investigations by recording the water level in the open boreholes. The observations are recorded on the Record of Borehole Sheets and summarized on Drawing No. 226903-A.

The groundwater level in general follows the natural ground surface and has a hydraulic gradient towards the Creek. The water level in the Creek at the time of investigation was at elevation 401.0 ft.

6. DISCUSSION AND RECOMMENDATIONS

(6.1) General

It is proposed to extend the existing Tansley Bridge over Bronte Creek on the north side to carry the west-bound lane of Hwy. 5. The present 4-span (150' - 200' - 200' - 150') steel truss bridge will have its deck replaced and will carry the east-bound traffic of Hwy. 5. The existing structure is supported on spread footings (each footing is supported on twin footings) founded within the shale bedrock, at the following elevations (Refer Drawing No. D1337-22-14 dated November 20, 1947):

West abutment	467.00 ft.
West pier	440.75 ft.
Centre pier	384.75 ft.
East pier	385.75 ft.
East abutment	470.5 ft.

The valley floor is covered by a deposit of heterogeneous mixture of clayey silt, sand and gravel. North of the east abutment, the upper 15 ft. consists of fill material containing gravel with some silty sand, followed by about 10 ft. of cohesive material. The overburden is underlain by shale bedrock.

Our recommendations pertaining to the structure foundations and other related considerations are contained in the following paragraphs.

(6.2) Structure Foundations

As mentioned earlier, the existing structure is supported on spread footings founded within the shale bedrock. Because it is proposed to extend the existing piers and abutments to carry the new west bound lane structure, most probably the new footings will be founded at the same elevations as the existing footings. However, at the time of writing of this report, it is not known if the extension will be independent or an integral part of the existing structure. The upper portion of the shale bedrock is weathered and relatively soft, as indicated by the fact that it was possible to auger into the weathered rock. At some places the augering into bedrock extended to a depth of 20 ft. below the elevation where rock was encountered.

The following table shows the elevations of the existing footings, and the elevations where weathered bedrock and that portion of bedrock which is not affected by weathering, was encountered in various boreholes put down for the extension of the existing footings:

	Existing Footing Elev.	Related Borehole No. for the Footing Ext.	Elev. Weathered Bedrock Encount'd	Elev. Bedrock unaffected by Weathering Encountered	Elev. Footing for Ext. may be placed at or below
West abutment	467.00	1	479.0	467.2	467.2
West pier	440.75	2	440.5	470.5	441.8
		7	445.5	441.8	
Centre pier	384.75	3	400.0	397.8	390.0
		6	397.5	390.0	
East pier	385.75	4	399.5	397.0	397.0
East abutment	470.5	5	497.0	481.6	481.6

The above table indicates that the footings for the existing structure are founded well within that portion of shale bedrock which is unaffected by weathering. The bridge has performed satisfactorily for the last 26 years. Therefore, it is recommended that the proposed extension be supported on spread footings founded within that portion of bedrock which is unaffected by weathering at or below the elevations given in the last column of the above table. An allowable bearing capacity of 10 tons/sq. ft. may be used for design purposes.

The above table shows that at the east abutment, east pier and the centre pier locations, it is possible to found the footing for the extension at a higher elevation than the respective existing footings. If it is decided to found the extensions at elevations higher than the existing footings, then this would impose additional pressures on the north portions of the existing footings. This may result in some small vertical movements of the northern portion of the existing structure. Moreover, in this case, the existing footings and the new extensions will behave independently. Because their founding elevations are different, this may cause some differential movements between the old and new portions, which will depend upon the differences in rock characteristics at these elevations.

However, if it is decided to incorporate the extension as an integral part of the existing structure, the new extensions can be

founded at the same elevation as the present footings. In this case, the problem of relative movements mentioned in the preceeding paragraph will be minimized.

Where the new footings are founded at the same elevation as the old ones, it will be necessary to excavate adjacent to it through the overburden and bedrock to the full depth. This will remove the lateral support on the north side of the existing footings, and may cause slight lateral yielding of the old footings. It is recommended that great care should be exercised to ensure that the existing footings are not disturbed in any manner. The excavation should not extend below the bottom of the present footings under any circumstances, since this can cause damage to, and movements of, the foundations.

As already mentioned, Queenston shale rapidly disintegrates and softens when exposed to the atmosphere. Therefore, in order to protect and keep intact the shale bedrock under the present footings, and the proposed footings, it will be necessary to pour a lean concrete working slab immediately after the excavation is completed.

The bedrock is layered, weathered and/or fractured, and if the excavation extends below the ground or creek water level, infiltration of water into the excavation will take place. A dewatering scheme consisting of pumping from sumps will be necessary to pour concrete in the dry. Moreover, the excavation for the centre pier extends to the creek bed. At this location, it will be necessary to divert the creek by means of a coffer dam.

No stability problems are anticipated if the present slopes in the vicinity of the structure are maintained.

7. MISCELLANEOUS

The field work was carried out during January 10 to January 28, 1975 under the supervision of Mr. V. Korlu, Project Engineer, who also prepared this report.

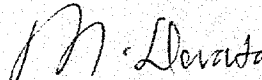
Mr. C. McKercher, Engineering Student, also assisted in the field investigations.

The field equipment was owned and operated by Atcost Drilling Co. of Toronto.

This project was carried out under the general supervision of Mr. M. Devata, Supervising Engineer, who also reviewed this report.


V. KORLU
Project Engineer.




M. DEVATA
Supervising Engineer.

February 26, 1975

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 1

W.P. 22-69-03

LOCATION Sta. 386+95 02 79' Lt. of C

ORIGINATED BY VK

DIST. 4 HWY. 5

BORING DATE January 21, 1975

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE Auger & sample with CME 36 machine

CHECKED BY H.T.

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w		UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	N' VALUES		20	40	60	80	100	w_p	w		
483.0	Ground Level														
0.0	Het. mix. of clayey sil sand, gravel. Hard		1	SS	40	480									GR SA SI CL
479.0			2	SS	100	475"									
4.0	Weathered Shale		3	SS	127	473"									
467.2						470									
15.8	Reddish brown shale interbedded with thin grey seams of shale & shaley limestone up to 8" thick. Moderately fractured throughout.		4	BXL	100%	465									
457.2			5	BXL	100%										
25.8	End of Borehole					450									

RECORD OF BOREHOLE NO 2

W.P. 22-69-03

LOCATION Sta. 387 + 37 90' Lt. of C

ORIGINATED BY VK

DIST. 4 HWY. 5

BORING DATE January 23, 1975

COMPILED BY CMCK

DATUM Geodetic

BOREHOLE TYPE Auger and Sample with CME 36 Machine

CHECKED BY H.S.

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W			UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	50	80	100	W_P	W	W_L		
501.0	Ground Level															
0.0	Ret. mix. of clayey silt, sand & gravel.		1	SS	42	500										0 6 55 39
			2	SS	110											
	Hard															
490.5			3	SS	116/114"											
10.5			4	SS	120/4"											
	Weathered Shale		5	SS	157/7"	480										
			6	SS	107/3"											
470.5																
30.5	Reddish brown shale interbedded with thin grey seams of shale & shaley limestone up to 8" thick. Moderately fractured throughout.		7	BXL	Rec. 100%	470										
			8	BXL	100%											
			9	BXL	100%	460										
			10	BXL	100%											
			11	BXL	100%	450										
			12	BXL	100%											
437.5			13	BXL	100%	440										
63.5	End of Borehole															
						430										

RECORD OF BOREHOLE NO 3

W.P. 22-69-03

LOCATION Sta. 389 + ²⁷~~31~~ 55' Lt. of ~~Q~~

ORIGINATED BY VK

DIST. 4 HWY. 5

BORING DATE January 13, 1975

COMPILED BY CMC

DATUM Geodetic

BOREHOLE TYPE Auger & Sample with CME 36 Machine

CHECKED BY *W.D.*

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	N' VALUES		20	40	60	80	100	w_p	w	w_L		
415.0	Ground Level															GR SA SI CL
0.0	Met. mix. of clayey silt, sand & gravel trace of organics.		1	SS	11	410										13 27 44 16
	Stiff to Hard		2	SS	15											
			3	SS	41											4 14 68 14
400.0			4	SS	150/7 1/2"											
19.0 397.8	Weathered Shale															
17.2	Reddish brown shale interbedded with thin grey seams of shale & shaley limestone up to 8" thick. Moderately fractured throughout.		5	BXL	Rec. 94%	390										
			6	BXL	97%											
			7	BXL	87.5%											
			8	BXL	100%	380										
			9	BXL	94%											
			10	BXL	100%	370										
			11	BXL	100%											
359.0			12	BXL	100%	360										
56.0	End of Borehole					350										

OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE NO 4

W.P. 22-69-03 LOCATION Sta. 391+32 54' Lt. of E
DIST. 4 HWY. 5 BORING DATE January 10, 1975 ORIGINATED BY VK
DATUM Geodetic BOREHOLE TYPE Auger and sample with CME 36 Machine COMPILED BY CMcK
CHECKED BY H.T.

