

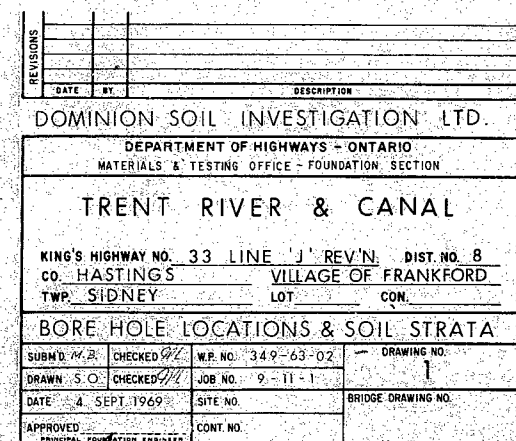
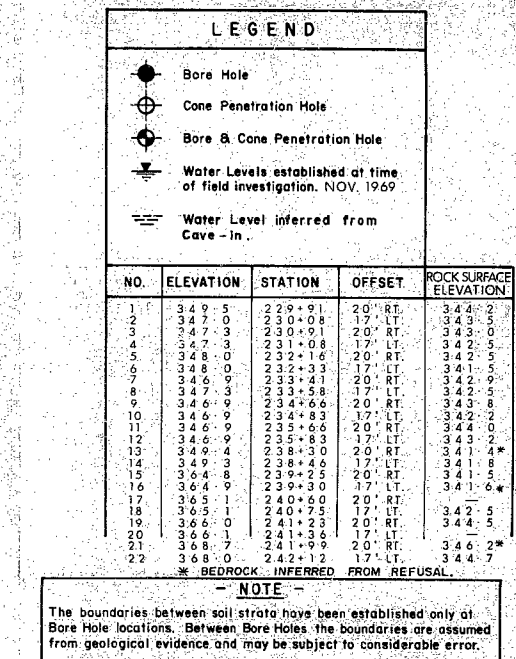
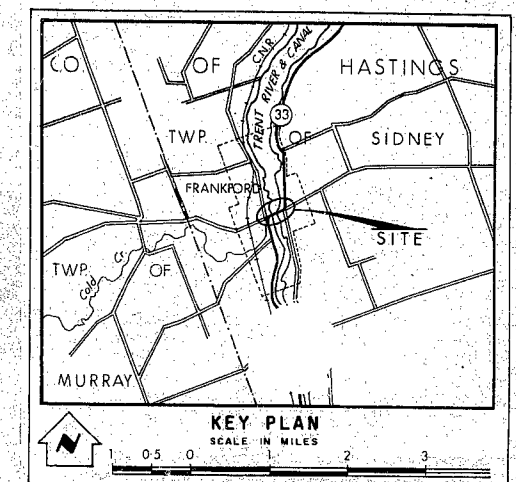
#69-F-201C

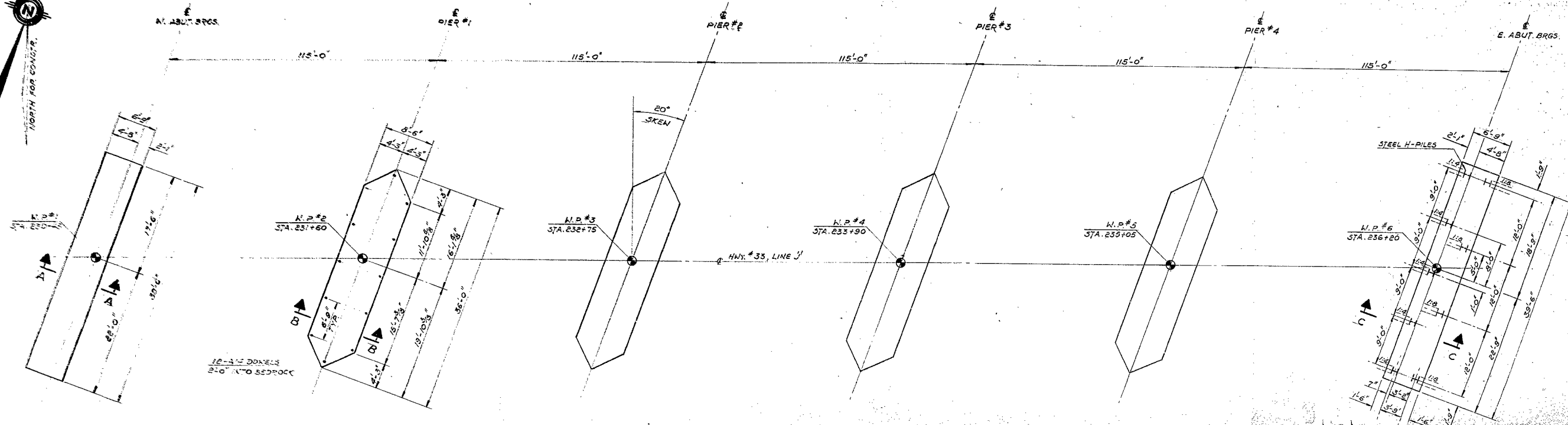
W.P. 349-63-02

H.W.Y. #33

TRENT RIVER AND

CANAL.

[illegible]

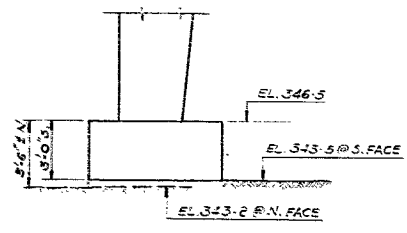


NOTE:
FOOTING LAYOUT FOR PIERS #2 #3 & #4 SIMILAR.
ALL SPREAD FOOTINGS TO BE PLACED ON SOUND BEDROCK.

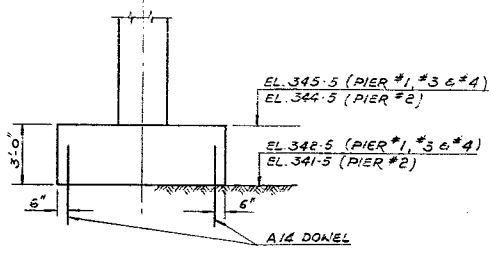
PLAN
SCALE: 1/8" = 1'-0"

12 BP 53 STEEL H-PILE

LOCATION	No. REQ'D.	EST. LENGTH	DESIGN LOAD	REMARK
EAST ABUTMENT	9	26'-0"	70 T/PILE	WITH DRIVING SHOE

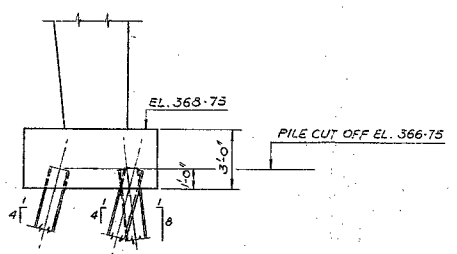


SECTION A-A
SCALE: 1/4" = 1'-0"



SECTION B-B
SCALE: 1/4" = 1'-0"

366?
341?
11?