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w w_p — w — w_L WATER CONTENT % 10 20 30	UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	N' VALUES		20	40	60	80	100			
412.0	Ground Level													
0.0	Het. mix. of clayey silt, sand & gravel, trace of organics. Firm to Very Stiff.		1	SS	20	410								8 30 42 20
			2	SS	18									0 31 50 19
			3	SS	6									
399.5			4	SS	34	400								
12.5 397.0	Weathered Shale		5	SS	100	390								
15.0	Reddish brown shale interbedded with thin grey seams of shale & shaley limestone up to 8" thick. Moderately fractured throughout.		6	BXL	Rec. 90%									
			7	BXL	Rec. 100%									
			8	BXL	100%									
376.8			9	BXL	100%	380								
35.2	End of Borehole													

RECORD OF BOREHOLE NO 5

W.P. 22-69-03

LOCATION Sta. 393+25 54' Lt. of E

ORIGINATED BY VK

DIST. 4 HWY. 5

BORING DATE January 16, 1975

COMPILED BY CMcK

DATUM Geodetic

BOREHOLE TYPE Auger and sample with CME 55 machine

CHECKED BY W. S.

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W			UNIT WEIGHT γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	VALUES		20	40	60	80	100	W_P	W	W_L		
517.5	Ground Level															
0.0	Topsoil															
2.0	gravel with some silt sand - Fill		1	SS	10											
			2	SS	47											
	Compact to Very Dense		3	SS	34	510										63 23 9 5
			4	SS	53											53 16 24 7
502.5			5	SS	35											
15.0	Het. mix. clayey silt, sand & gravel.		6	SS	11	500										15 49 27 9
497.0	Stiff		7	SS	160											
20.5	Weathered Shale															
491.6			8	SS	100/5"	490										
25.9	Reddish brown shale interbedded with thin grey seams of shale & shaley limestone up to 8" thick. Moderately fractured throughout.		9	BXL	Rec. 97%											
			10	BXL	100%	480										
			11	BXL	100%											
			12	BXL	100%											
466.0			13	BXL	100%	470										
51.5	End of Borehole					460										

W.P.	22-69-03	LOCATION	Sta. 389 + 85 55' Lt. of E	ORIGINATED BY	VK
DIST.	4 HWY. 5	BORING DATE	January 16, 1975	COMPILED BY	CMCK
DATUM	Geodetic	BOREHOLE TYPE	Auger & sample with CME 36 machine	CHECKED BY	MS

15 ϕ 5 % STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 7

W.P. 22-69-03 LOCATION Sta. 387 + ⁷⁴~~80~~ 13' Lt. of ~~6~~
DIST. 4 HWY. 5 BORING DATE January 28, 1975 ORIGINATED BY VK
DATUM Geodetic BOREHOLE TYPE Auger and sample with CME 36 Machine COMPILED BY CMK
CHECKED BY W. J.

SOIL PROFILE			SAMPLES			GROUND WATER ELEV.	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT γ	REMARKS % GR SA. SI. CL
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	N' VALUES		20	40	60	80	100	w_p	w	w_L		
448.0	Ground Level															
0.0	Het. mix. clayey silt, sand & gravel															
445.5			1	SS	100%											
2.5	Weathered Shale		2	SS	100%											
441.8			3	BXL	88% 94%	440										
6.2	Reddish brown shale interbedded with thin grey seams of shale & shaley limestone up to 8" thick. Moderately fractured throughout.		4	BXL	100%											
			5	BXL	100%											
427.8			6	BXL	100%	430										
20.2	End of Borehole					420										

GRAIN SIZE DISTRIBUTION

UNIFIED SOIL CLASSIFICATION SYSTEM

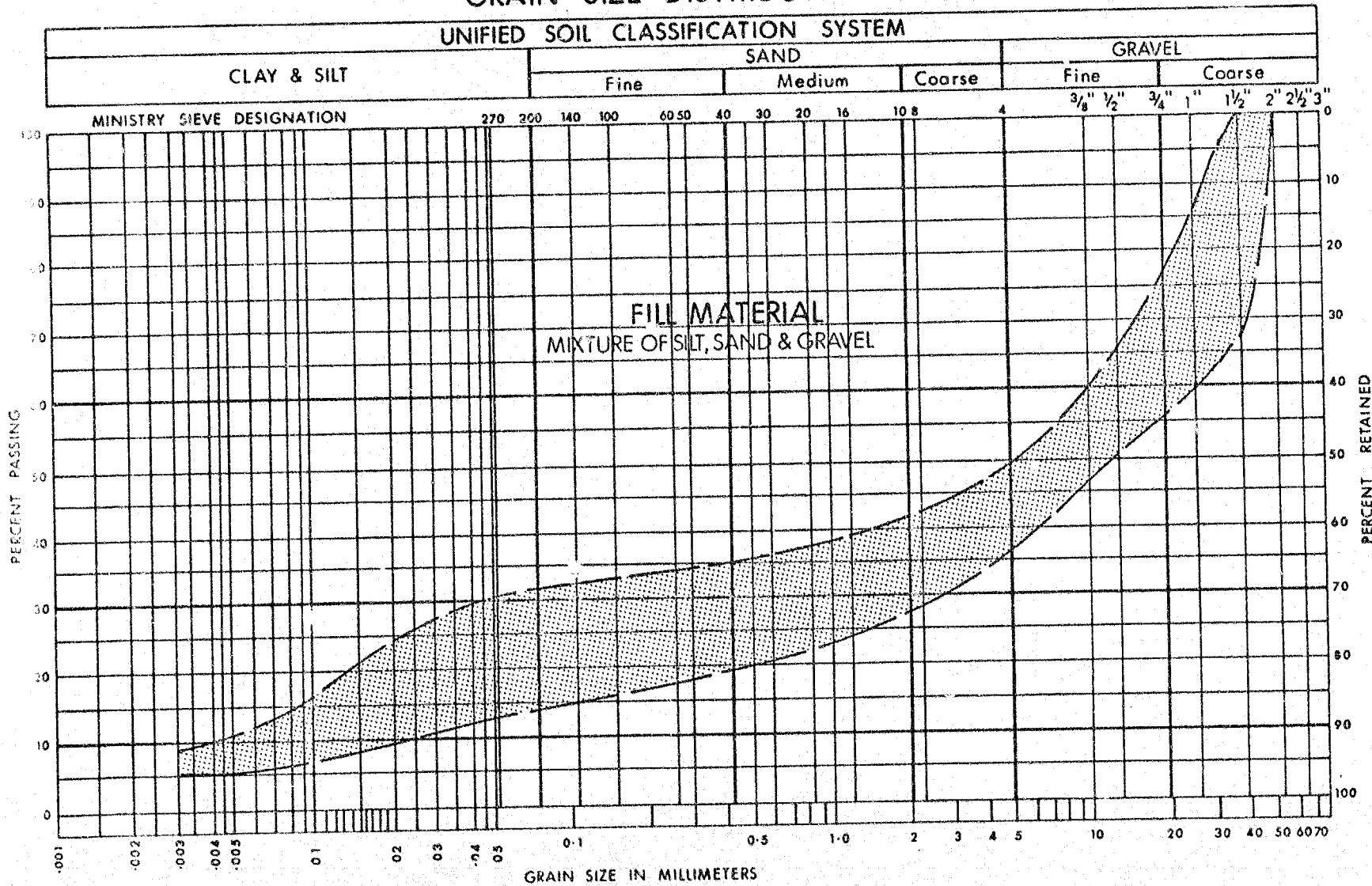


FIG. 1

GRAIN SIZE DISTRIBUTION

UNIFIED SOIL CLASSIFICATION SYSTEM

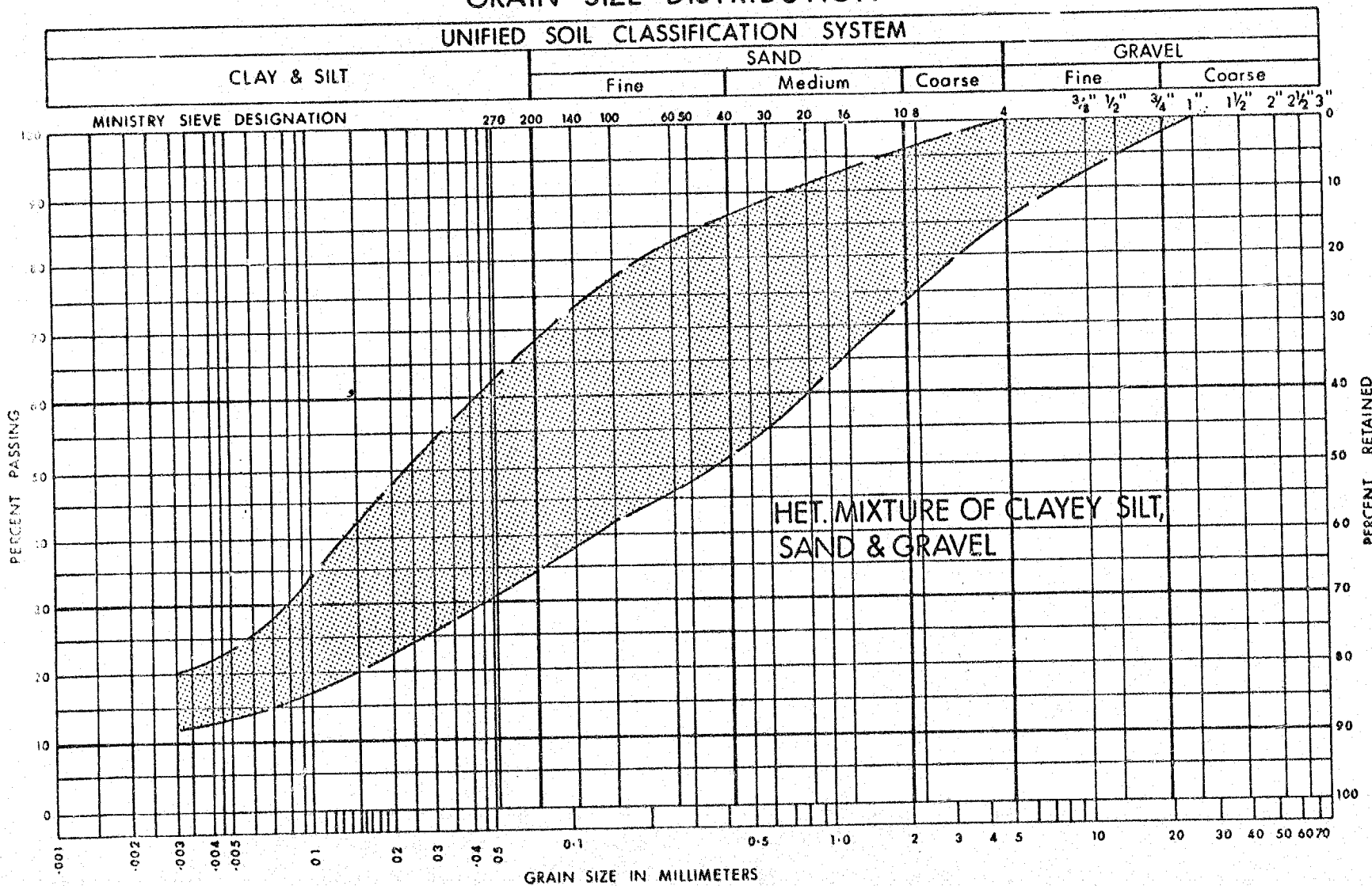


FIG. 2

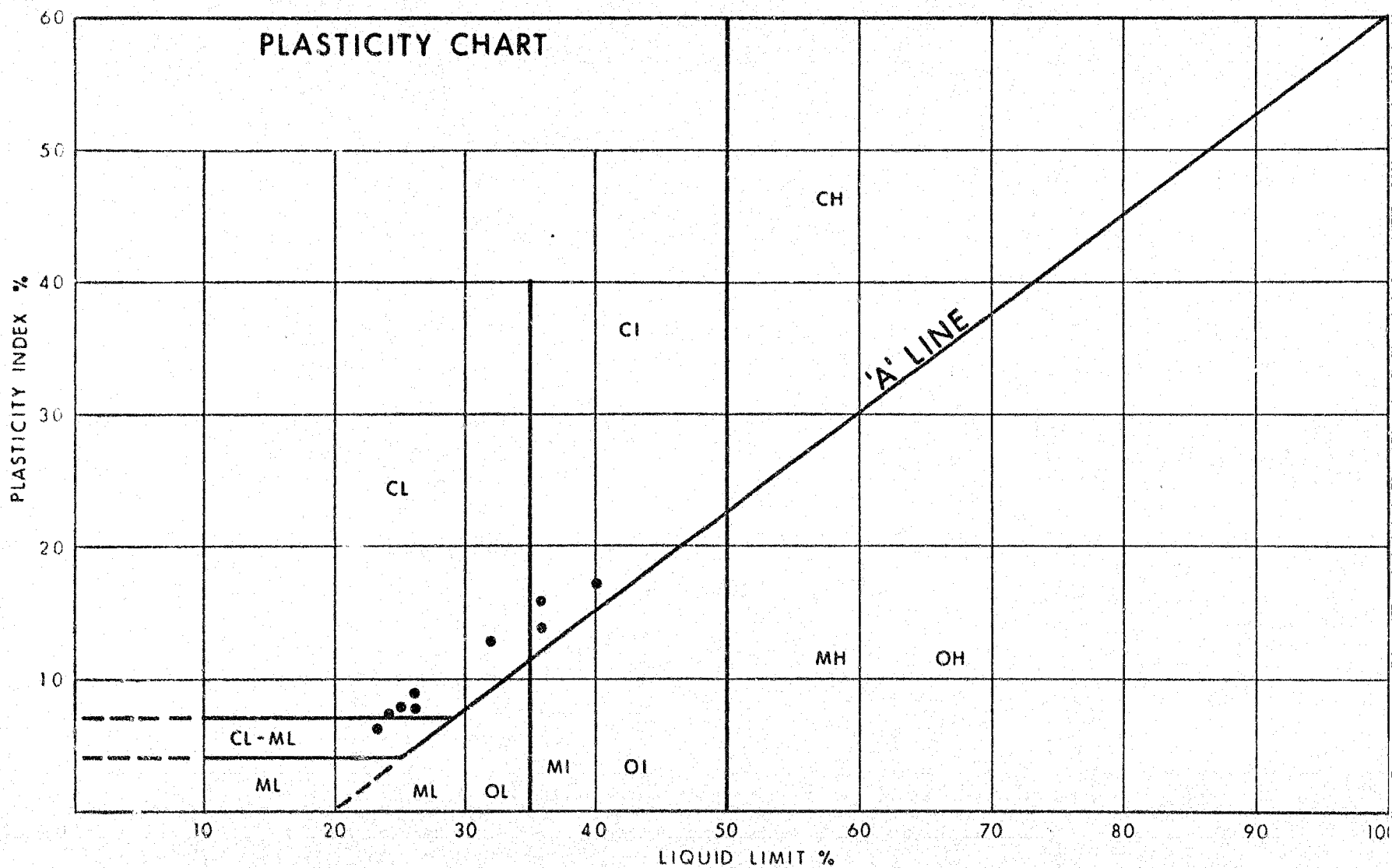


FIG. 3

ABBREVIATIONS & SYMBOLS USED IN THIS REPORTPENETRATION RESISTANCE

'N' STANDARD PENETRATION RESISTANCE : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL. THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS :-

<u>CONSISTENCY</u>	<u>c LB./SQ.FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 250	VERY LOOSE	0 - 4
SOFT	250 - 500	LOOSE	4 - 10
FIRM	500 - 1000	COMPACT	10 - 30
STIFF	1000 - 2000	DENSE	30 - 50
VERY STIFF	2000 - 4000	VERY DENSE	> 50
HARD	> 4000		

TERMS TO BE USED IN DESCRIBING SOILS:-

TRACE < 10% , SOME 10-25% , WITH 25-40% , > 40% SILTY, SANDY, GRAVELLY, CLAYEY ETC.

TYPE OF SAMPLE

S.S. SPLIT SPOON	T.W. THINWALL OPEN
W.S. WASHED SAMPLE	T.P. THINWALL PISTON
S.T. SLOTTED TUBE SAMPLE	O.S. OESTERBERG SAMPLE
A.S. AUGER SAMPLE	F.S. FOIL SAMPLE
C.S. CHUNK SAMPLE	R.C. ROCK CORE

P.H. SAMPLE ADVANCED HYDRAULICALLY

P.M. SAMPLE ADVANCED MANUALLY

SOIL TESTS

U UNCONFINED COMPRESSION	L.V. LABORATORY VANE
UU UNCONSOLIDATED UNDRAINED TRIAXIAL	F.V. FIELD VANE
CU CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL	C CONSOLIDATION
CID " " DRAINED "	S SENSITIVITY
CAU " ANISOTROPIC UNDRAINED "	
CAD " " DRAINED "	

ABBREVIATIONS & SYMBOLS USED IN THIS REPORTSOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_p	PLASTIC LIMIT
I_p	PLASTICITY INDEX
w_s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX $= \frac{w - w_p}{I_p}$
I_c	CONSISTENCY INDEX $= \frac{w_L - w}{I_p}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX $= \frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE $= \frac{-\Delta e}{(1+e)\Delta\sigma}$
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX $= \frac{\Delta e}{\Delta \log_{10} \sigma}$
T_v	TIME FACTOR $= \frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_r	SENSITIVITY

$$\left. \begin{array}{l} \text{IN TERMS OF} \\ \text{EFFECTIVE STRESS} \end{array} \right\} \tau_f = c' + \sigma' \tan \phi'$$

$$\left. \begin{array}{l} \text{IN TERMS OF} \\ \text{TOTAL STRESS} \end{array} \right\} \tau_f = c_u + \sigma \tan \phi$$

GENERAL

π	$= 3.1416$
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
$\bar{\sigma}$	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

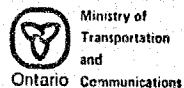
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



HOLE NO. 2 SHEET NO. 1

다

PROPERTY _____ W. P. 22-69-03 _____
LOCATION _____
_____ Bronte Creek Structure, _____
_____ Hwy. 5 _____
LATITUDE _____
DEPARTURE _____
BEARING _____