SECTION C-C
SCALE: 1/4" = 1'-0"

REVISIONS

DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

Don Hill

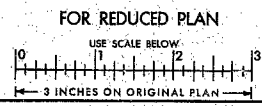
TRENT RIVER BRIDGE
IN FRANKFORD

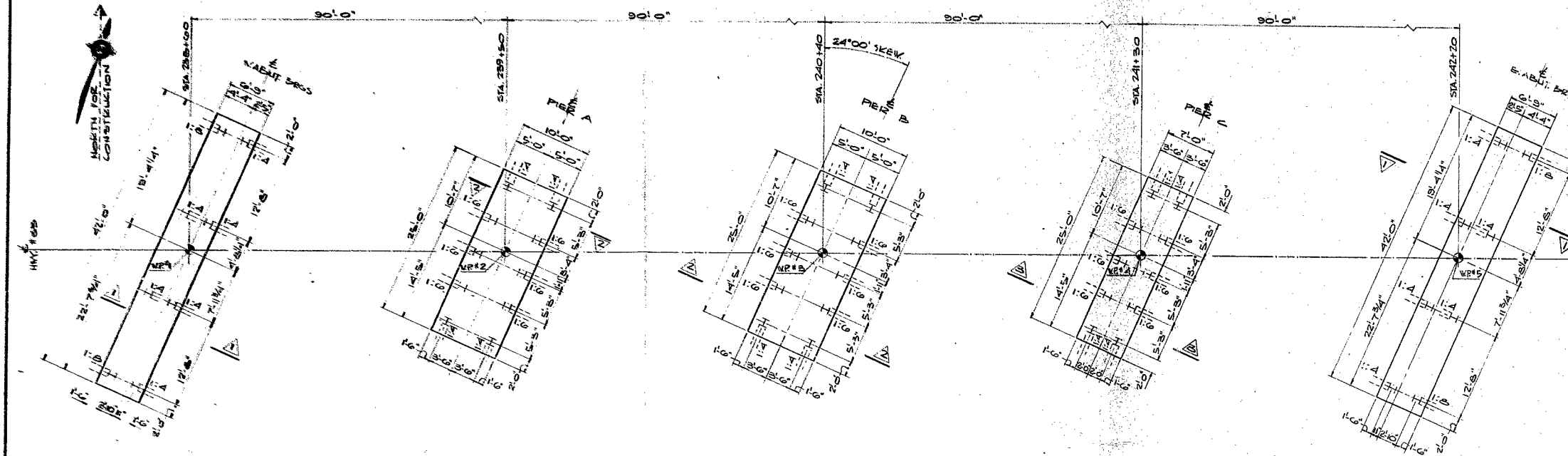
KING'S HIGHWAY No. 33 DIST. No. 8
CO. HASTINGS
TWP. SIDNEY LOT CON.

FOOTING LAYOUT

APPROVED: SITE No. 11-145 W.P. No. 349-63-02

DESIGN: A.R. CHECK: V.F.B. CONTRACT No.
DRAWING: H.N. CHECK: A.R. DRAWING No. D-6794-3
DATE: OCT/70 LOADING: 45, 20-44



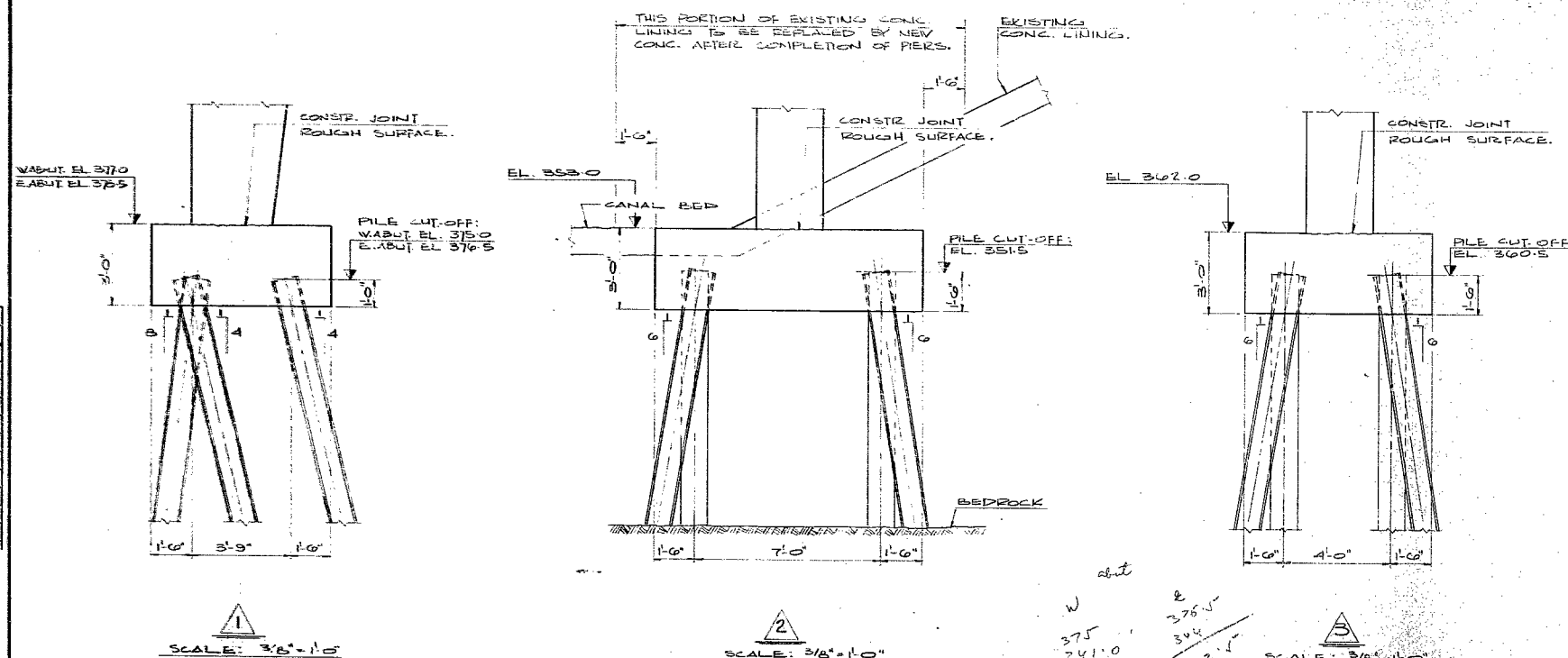


FOOTING LAYOUT
SCALE: 1/8" = 1'-0"

LIST OF 12BP53 STEEL H-PILES				
LOCATION	NO. REQ'D	EST. LENGTH	DESIGN LOAD	REMARKS
V. ABUT.	8	38' ✓	70 T./PILE	WITH DRIVING SHOE.
E. ABUT.	8	36' ✓		

LIST OF 12BP74 STEEL H-PILES				
LOCATION	NO. REQ'D	EST. LENGTH	DESIGN LOAD	REMARKS
PIER A	10	14'	95 T./PILE	WITH DRIVING SHOE.
PIER B	10	12'		
PIER C	10	20'		

NOTE:
ALL PILES TO BE DRIVEN TO BEDROCK.