90°

TOTAL FOOTAGE 63'0"

ELEV. COLLAR

DATU²A

DATE STARTED

DATE COMPLETED

DRILLED BY

LOGGED BY

[illegible]

DATE OF EXAMINATION February, 1975

B. K. Glassford

08-MT-113



Ministry of
Transportation
and
Communications

DIAMOND DRILL RECORD

HOLE NO. 1, 3, 4, 5 SHEET NO. 2

PROPERTY W.P. 22-69-03
LOCATION Bronte Creek Structure
Hwy. #5
LATITUDE _____
DEPARTURE _____
BEARING _____

DIP
90°

TOTAL FOOTAGE _____

ELEV. COLLAR _____
DATUM _____
DATE STARTED _____
DATE COMPLETED _____
DRILLED BY _____
LOGGED BY _____

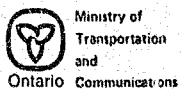
	FOOTAGE		FORMATION	SAMPLE NUMBER			REMARKS
	FROM	TO					
433.0	15'8"	25'8"	HOLE #1				grey shaly limestone seams
			Same description as #2 hole				at - 18'0" for 4"
							21'0" for 4"
415.0	17'2"	56'0"	HOLE #3				grey shaly limestone seams at -
			Same description as #2 hole				33'6" for 7"
							46'0" for 12"
412.0	15'0"	35'2"	HOLE #4				grey shaly limestone seams at -
			Same description as #2 hole				27'0" for 5"
							30'4" for 4"
517.5	25'11"	51'0"	HOLE #5				grey shaly limestone seams at -
			Same description as #2 hole				35'10" for 1'8"
							39'0" for 8"
							44'0" for 6"
							46'4" for 4"

DATE OF EXAMINATION February, 1975

B.K. Glassford

OB-MT-113

3.3



HOLE NO. 6, 7 SHEET NO. 3

300

TOTAL FOOTAGE _____

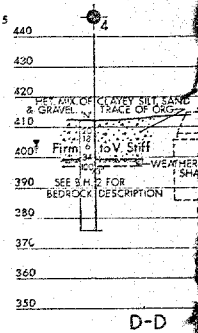
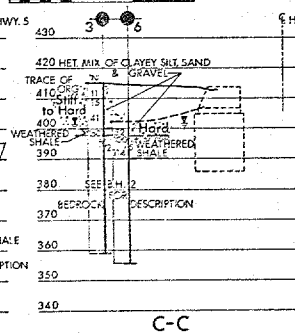
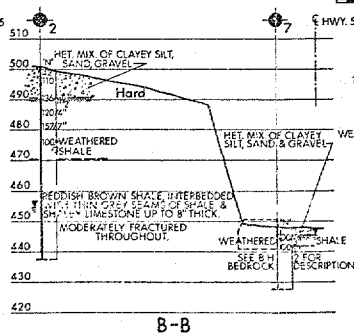
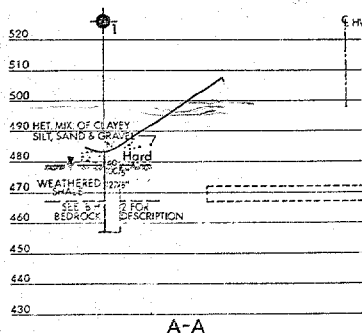
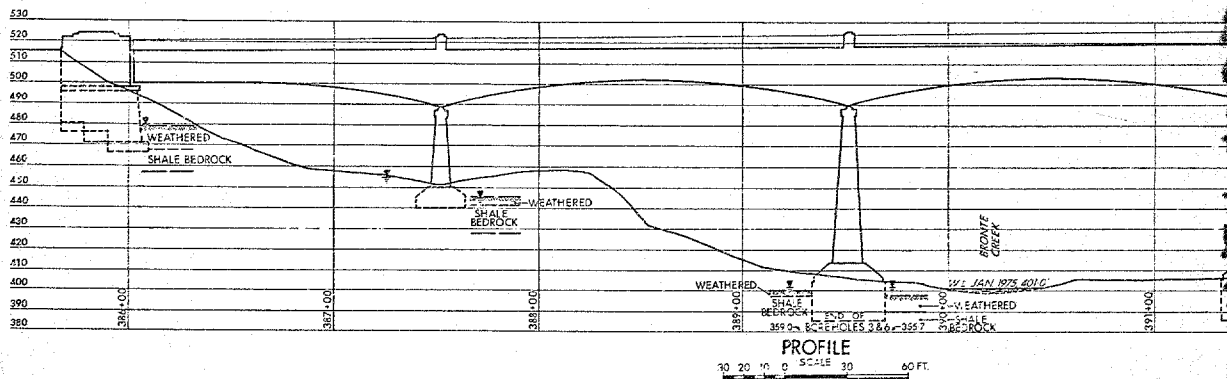
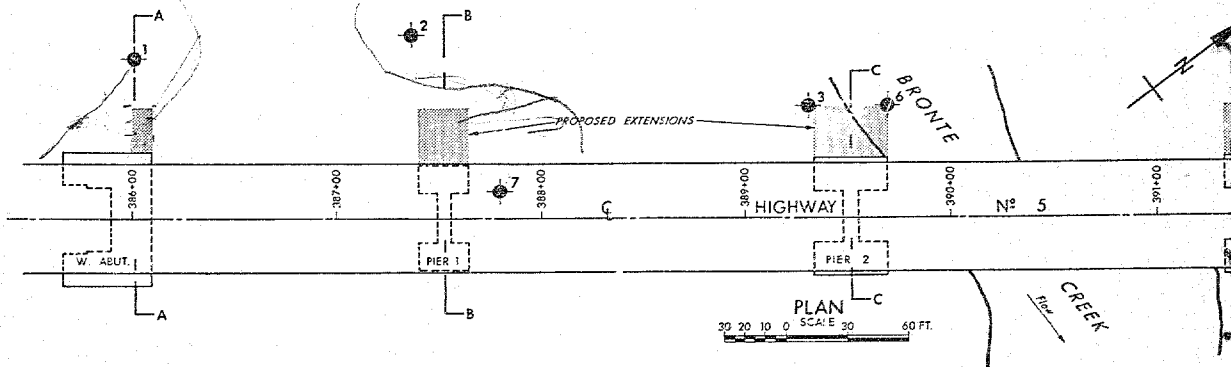
ELEV. COLLAR _____
 DATUM _____
 DATE STARTED _____
 DATE COMPLETED _____
 DRILLED BY _____
 LOGGED BY _____

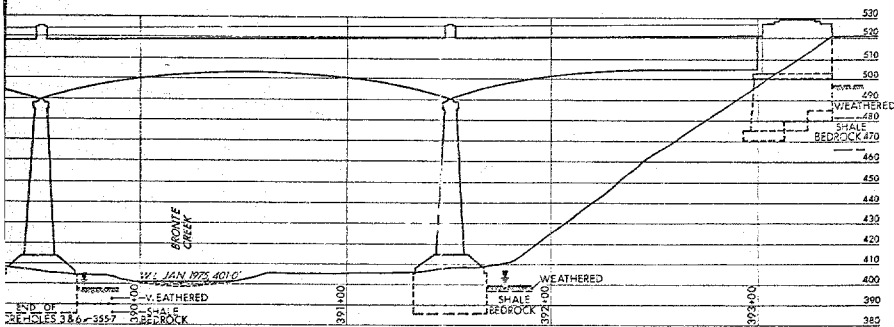
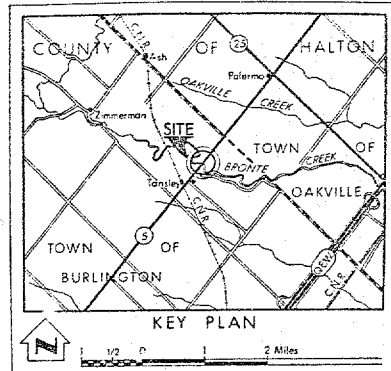
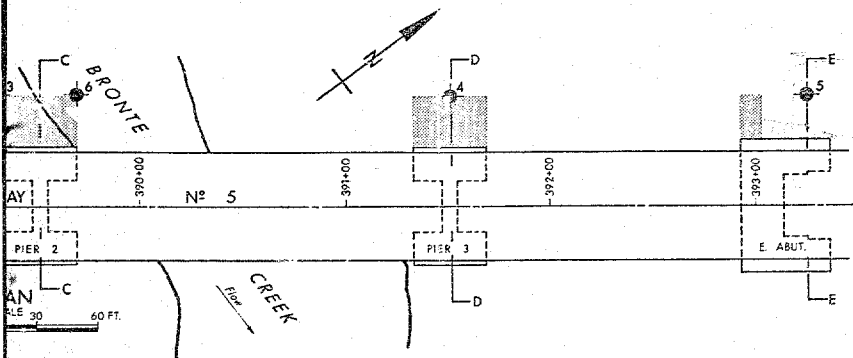
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DATE OF EXAMINATION February, 1975

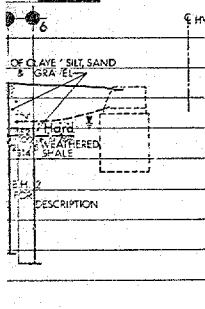
B. K. Glassford

CB-MT-113

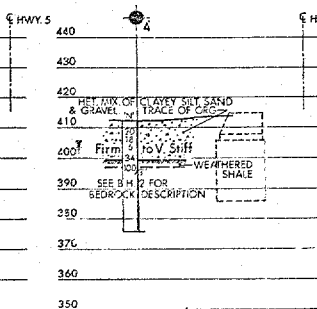




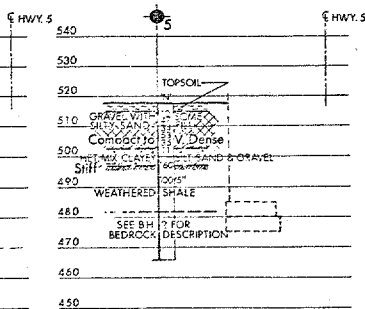
FILE
ALE 30
60 FT.



IONS
ALE 20
60 FT.



D-D



E-E

NOTE FOR CONTRACT DOCUMENT

The complete foundation investigation report for this structure may be examined at the Structural Office and Foundations Office, Downsview, and at the Hamilton District Office.



REF NO. 1337-22-14 NOVEMBER 26 1947

LEGEND

- Bore Hole
- Dynamic Cone Penetration Resistance
- Bore Hole & Cone Test
- Water Level established at time of field investigation, January 28, 1975
- Water Level not established in Bore Hole No. 5

NO.	ELEVATION	STATION	OFFSET
1	463-0	386+02	79' LT.
2	501-0	387+37	90' LT.
3	415-0	389+31	55' LT.
4	412-0	391+52	54' LT.
5	517-5	393+25	54' LT.
6	402-5	389+69	55' LT.
7	448-0	387+80	13' 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.

REVISIONS	DATE	BY	DESCRIPTION

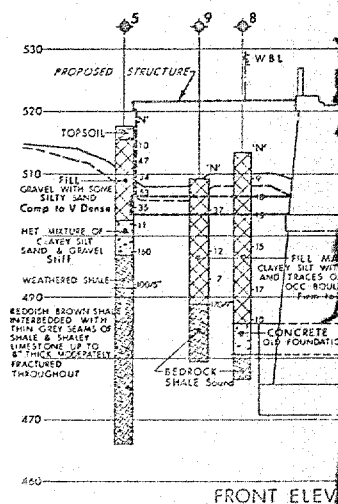
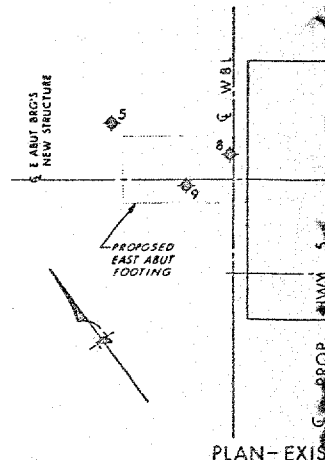
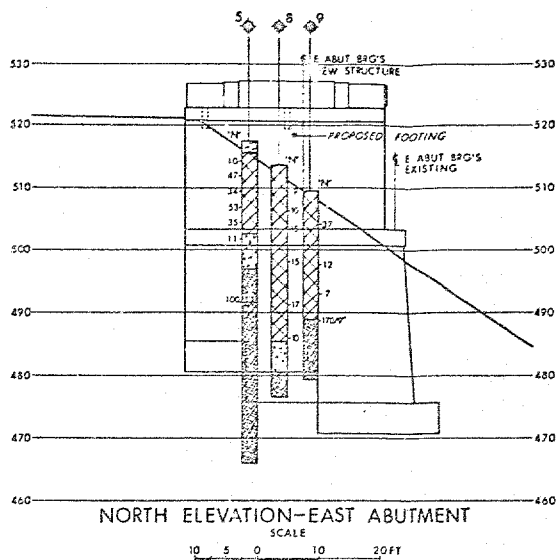
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO
ENGINEERING SERVICES BRANCH—GEOTECHNICAL OFFICE—SOIL MECHANICS SECTION

TANSLEY BRIDGE OVER BRONTE CREEK

HIGHWAY NO. 5 DIST. NO. 4
CO. HALTON
TOWN OF BURLINGTON LOT CON

BORE HOLE LOCATIONS & SOIL STRATA

SUBMIT V.K. CHECKED	APP NO. 22-69-03	DATE	226903-A
DRAWN: N.T. CHECKED	DATE	1/12/75	44000 DRAWING NO.
DATE FEBRUARY 12, 1975	1/12/75	APPROVED	COMING

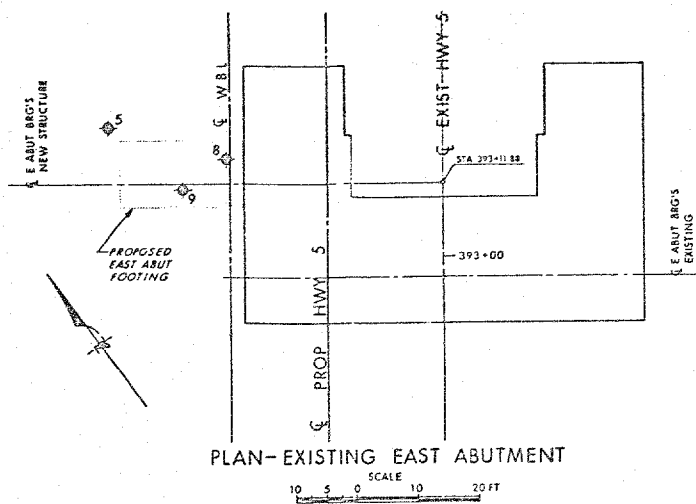




TANSLEY BRIDGE over BRONTE CR
NEW W.B. BRIDGE
BORE HOLE LOCATIONS & SOIL STRATA

SHEET

30
20
10
00
100
180
170
160



PLAN-EXISTING EAST ABUTMENT

SEE DWG 226903-A

KEY PLAN

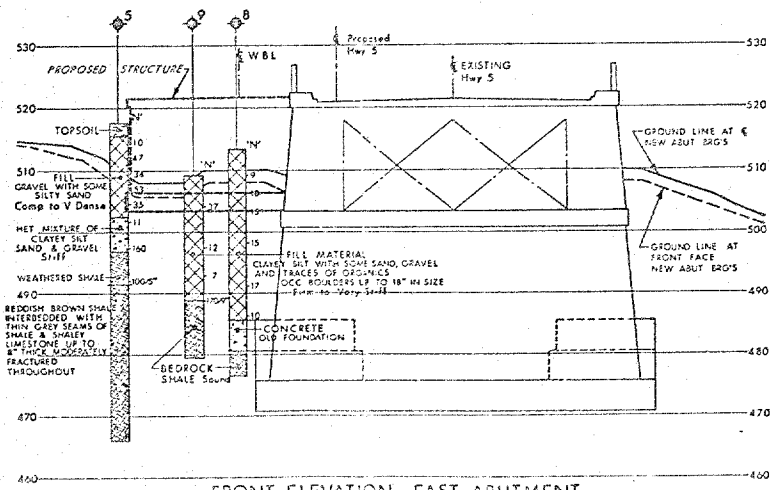
LEGEND

- ⊙ Bore Hole
- ⊕ Dynamic Cone Penetration Test (Cone)
- ⊗ Bore Hole & Cone
- TV Blow/ft (Std Pen Test 350ft lbs energy)
- CONC Blow/ft (60° Cone, 350ft lbs energy)
- W.L. at time of investigation
- W.D. Water in Bore Hole # 8 & 9
- W.L. Not Established in B.H.#5

No	ELEVATION	STATION	OFFSET HWY 5
5	517.5	393+21	54' LT
8	513.5	393+16	35' LT
9	509.4	393+11	42' 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.



FRONT ELEVATION - EAST ABUTMENT



NO.	DATE	BY	CHKD.	APP'D.
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

P. Payer *V. K. 16*

Meeting of

Structural Review Committee

Time: 9:30 a.m., September 21, 1977.

Place: Boardroom "B", West Building.

Attending: Messrs.

K. Luczka - Construction Branch
D. Thrasher - Regional Construction Branch
D. Waller - Regional Construction Branch
K. Carter - Regional Construction Branch
G. Al-Bazi - Structural Office
N. Zoltay - Structural Office
P. Roy - Structural Maintenance Section
✓ P. Payer - Soil Mechanics Section

Projects Reviewed.

W.P. 22-69-01, Site 10-111,
Tansley Bridge Deck Replacement.
W.P. 22-69-03, Site 10-111,
Tansley Bridge.
Highway 5, District 4.

Mr. Al-Bazi presented the projects pointing out the design features and related pertinent data.

The following points were put forth as noted below with recommendations where applicable.

Tansley Bridge (W.P. 22-69-03)

Foundations

The piling requirements were reviewed. The Committee was concerned with the bedrock profile and boulders in the area of the east abutment and feels that at the east abutment consideration should be given to the use of predrilled tube piles in place of H piles. It was agreed that this matter be reviewed and re-assessed by the Structural Office and the Soil Mechanics Section.