SCALE: 3/8" = 1'-0"

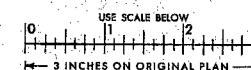
SCALE: 3/8" = 1'-0"

SCALE: 3/8" = 1'-0"

32 375 341.0 34.0
2 375.5 304 52.5

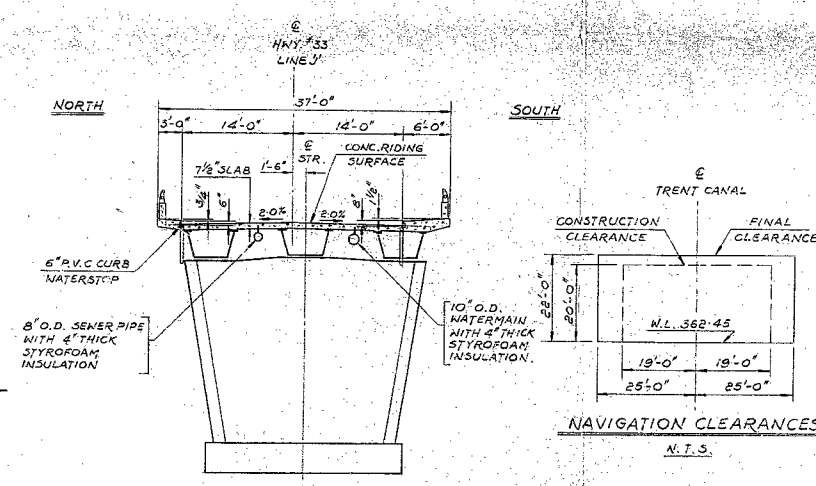
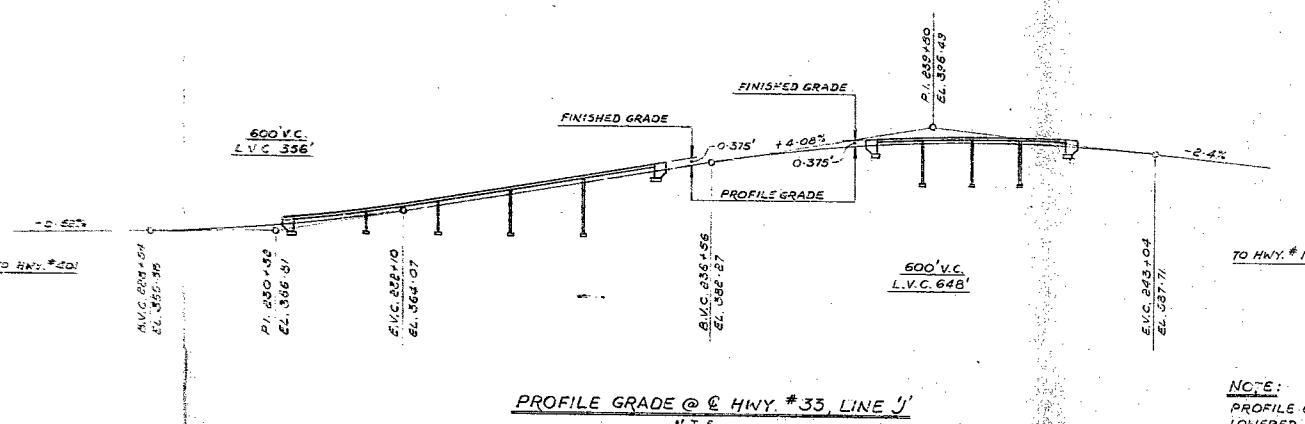
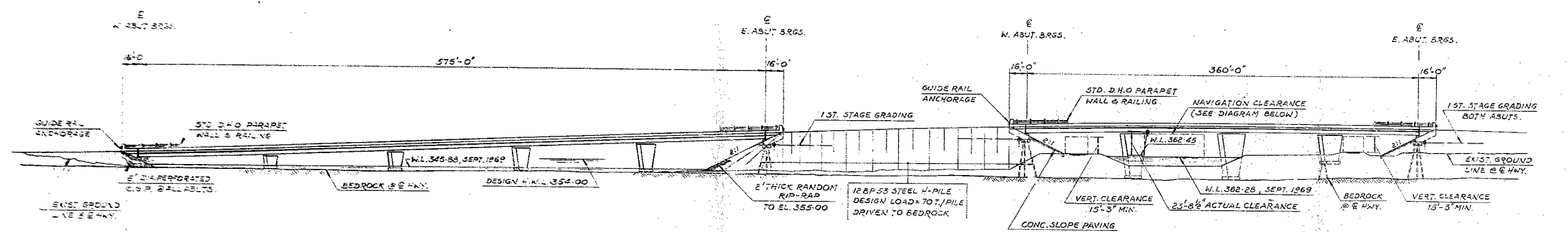
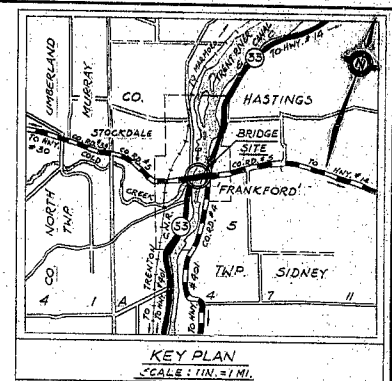
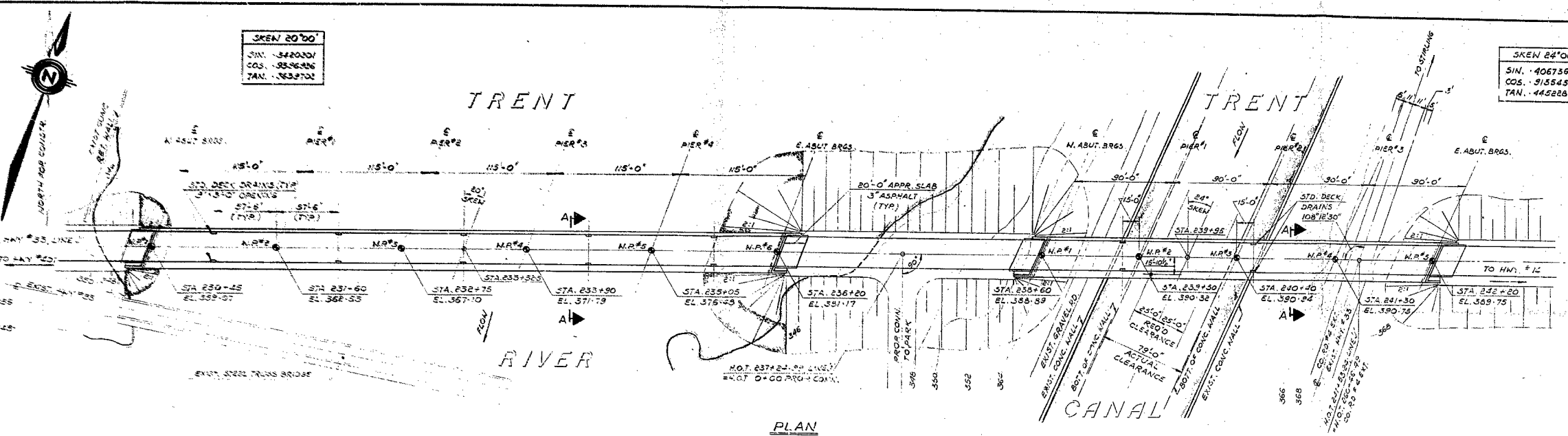


FOR REDUCED PLAN
USE SCALE BELOW



REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
Vern Hill			
TRENT CANAL BRIDGE IN FRANKFORD			
KING'S HIGHWAY No. 33	DIST. No. 8		
CO. HASTINGS			
TWP. SIDNEY	10T	CON.	
FOOTING LAYOUT			
APPROVED	BRIDGE ENGINEER	SITE No. 11-280	W.P. No. 349-63-04
DESIGN P.O.L.	CHECK V.F.B.	CONTRACT No.	
DRAWING P	CHECK P.O.L.	DRAWING No.	D-6795-3
DATE OCT. 1970	LOADING H50-44		



B.M. 365.45
 GEODETIC DATUM
 N. & W. IN N.E. ROOT
 OF 1" MAP
 124' RT. 240+20

REVISIONS	DATE	BY	DESCRIPTION

11/1/61

DEPARTMENT OF HIGHWAYS ONTARIO
 BRIDGE DIVISION

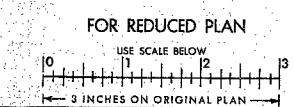
TRENT RIVER AND CANAL BRIDGE
IN FRANKFORD

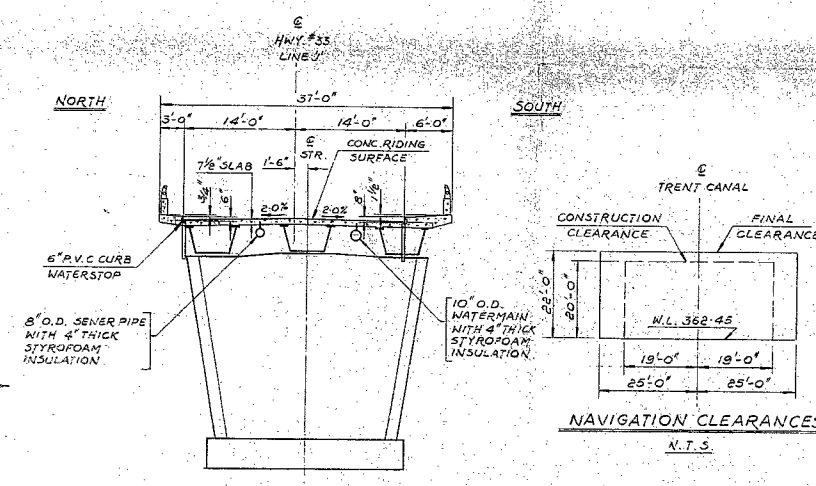
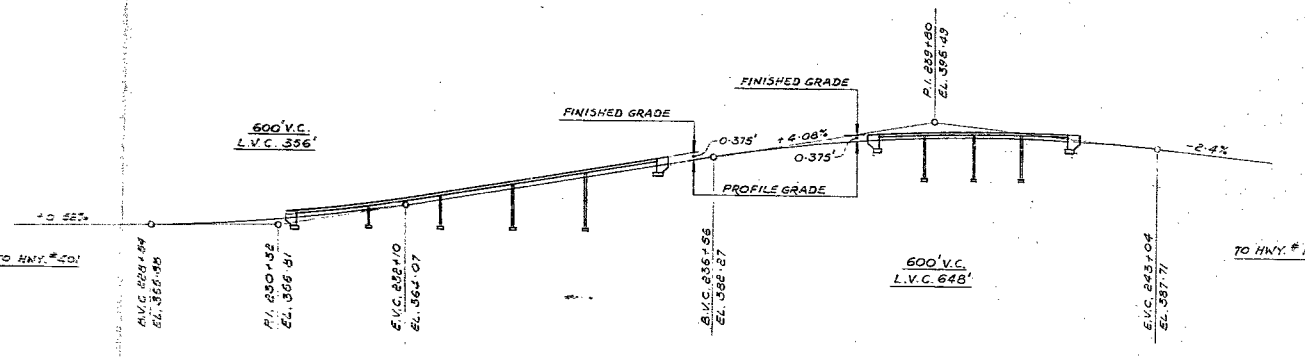
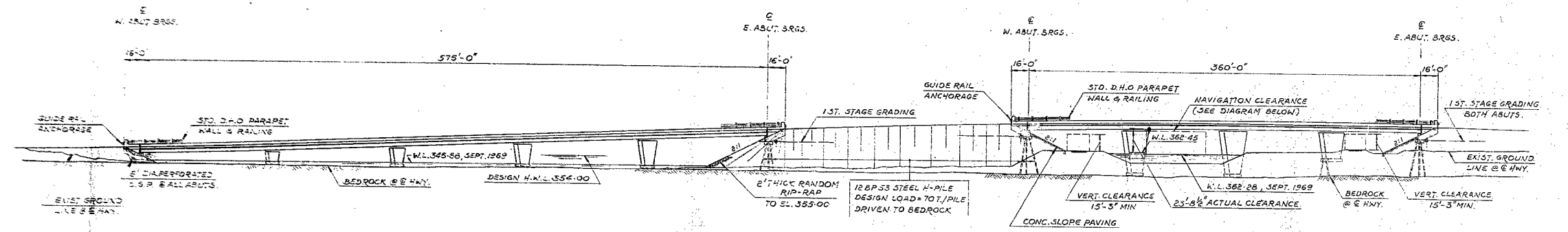
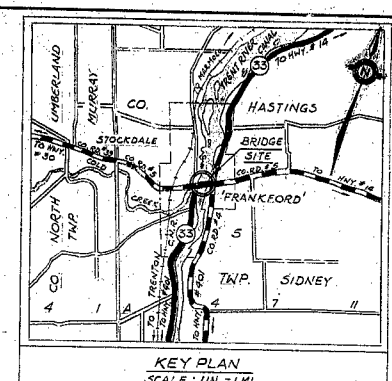
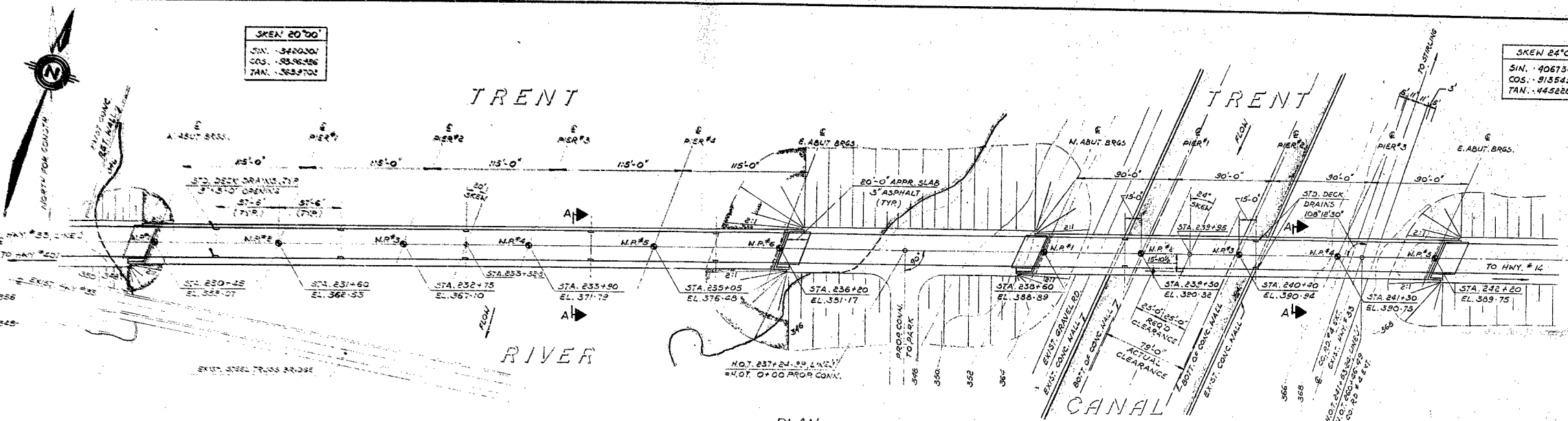
KING'S HIGHWAY No. 33 DIST. No. 6
 CO. HASTINGS
 TWP. SIDNEY LOT — CON. —