Structure

Drawing #1.

- (a) The Regional Construction Office queried the economics of the pier's shape and recommended for consideration the hammer head type piers without the six inch recesses.

Drawing #12

The Designer is to indicate on the drawing that the deck concrete is to be poured simultaneously.



Drawing #13.

- (a) Bearing manufacturer is to be checked, if "Spencer" type is still on the market.
- (b) Shoe plate is to be field welded and in order to accommodate field weld the plate dimension is to be increased by 1/2" both side.

Drawing #15.

- (a) The class or classes of allowable expansion joint assembly is to be shown on the drawing.
- (b) General Notes No. 7.

Note is to be changed to read ".....zinc metalized before or after fabrication....." .

The bridge is to be machine finished.

Tansley Bridge Deck Replacement (W.P. 22-69-01)

Structure

Drawing #1.

Clear cover on reinforcing steel in barrier wall is to be changed to read "1 1/2" except as noted".

Drawing #5.

The following note is to be included at screed Elevations table. "Elevations are approximate. See Notes".

Drawing #11.

Same comments as for W.P. 22-69-03, Drawing 15.

The deck is to be machine finished.

No other matters were brought up and the meeting adjourned at 11:50 a.m.

NZ/im



N. Zoltay,
Structural Contract
Specifications Engineer.

c.c. All present

J. B. Wilkes
R. A. Dorton
C. S. Grebski
K. G. Bassi
E. Van Beilen
M. R. Ernesaks
W. McFarlane

Mr. C.S. Grebski
Structural Design Engineer
Structural Office
West Building, Downsview

Soil Mechanics Section
Engineering Materials Office
West Building, Downsview

77 11 18

Re: Tansley Bridge over Bronte Creek
(New Westbound Bridge)
W.P. 22-69-03, Site 10-111
Highway 5, District 4, Hamilton

We reviewed the drawing of the revised Footing Layout and Reinforcement, showing the new pile data for East and West abutments of the above mentioned structure.

In this connection we would like to make the following comments:

1. In our opinion the drilling procedure, to be added to the 04 and Special Provision suggested in your memo dated 77 10 24, is quite appropriate.
2. We remind you of the presence of numerous large boulders embedded in the dump fill approaches at the location of the proposed new abutments. In view of this, if pile driving encounters any difficulties, churn-drilling techniques will have to be employed to achieve the results. We believe you will make the necessary provision to this effect as well.
3. From recent field trips to this site, it is concluded that there will not be any specific benefit from additional field investigation at the new east abutment location due to the fact that the small remaining unexplored area is practically unattainable or operational by any type of drilling equipment available.

V. Korlu
Project Engineer

For: M. Devata
Supervising Engineer

BK/MD/bh

cc: G.C.E. Burkhardt
Files ✓

Mr. C.S. Grebski
Structural Design Engineer
Structural Office
West Building, Downsview

Mr. W. Lin

Soil Mechanics Section
Engineering Materials Office
West Building, Downsview

77 10 17

Re: Tansley Bridge Over Bronte Creek
New Westbound Bridge
W.P. 22-69-03, Site 10-111
Hwy. 5, District 4, Hamilton

This section submitted a foundation report on 75 02 28. Since then a preliminary design was developed by your section and drawings were submitted for our review. At this stage it was decided to discuss in detail the type of foundation support for the east abutment. As a result of this, a meeting was held in the Structural Office on 77 01 13, and the pertinent conclusions were summarized in our memorandum dated 77 02 11.

It was our understanding that the east abutment would be supported on pedestals founded on bedrock. In order to define the bedrock details for this concept, additional borings were initiated during early summer of 1977 as agreed by the Structural Office. The results of the additional subsurface investigation, together with our recommendation for the east abutment foundations, were provided in a memorandum dated 77 07 06 to your office, so that the final drawings for the design can be completed. To our surprise the final bridge drawings were issued on 77 07 04 without the benefit of the additional subsurface information. Furthermore, the final design drawings indicated that the east abutment was being founded on piles driven to bedrock. A careful review of these drawings was carried out and concluded that the additional investigation was not of much value since the concept agreed was not followed.

The writer discussed the problems associated with piled foundations for this abutment with Messrs. W. Lin and G. Al-Bazzi of your office on 77 08 18. At this time Mr. W. Lin indicated that the concept of footing support on pedestals founded on bedrock would be too expensive. It was also discussed and decided to give further consideration to stepped-up footings for the outside portion and pile support of the inner portion of the east abutment. This was in view of the presence of large boulders in the upper 6 to 8 feet of the overburden at the location of the northern portion of the footing. The Structural Office agreed that they will consider this alternative and provide the pertinent details in a memorandum to this office. So far this section did not receive any information on this aspect.

In order to pursue and expedite the matter this section requested for a meeting to clarify the final choice of the footing requirements. On 77 09 26 a meeting was held at the Structural Office and attended by Messrs. C.S. Grebski, W. Lin, G. Al-Bazzi, M. Devata and V. Korlu.

cont'd.....

In this meeting Mr. C.S. Grebski was of the opinion that the piled foundation was the most logical choice based on economical considerations. However, it was pointed out by Mr. Devata that churn drilling techniques may be required to reach the desired tip elevation in view of the presence of boulders and other obstacles in the overburden. It was also agreed that a minimum depth of penetration of piles should be specified on design drawings.

The members present agreed that the bedrock surface could not be defined precisely to the full extent since some excavation for the old structure was undertaken in this area. Therefore, considerable variation in pile lengths can be anticipated in spite of additional borings. However, the Structural Office emphasized that effort should be made to define the bedrock conditions as accurately as possible in spite of the complex and costly drilling operations. It was agreed that the cost of the new bridge warrants such additional investigation. Therefore, in this meeting it was finally concluded that this Section would carry out additional investigation in the area of the abutments where piles are to be driven.

Our comments pertaining to final bridge drawings are already discussed in the meeting of 77 09 26 and we request you to consider these as our comments.

V. Korlu
Project Engineer

For: M. Devata
Supervising Engineer

VK/gs

cc: G. Al-Bazi
G.C.E. Burkhardt
M. Devata
Files]

Mr. C.S. Grebski
Structural Design Engineer
Structural Design Section
West Building, Downsview

Soil Mechanics Section
Engineering Materials Office
West Building, Downsview

77 07 06

Mr. W. Lin

Re: Additional Subsurface Investigation
Tansley Bridge over Bronte Creek
(New W/B Bridge)
W.P. 22-69-03, Site No. 10-111
District 4, Hamilton

This Section submitted on 75 02 28 a foundation report for the proposed W.B.L. four span structure adjacent to and on the north side of the existing Hwy. 5 structure over Bronte Creek, known as Tansley Bridge. At the time of writing our report, it was not known if the W.B.L. structure footings would be independent or an integral part of the existing structure. The recent preliminary Bridge Dwg. P1 A submitted by the Structural Office indicated that footings will be independent and the abutments will be supported on piles. After an analytical discussion about the abutment foundation design, it was agreed by this Section and the Structural Office, that in order to substantiate the possibility of supporting the east abutment on spread footings, additional subsurface investigation will be carried out. In order to facilitate this investigation the Structural Office submitted a plan and section of the exact location of the east abutment. This Section carried out a subsurface investigation between the period of May 4th to May 7th, 1977.

The recent investigation revealed that the bedrock was excavated to a certain depth in the area of the W.B.L. east abutment footing location during the time of construction of the existing structure. At one location (B.H. #8) adjacent to the existing east abutment immediately beneath the existing fill, mass concrete up to 5 feet thick was encountered immediately above the shale bedrock. Further, it was concluded that the excavated bedrock surface varies from elevation 486 to elevation 481 in the proposed east abutment footing location. The pertinent details are shown on our enclosed, revised foundation drawings #226903A and #226903B. The additional Record of Borehole Sheets #3 and #9 are also enclosed.

The recent subsurface investigation data, together with bedrock conditions, were presented to the Structural Office immediately after the completion of the fieldwork. Based on this data it was concluded that the most appropriate type of foundation for the W.B.L. structure east abutment footing would be to support this footing on concrete columns founded on sound shale bedrock. It should be noted during construction that all fill material must be removed down to the elevation of bedrock prior to placing concrete columns.

cont'd.....

We believe that the above mentioned information will be adequate for you to complete the foundation design of the east abutment footing. This memorandum and the enclosed drawings, together with the Record of Borehole Sheets should be included in the original foundation report W.P. 22-69-03 submitted to you on 75 02 28. This Section will, however, provide additional comments if required upon the receipt of the revised preliminary Bridge Drawings.

Should you require any further information on this project, please contact this office.

V. Korlu
Project Engineer

For: M. Devata
Supervising Engineer

Enclosures

VK/gs

cc: Files ✓
Record Services

G.C.E. Burkhardt (3)
R.D. Gunter
M.R. Ernesaks
D.E. Thrasher (2)

G.A. Wrong
B.J. Giroux
R.S. Pillar

R. Hore

R. Fitzgibbon
J. Anderson
G. Sloan

Mr. C.S. Grebski
Structural Design Engineer
Structural Design Section
West Building, Downsview

Mr. W. Lin

Soil Mechanics Section
Engineering Materials Office
West Building, Downsview

February 11, 1977

Re: Tansley Bridge Widening
W.P. 22-69-03, Site 10-111
Hwy. 5, District 4, Hamilton

In connection with the review of the preliminary plan drawings submitted by the Structural Office for the above mentioned structure, a meeting was held in the Structural Office, attended by Messrs. W. Lin, G. Al-Bazi, M. Devata and V. Korlu on January 13, 1977. After an analytical discussion about the foundations design of the above structure it was agreed that in order to substantiate the possibility of supporting the east abutment on spread footings rather than piled foundations, additional subsurface investigations will be carried out at the precise location of the east abutment footing. For this purpose, the Structural Office will submit a plan showing the exact location and dimensions of the east abutment footing.

The final design of the east abutment foundations will be based upon the additional findings and subsequent recommendations.

V. Korlu
Project Engineer

For: M. Devata
Supervising Engineer

VK/gs

cc: G.C.E. Burkhardt
Files ✓
Record Services

MEMORANDUM

TO: Mr. M. Devata,
Supervising Engineer,
Soil Mechanics Section,
West Building.

FROM: Mr. B.K. Glassford,
Geologist.

ATTENTION:

DATE: February 13, 1975.

OUR FILE REF.

IN REPLY TO

SUBJECT:

W.P. 22-69-03, Hwy. 5
Bronte Creek Structure

The bedrock intersected in seven boreholes drilled at this site was found to be typical of the Queenston formation, which is in itself the characteristic bedrock of this general area. It is primarily a thin to medium bedded, dark brownish red shale with occasional layers of a shaly limestone generally ranging in thickness from 0.1 to 0.4 feet and rarely exceeding 0.8 feet.

The upper layers appeared weathered and frequently transitional with a thin overlying till layer, which contained frequent shale and limestone fragments. This weathered zone grades through a zone of moderate weathering into fresh bedrock. All of the seven boreholes were similar with a soft to medium hard, brown-red shale, mottled in sections and interbedded with grey shaly limestone seams up to 0.8 feet. Some sections appear to be fissile. There is moderate fracturing throughout.

It is suggested that pier and abutment footings be founded on top of the respective grey shaly limestone bedding. These grey shaly limestone layers appear at various elevations on the seven boreholes. There appears to be a relation between these layers for holes 3, 4 and 6 at the lower elevations and a relation between the upper elevation holes 1, 2, 5 and 7, shaly limestone layers.

BK Glassford

B.K. Glassford,
Geologist.

BKG/sd

MEMORANDUM

TO: Mr. C. Mirza,
Head, Soils Mechanics Section,
West Building.

FROM: G. C. E. Burkhardt,
Structural Planning Office,
3501 Dufferin Street.

ATTENTION:

DATE: November 25, 1974.

OUR FILE REF.

IN REPLY TO

SUBJECT: Tansley Bridge over Bronte Creek,
New W.B.L. Structure,
W.P. 22-69-3, Site 10-111,
Highway 5, District 4.

As Highway 5 has been proposed for widening to four lanes, a new structure, adjacent to and on the north side of the existing structure is required. The footing for the proposed structure may possible be butted to the existing footing.

Preliminary details of the proposed structure and roadway alignment are indicated on the enclosed plans. The existing structure drawings detail the original soils investigation. These plans include:

B-83-5-2	(2 copies)
Existing Structure Drawings	D-1337-22
Proposed Cross-Section	
Site Photographs	

The alignment will not be co-ordinated, and the finalized station will be forthcoming. The proposed footings are located in relation to the centreline of the existing structure.

Could you please prepare a Foundation Investigation Report of sufficient scope to facilitate the design of the proposed structure. The current schedule calls for a completed Foundation Investigation by February 19th, 1975.

The exact location of existing services at the site have not been determined as yet. There are however, some existing services known to be in the vicinity. On the north side of the existing structure are overhead Bell and Hydro wires. At the northwest end of the existing structure, a Bell underground cable exists. Running parallel to Hwy. 5 on the south side of the existing structure is a gas main. The exact location of these and other possible services should be established with the proper authorities before drilling.

RAJ:lm
Encl.

R. A. Jeffries
R. A. Jeffries,
STRUCTURAL PLANNING SUPERVISOR,
for:
G. C. E. Burkhardt,
REG. STRUCTURAL PLANNING ENG.

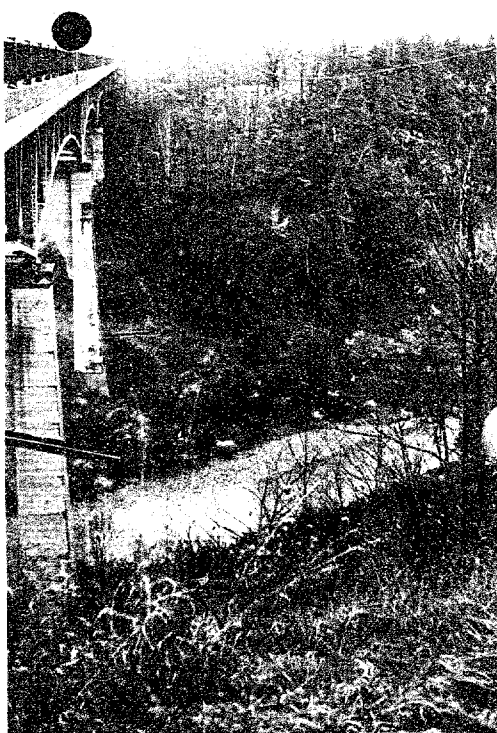
c.c. G. Celmins
R. Fitzgibbon
J. Anderson
J. Barclay



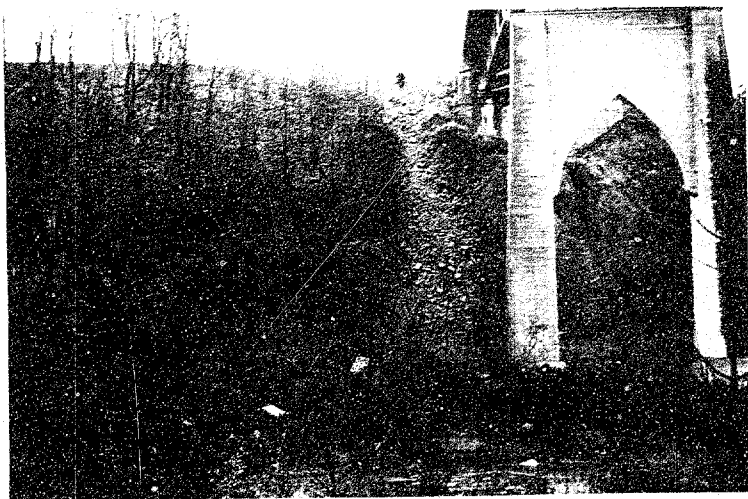
MT → Jeld 216

MD

JK



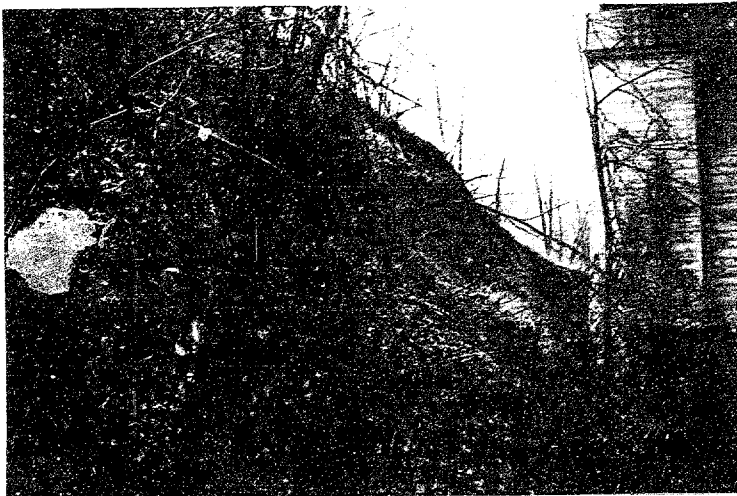
LOOKING WEST ALONG NORTH
SIDE OF EXISTING STRUCTURE



LOOKING AT EAST ABUTMENT ALONG
NORTH SIDE OF EXISTING STRUCTURE



PIERS #2 & #3 LOOKING TOWARDS NORTH SIDE
NOTE OLD PIER IN CORNER OF PICTURE



EARTH EMBANKMENT AT PIER #1 NORTH SIDE
OF EXISTING STRUCTURE



WEST ABUTMENT NORTH SIDE OF EXISTING STRUCTURE

UNITED STATES GEOLOGICAL SURVEY

GEOCRES No. 3045-99

DIST. 4 REGION Central

W.P. No. 22-69-03

CONT. No. 78-31

W. O. No. _____

STR. SITE No. _____

HWY. No. _____

LOCATION Tansky Bridge Over
Bront Creek

DATE OF FIELD WORK 4

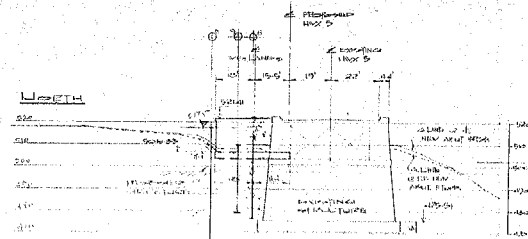
REMARKS _____

301/5-99

CONT No
WP No 72-69-01

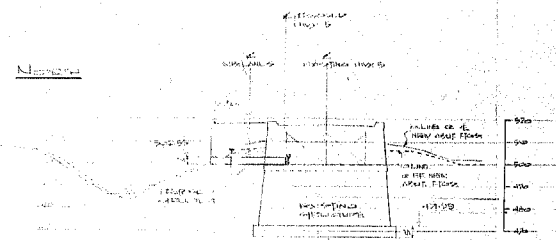
JANSELY BRIDGE OVER
SALMON CREEK

SHEET



EAST ABUTMENT

(PLANET. ELEVATION)