PRELIMINARY

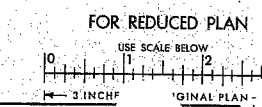
APPROVED:
 BRIDGE ENGINEER:
 CONTRACT No.
 DESIGN: H.N. CHECK: P.O.L. DRAWING: D-6794-P1
 DATE: APR. 1970 LOADING: 145 20-24 No. D-6795-P1

NOTE:
 PROFILE GRADE MAY BE
 LOWERED BY 1'-6" AND REQ'D
 NAVIGATION CLEARANCE
 STILL MAINTAINED.





NOTE:
 PROFILE GRADE MAY BE LOWERED BY 1'-6" AND REQ'D NAVIGATION CLEARANCE STILL MAINTAINED.



B.M. 365.48
 GEOMETRIC POINT
 N. 4 W. IN N.E. CORNER
 OF 1 MAPLE
 124' RT. 240+20

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
 BRIDGE DIVISION

Nov/69

TRENT RIVER AND CANAL BRIDGE
IN FRANKFORD

KING'S HIGHWAY No. 33 DIST. No. 8
 CO. HASTINGS
 TWP. SIDNEY LOT CON.

PRELIMINARY

APPROVED	BRIDGE ENGINEER	SITE No. 11-145	W.P. No. 343-63-02404
DESIGN	CHECK	CONTRACT	No.
DRAWING	CHECK	P.O.L.	D-6794-P1
DATE	APR 1970	LOADING	HS 20-44
		No.	D-6795-P1

MEMORANDUM

69-F-201c

TO: Mr. B. R. Davis,
Bridge Engineer,
Bridge Office,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Office,
Room 107, Lab. Bldg.

ATTENTION: Mr. S. McCombie

DATE: December 12, 1969

OUR FILE REF.

IN REPLY TO **DEC 12 1969**

SUBJECT:

FOUNDATION INVESTIGATION REPORT --
BY: Dominion Soil Investigation Limited
Proposed Crossing of Trent River and Canal
King's Hwy. #33, Frankford, Ontario
W.P. 349-63-02 -- District 8 (Kingston)

Attached, please find the above mentioned report report prepared and submitted by the Consultant, Dominion Soil Investigation Limited.

We have reviewed the report and believe that it contains all the information necessary for you to proceed with the design of the structure.

It would appear to us that a possibly better solution for the Trent Canal structure would be to have all the footings founded on piles rather than have two founded on spread footings and the remainder on piles. Large diameter caissons should also be considered since they would eliminate the need for footings.

Should you wish to discuss the report, or any part thereof, please feel free to contact this Office.

A. C. Stermac

A. C. Stermac
PRINCIPAL FOUNDATION ENGINEER

AGS/MdEF

Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
S. J. Markiewicz
V. A. Snell
T. C. Kingsland (2)
J. E. Gruspier
B. A. Singh

Foundations Files
Gen. Files

fr



69-F-201C

DOMINION SOIL INVESTIGATION LIMITED
CONSULTING SOIL & FOUNDATION ENGINEERS

HEAD OFFICE

104 CROCKFORD BLVD.
LEAMINGTON, ONT.
CANADA
TELEPHONE: 751-6565

BRANCH OFFICE

369 QUEENS AVE.
LONDON, ONT.
TELEPHONE: 433-3851

December 9th, 1969

FOUNDATION INVESTIGATION
PROPOSED CROSSING AT
TRENT RIVER AND CANAL
KINGS HIGHWAY #33
FRANKFORD, ONTARIO
W.P. 349-63-02

Our Ref. No. 9-11-1

Your Ref. No. W.P. 349-63-02

Prepared for:

Department of Highways, Ontario
Materials & Testing Division
Foundation Section
Downsview, Ontario

Distribution:

12 copies - Department of Highways, Ontario
2 copies - Dominion Soil Investigation Ltd.



DOMINION SOIL INVESTIGATION LIMITED
CONSULTING SOIL & FOUNDATION ENGINEERS

HEAD OFFICE
104 CROCKFORD BLVD.
SCARBOROUGH, ONT.
CANADA
TELEPHONE: 751-6565

BRANCH OFFICE
389 QUEENS AVE.
LONDON, ONT.
TELEPHONE: 433-3851

December 9, 1969

Your Ref. No. W.P. 349-63-02

Our Ref. No. 9-11-1

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

Attention: Mr. A. Rutka, P. Eng.,
Materials and Testing Engineer

Re: Foundation Investigation
Proposed Crossing at
Trent River and Canal
Kings Highway No. 33
Frankford, Ontario

Dear Sirs:

In accordance with your letter of authorization dated October 31st, 1969, we have performed a soil investigation at the above site and our findings are presented in this report.

We find that underlying up to 22 feet of granular overburden, the surface of the limestone bedrock is at a uniform level of 342± feet.

The structure over the Trent River can be supported on spread footings and the structure over the Canal on piles driven to bedrock or a combination of piles and spread footings established in the overburden or compacted fill. In either case both total and differential settlements are estimated to be within tolerable limits for a continuous structure.

We trust that you will find the following report satisfactory, however, we would be pleased

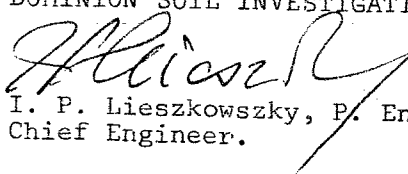
- 2 -

Your Ref. No. W.P. 349-63-02
Our Ref. No. 9-11-1

December 9, 1969

to discuss any aspect of this project with you at
your convenience.

Yours very truly,
DOMINION SOIL INVESTIGATION LIMITED


I. P. Lieszkowszky, P. Eng.,
Chief Engineer.

IPL/ns
Encl:

C O N T E N T S

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 THE SITE	2
3.0 GENERAL SUBSURFACE CONDITIONS.....	3
4.0 GROUNDWATER CONDITIONS.....	4
5.0 DISCUSSION OF THE RESULTS.....	5
5.1 STRUCTURE OVER THE TRENT RIVER	5
5.1.1 West Abutment.....	5
5.1.2 Piers.....	6
5.1.3 East Abutment.....	7
5.2 STRUCTURE OVER THE TRENT CANAL	9
5.2.1 West Abutment.....	9
5.2.2 West and Centre Piers.....	10
5.2.3 East Pier.....	10
5.2.4 East Abutment.....	11
5.3 Approach Fill.....	13
6.0 CONCLUSIONS.....	14
Appendix "A"	16

ENCLOSURES

	<u>No.</u>
Borehole Logs	1 to 22
Grain Size Distribution.Curves.....	23 to 27
Drawing No. I.....	Pocket

§

1.0 INTRODUCTION

This report describes the results of a foundation investigation carried out at the site of the proposed crossing at Highway No. 33 over the Trent River and Canal at Frankford, Ontario.

It is proposed to replace the existing narrow structure with two widened structures located about 100 to 200 feet upstream from the present bridge site. The total length of the crossing is 1300 feet which will be accomplished by two multi-span structures separated by a 300 foot long and 35 foot high earth embankment. The proposed construction is shown on Plan E-4681-1 of the Department of Highways, Ontario.

The requirements of the project and scope of the investigation were discussed with Mr. A.G. Stermac, P. Eng., Principal Foundation Engineer. The exploratory drilling programme consisted of seventeen boreholes, and five separate cone penetration tests. The location of the test holes is indicated on Drawing No. 1 attached in the side pocket at the rear of this report and the results of the borings can be found in the borehole logs. Further details of the field work and the procedures followed are given in the Appendix.

2.0 THE SITE

The site is located in the village of Frankford just north of the present crossing of Highway No. 33 over the Trent River and Canal.

The river at the point of crossing has a swift current and flows in a 700 foot wide channel in a due south direction. The river bed is cut in granular deposits, and the limestone bedrock forms the bottom of the channel. The flow in the river is governed by a dam located a short distance up stream, and at the time of the investigation the water level varied from day to day as much as 2 feet. The average river bottom elevation is 342 feet and the water level ranged between 346 and 348 feet. The west shore of the river is a built up area, whereas the east shore between the river and the canal is a low-lying flat land covered with heavy bush. The terrain is flat and poorly drained with occasional patches of thin peat or muskeg. East of the canal the ground rises to elevation 370 feet, is well drained and supports only a few small trees and little ground vegetation.

Physiographically the site is located in the "Trent Embayment" of the Iroquois Plain which is an inland embayment of the post-glacial Lake Iroquois reaching several miles inland north of the Bay of Quinte. For the most part the rock underlying this region is the Trenton Limestone and the overburden consists of rugged drumlin



hills with various lacustrine deposits found in the lowlands. The basin in which the Trent River and its tributary the Cold Creek has cut its channel is floored by deep sandy deposits.

3.0 GENERAL SUBSURFACE CONDITIONS

Detailed descriptions of the subsurface conditions at the site are presented on the Borehole Logs accompanying this report. In the following paragraph only a brief summary of the significant features of the subsurface conditions are discussed.

The ground surface in the area of the proposed structure over the Trent River ranges between elevation 342 and 348 feet, and at the Trent Canal site between elevation 356 and 370 feet. The surface of the bedrock is virtually horizontal, and lies between elevation 341 and 345 feet.

Overburden

In the area of the structure over the Trent river the overburden was either totally eroded or left as a very shallow layer of sand and gravel with numerous cobbles.

On the east shore of the river, and on both sides of the Trent Canal, the overburden is 7 to 23 feet deep. It consists of stratified granular deposits: two well graded sand and gravel strata separated from each other by compact silt and fine sand deposit. The thickness

of this fine sand and silt stratum increases from 18 inches to over 10 feet in the easterly direction.

Bedrock

The surface of the bedrock was encountered or inferred from refusal in the cone tests between elevation 341.5 and 344.7 ft. In the boreholes the bedrock was proven by coring for depths 5 to 10 feet. The rock is a light to dark grey coloured limestone belonging to the Trenton formation of the Ordovician system. It is a generally massive crystalline limestone with occasional dark bands of fine grained argillaceous limestone.

4.0 GROUNDWATER CONDITIONS

Water level observations carried out to the end of the field work indicate that the groundwater table has a small gradient toward the Trent River. It drops at a uniform rate from elevation 355 feet at the most easterly borehole to meet the water level of the river which at the time of the investigation fluctuated between elevation 346 and 348 feet.



5.0 DISCUSSION OF THE RESULTS

5.1 STRUCTURE OVER THE TRENT RIVER

This bridge will be a 575 feet long, 5 span structure with 125 foot interior and 100 foot exterior spans. The bridge deck will be constructed on a grade increasing from elevation 358 feet on the west side to elevation 380 feet at the east abutment.

The bedrock outcrops to the surface at almost each pier location and only at the abutment locations is it overlain by a shallow sand and gravel overburden. Rock surface elevation ranges between 341.5 and 344 feet.