WEST ABUTMENT

(PLANET. ELEVATION)

FOR REDUCED PLAN

1:1000

DATE	BY	DESCRIPTION
DESIGN	CHECK	LOADING
DRAWING	CHECK	DATE 10/20/01

CONT No
WP No 22-69-03

TANSLEY BRIDGE OVER BRONTE CR.
NEW W/B BRIDGE.
FOOTING LAYOUT & REINFORCEMENT

SHEET



FOOTING LAYOUT

NOTE:
THE GROUP AND MEMBERS ARE
SIMILAR BOTH DEUTMENTS.




		LOCATION	28	50% 100	100% 200	200
WEST BANK	FRONT ROW	10	1:4	40	100	
	CENTER ROW	10	1:4	40	100	
	BACK ROW	4	1:8	40	100	
	SOUTH END-BACK ROW	3	1:3	40	100	
	FRONT ROW	10	1:4	40	100	
EAST BANK	CENTER ROW	10	1:4	40	100	
	BACK ROW	4	1:8	40	100	
	SOUTH END-BACK ROW	3	1:3	40	100	
	FRONT ROW	10	1:4	40	100	
	CENTER ROW	10	1:4	40	100	

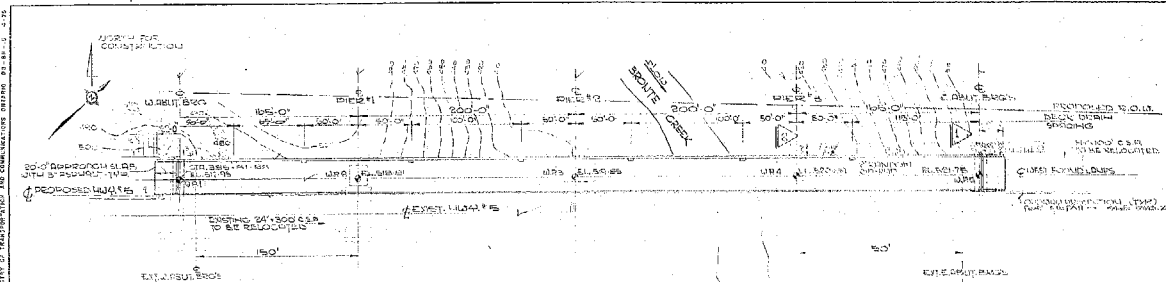
ADDITIONAL SPRING MEASURED IN
UNDERSIDE OF FOOTING.

FOR REDUCED PLAN

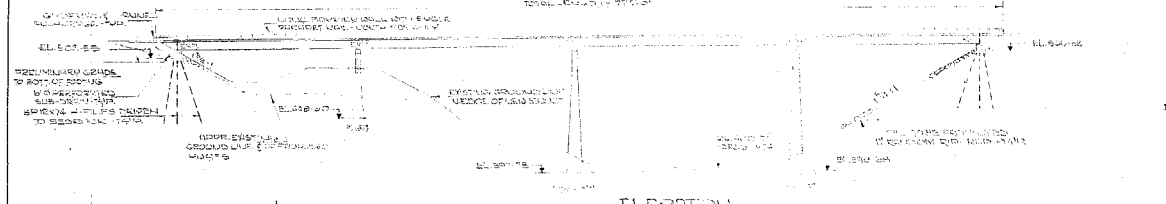
DATE BY	DESCRIPTION		
DESIGN <i>GA</i>	CHECKER	LOADING <i>HS 50-44</i>	DATE <i>LINE 27</i>
DRAWING <i>FA</i>	CHECK <i>GA</i>	SITE No <i>10</i>	DWG <i>3</i>

3045-99

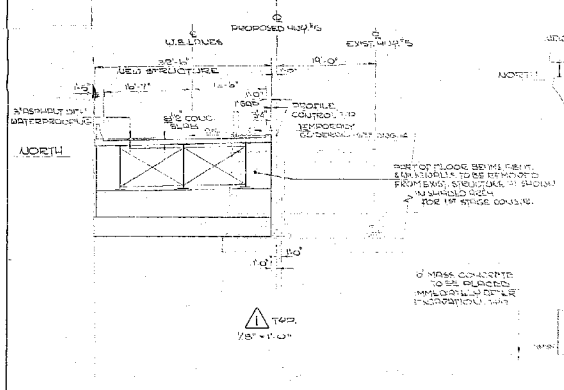
DIST. 4		
CONT No	22-69-03	
WP	No 22-69-03	
HANSLEY BRIDGE OVER BRONTE CREEK NEW W/B BRIDGE		SHEET
GENERAL LAYOUT		



PLAN
(GENERAL LAYOUT)



ELEVATION
(GENERAL LAYOUT)



GENERAL NOTES

CLASS OF CONCRETE	THICKNESS	UNIT PRICE
CONCRETE BRIDGE DECK	10.00	1.00
CONCRETE BRIDGE PIER	10.00	1.00
CONCRETE BRIDGE ABUTMENT	10.00	1.00
CONCRETE BRIDGE APPROACH	10.00	1.00
CONCRETE BRIDGE CURB	10.00	1.00

CLASS OF CONCRETE ON REINFORCING STEEL

CLASS OF CONCRETE	THICKNESS	UNIT PRICE
CONCRETE BRIDGE DECK	10.00	1.00
CONCRETE BRIDGE PIER	10.00	1.00
CONCRETE BRIDGE ABUTMENT	10.00	1.00
CONCRETE BRIDGE APPROACH	10.00	1.00
CONCRETE BRIDGE CURB	10.00	1.00

CONSTRUCTION NOTES

THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF THE BRIDGE DECK AND THE BRIDGE PIER AND ABUTMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF THE BRIDGE DECK AND THE BRIDGE PIER AND ABUTMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF THE BRIDGE DECK AND THE BRIDGE PIER AND ABUTMENT.

- LIST OF DRAWINGS**
1. GENERAL LAYOUT
 2. BRIDGE DECK LAYOUT
 3. BRIDGE PIER LAYOUT
 4. BRIDGE ABUTMENT LAYOUT
 5. BRIDGE APPROACH LAYOUT
 6. BRIDGE CURB LAYOUT
 7. BRIDGE DECK ELEVATION
 8. BRIDGE PIER ELEVATION
 9. BRIDGE ABUTMENT ELEVATION
 10. BRIDGE APPROACH ELEVATION
 11. BRIDGE CURB ELEVATION
 12. BRIDGE DECK SECTION
 13. BRIDGE PIER SECTION
 14. BRIDGE ABUTMENT SECTION
 15. BRIDGE APPROACH SECTION
 16. BRIDGE CURB SECTION
 17. BRIDGE DECK DETAIL
 18. BRIDGE PIER DETAIL
 19. BRIDGE ABUTMENT DETAIL
 20. BRIDGE APPROACH DETAIL
 21. BRIDGE CURB DETAIL

CONCRETE QUANTITIES

ITEM	QUANTITY	UNIT PRICE	TOTAL
CONCRETE BRIDGE DECK	10.00	1.00	10.00
CONCRETE BRIDGE PIER	10.00	1.00	10.00
CONCRETE BRIDGE ABUTMENT	10.00	1.00	10.00
CONCRETE BRIDGE APPROACH	10.00	1.00	10.00
CONCRETE BRIDGE CURB	10.00	1.00	10.00

STRUCTURAL STEEL QUANTITIES

ITEM	QUANTITY	UNIT PRICE	TOTAL
STEEL BRIDGE DECK	10.00	1.00	10.00
STEEL BRIDGE PIER	10.00	1.00	10.00
STEEL BRIDGE ABUTMENT	10.00	1.00	10.00
STEEL BRIDGE APPROACH	10.00	1.00	10.00
STEEL BRIDGE CURB	10.00	1.00	10.00

G.B.M. - E.L. 549.7516

TABLET IN S.E. CORNER OF CONCRETE CURB

ALL CONCRETE WORK SHALL BE DONE IN ACCORDANCE WITH THE SPECIFICATIONS

RECEIVED

DATE

DESCRIPTION

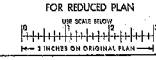
BY

FOR REDUCED PLAN

1/8" = 1'-0"

BRIDGE PROFILE
NOT TO SCALE

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DWG. NO. 22-69-01



SHEET