5.1.1 West Abutment

As the finished grade is only 14 feet above the rock level, a closed end type of abutment and wing walls can be supported on spread footings resting on the surface of the bedrock and designed for a maximum contact pressure of 40 kips per square foot. The cores recovered from borehole No. 1 suggest that the top few feet of the rock may be fractured and weathered locally and therefore it is recommended that the excavation be carefully inspected and all loose and broken rock be removed before pouring the footings.

The horizontal thrust on the abutments can be resisted by frictional resistance between the foundation and the bedrock. In the design the coefficient of friction can be taken as 0.7 and it is recommended that the design

incorporate a safety factor of at least 1.5 against horizontal sliding.

Should an open type of abutment be considered, then the abutments can be supported on short steel H-piles driven to refusal on bedrock. Suggested safe working capacities for different pile sections are listed below.

<u>Pile Section</u>	<u>Safe Working Load</u>
8 BP 36	47 tons
10 BP 42	55 tons
12 BP 53	70 tons
14 BP 73	95 tons

Consideration could also be given to support the perched abutment on spread footings placed in the compacted approach fill. For a clean granular fill material compacted to 100% of its standard Proctor Maximum dry density an allowable bearing pressure of 3.5 kips per square foot is recommended. It is estimated that for the anticipated loading and bearing pressure the settlement will not exceed 1 inch. In this case however, adequate measure should be made to protect the end-slopes against erosion by the swift current of the river.

5.1.2 Piers

Pier footings can be established on the limestone bedrock encountered at the river bottom. There are no visible erosion channels in the river bed and the erosion of the sound bedrock would be noticeable only on a geological time scale. It is good practice however to

establish the footings a few inches below the top weathered zone. The allowable bearing pressure for spread footings resting on sound bedrock is 40 kips per square foot. The sliding resistance of the piers against ice thrust should be checked taking the value of the coefficient of friction as 0.7.

5.1.3 East Abutment

The finished grade at the east abutment is nearly 37 feet above the surface of the bedrock. Closed end type of abutments supported on spread footings will therefore not be practical, and one of the following foundation treatments should be considered.

Piled Foundations: The abutments could be supported on piles driven to practical refusal on the bedrock. To facilitate the driving of the piles through the approach fills, steel H-piles are recommended. Suggested safe working loads for the piles are discussed at the West Abutment.

Footings in Compacted Fill: The abutment could also be supported on spread footings laid 4 feet below the finished grade in the compacted approach embankment. Compaction requirements for the fill and allowable bearing pressures are the same as for the West Abutment. It is estimated however, that in view of the greater height of the fill the settlement would be of the order of 1.5 inches. The end and upstream side slopes of

Ref. No. 9-11-1

- 8 -

the embankment should be protected against
scour by rip-rap, gabions or concrete aprons.

S

5.2 STRUCTURE OVER THE TRENT CANAL

The proposed bridge over the Trent Canal will be a 4 span structure of a total length of 346 feet. The proposed deck level of the structure will be at about elevation 390 feet.

The subsurface conditions at this structure location are indicated on the Log of Boreholes 13 to 22 inclusive. The surface of the bedrock lies between elevations 341 and 344.7 feet and is covered by 7 to 23 feet of granular overburden.

5.2.1 West Abutment

The abutment can be supported on steel H-piles driven through the approximately 40 feet high approach fill. Safe working loads for various pile sections driven to practical refusal on bedrock are listed below.

<u>Steel-H Pile Section</u>	<u>Safe Working Load</u>
8 BP 36	47 ton.
10 BP 42	55 tons
12 BP 53	70 tons
14 BP 73	95 tons

The horizontal thrust on the abutments shall be resisted by battered piles.

The abutment could also be supported on spread footings placed 4 feet below finished grade in the compacted fill of the approach embankment. In this case the fill material shall be compacted to not less than 100%

of its Standard Proctor Maximum Dry Density and the footings shall be proportioned that the maximum pressure under the foundation does not exceed 3.5 kips per square foot. It is estimated that the maximum total settlement under the footings will be of the order of 1.5 inches.

5.2.2 West and Centre Piers

The centre line of these piers is located on the concrete lined side slopes of the Trent Canal. Test Holes Nos. 15, 16, 17 and 18 indicate that the banks of the canal consist of loose to dense sand and gravel deposits extending to about elevations 350±. Below this level the significant soil deposit is a compact silt stratum which is underlain by the limestone bedrock at elevation 342± feet.

To eliminate construction problems in establishing footings within these granular deposits below the water table, and to minimize the obstruction of the canal during construction it is recommended that the piers be supported on piles driven to refusal on bedrock. Safe working loads are the same as those discussed for the West Abutment.

5.2.3 East Pier

At the east pier location the overburden is about 21 feet deep consisting of 7 feet of dense sand and gravel, underlain by 11 feet of loose to compact silt and very fine sand followed by 3 feet of very dense sand and gravel. The surface of the bedrock is at elevation 344± ft.

Conventional spread footings could be established 4 feet below grade, that is about elevation 362 feet. The allowable bearing pressure at this level for strip footings is governed by the bearing capacity and compressibility of the underlying silt and very fine sand deposit. The recommended allowable bearing pressure for strip footings is 5 kips per square foot.

The total load on the east pier will probably be of the order of 60 kips per linear foot and the maximum settlement under this loading is estimated to be about 2.5 inches. Because of the granular nature of the subsoil the settlements will be almost instantaneous, that is they will occur as the loads are applied.

Alternatively the pier could be supported on steel H-piles driven to practical refusal on bedrock.

5.2.4 East Abutment

At the east abutment the overburden consists of compact silty fine sand which extends to the surface of the limestone bedrock encountered 23 feet below grade at elevation 344± feet.

The footings of closed end abutments and wing walls can be established at elevation 363 feet with an allowable bearing pressure of 6.0 kips per square foot.

The maximum settlement corresponding to a uniformly distributed load of 40 kips per linear foot of abutment was calculated to be of the order of 2 inches.

Open end, spill-through, type of abutment could be supported on either steel-H end bearing piles driven to refusal on bedrock, or on spread footings established in the compacted fill. Safe working loads for the piles and recommended allowable bearing pressures for spread footings in the fill are the same as discussed for the west abutment.

5.3 APPROACH FILL

There are no stability problems foreseen for the approximately 20 to 35 foot high approach fills constructed with normal 2 to 1 side and end slopes.

On the east shore of the Trent River between stations 237 + 00 and 238 + 50, a thin layer of muskeg may have to be removed. A maximum of 12 inches was encountered in borehole 14 and visual inspection of the area cleared for the survey line suggests that the muskeg may not form a continuous layer but that it occurs in isolated pockets.

The placement and compaction of the fill shall be in accordance with D.H.O. Form 200 Section 214. However, if the abutments are supported on spread footings in the fill the minimum degree of compaction of the fill shall be 100% of the Maximum Proctor Dry Density.

6.0 CONCLUSIONS

From the above discussion it is concluded that the structure over the Trent River can be supported on spread footings established on bedrock, except at the East Abutment, where because of the high approach fills steel H-piles driven to bedrock will be more practical. In either case only negligible settlements are expected and therefore the foundation conditions are suitable for the design and construction of a continuous structure.

For the foundation treatment of the structure over the Trent Canal, several alternatives were discussed:

- i) all piers and abutments supported on steel H-piles driven to bedrock.
- ii) Piers supported on piles driven to bedrock and abutments supported on spread footings in compacted fill.
- iii) The West Abutment, west pier and centre piers supported on piles; east pier and east abutment supported on spread footings in the overburden or compacted fill.

For schemes ii) and iii) the maximum differential settlement was estimated to be of the order of 2 to 2-1/2 inches which for the minimum span length of 75 feet represents an angular distortion of $\frac{1}{360}$. This is considered to be within tolerable limits of a continuous steel frame structure.

There are no stability problems or excessive settlements anticipated under the approach fills.



DOMINION SOIL INVESTIGATION LIMITED

I. P. Lieszkowszky
I. P. Lieszkowszky, P. Eng.,
Chief Engineer.

IPL/ns

Encl:

APPENDIX "A"

Authority to proceed with the project was contained in a letter by Mr. A. Rutka, Materials and Testing Engineer, Department of Highways, dated October 31, 1969.

The investigation consisted of 17 boreholes and 5 separate cone penetration tests at the locations shown on Drawing No. 1. The field work was carried out in the period November 3rd to November 20th, 1969.

A skid-mounted diamond drill machine was used to advance the borehole and the borings in the Trent River were carried out from a floating raft platform.

Sampling of the overburden was affected by the Standard Penetration Test methods in which the 2 inch diameter split-spoon sampler was driven into undisturbed soil by means of a 140 pound hammer falling freely to a distance of 30 inches. The number of blows of the hammer required to advance the sampler 1 foot has been recorded as the Standard Penetration Resistance or N-value of the soil. The boreholes were lined with Bx (2-7/8 inch) size steel casing. The bedrock was cored in Axt (1-1/4 inch) size to depths ranging between 5 and 10 feet. Records of the borings, sampling and penetration tests are shown on the Borehole Logs.

The field work was under the constant supervision of Mr. M. Pressette, Soils Technician.

S

Appendix "A" (continued)

Elevations were referred to geodetic banchmark No. 3204, the location of which was shown on Plan E-4681-1 of the Department of Highways, Ontario. Elevation of this benchmark was given as 353.915 feet.

Samples sent in from the field in airtight glass jars were subjected to further visual classification and testing. The testing programme consisted of sieve and hydrometer tests performed on representative samples. The results of these tests are presented on Enclosures 23 to 27 inclusive.

ENCLOSURES

LOG OF BOREHOLE.....I.....





Our Reference No 9-11-1

Enclosure No 1

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL
LOCATION: HWY. 33, FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING
Diameter: Bx & AxT.
Date: NOV. 19 - 20 . 1969

SUBSURFACE PROFILE				SAMPLES		PENETRATION RESISTANCE					WATER CONTENT %			REMARKS			
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT		NATURAL	LIQUID LIMIT	
								20	40	60	80	100	Wp		W	Wl	
								UNDRAINED SHEAR STRENGTH									lbs/sq. ft
								+ FIELD VANE TEST									
349.5	0	GROUND SURFACE															
344.2	5.3	Brown			1	SS	100%										
		SAND															
		Some Gravel numerous cobbles															
		Grey															
334.3	15.2	fractured.		W.L. EL. 346.5 NOV. 20, 1965	2	AxT.	30%										
		Sound															
		LIMESTONE BEDROCK.															
		3															
		END OF BOREHOLE															

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED: C

LOG OF BOREHOLE 2

Our Reference No. 9-11-1

Enclosure No. 2

CLIENT: DEPARTMENT OF HIGHWAYS.
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33, FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING.
Diameter: 8x 8xT.
Date: NOV. 5, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %			REMARKS	
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT	NATURAL		LIQUID LIMIT
								20	40	60	80	100				
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST								lb/sq. ft. ● COMPRESSION TEST
<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><</div>																

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED: /

LOG OF BOREHOLE3.....

Our Reference № 9-11-1

Enclosure № 3

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HIGHWAY 33, FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING
Diameter: 9x. & AxT.
Date: NOV. 6, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT			REMARKS	
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT	NATURAL		% LIQUID LIMIT
								20	40	60	80	100	W _p	W		W _L
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST								
347.3	0	RIVER LEVEL														
343.0	4.3	RIVER BOTTOM														
	5	Grey LIMESTONE BEDROCK Sound			1	AxT RC	15 %									
					2	AxT RC	10 %									
337.8	9.5	END OF BOREHOLE														

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED: 17

LOG OF BOREHOLE4.....

Our Reference N^o 9-11-1

Enclosure N^o 4

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 35, FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING.
Diameter: Bx & AxT.
Date: NOV. 6, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %			REMARKS
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N'	Blows / Foot	UNDRAINED SHEAR + FIELD VANE TEST	STRENGTH ● COMPRESSION TEST	lbs/sq. ft.	PLASTIC LIMIT W _p	NATURAL W	LIQUID LIMIT W _L	
								20 40 60 80 100							
347-3	0	RIVER LEVEL													
342-5	4-8	RIVER BOTTOM													
	5	Grey LIMESTONE BEDROCK			1	SS	100%								
		Sound			2	AxT. RC	93 %								
337-6	9-7	END OF BOREHOLE													

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED: /

LOG OF BOREHOLE5.....

Our Reference No 9-11-1

Enclosure No 5

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33. FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING.
Diameter: 8x 8 AxT.
Date: NOV. 7, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %					REMARKS
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT	NATURAL	LIQUID LIMIT		
								20	40	60	80	100					
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST							STRENGTH lbs/sq. ft. ● COMPRESSION TEST		
348.0	0	RIVER LEVEL															
	5																
342.5	5.5	RIVER BOTTOM															
		Grey LIMESTONE BEDROCK															
		Fractured, horizontal joints 1" to 3" apart			1	AxT. RC	80 %										
	10																
337.5	10.5	END OF BOREHOLE															

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED:

LOG OF BOREHOLE6.....

Our Reference No 9 - 11 - 1

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL
LOCATION: HWY. 35 FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

Enclosure No 6

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING
Diameter: Bx & AxT
Date: NOV. 7. 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT			REMARKS				
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT	NATURAL		% LIQUID LIMIT			
								20	40	60	80	100	UNDRAINED SHEAR + FIELD VANE TEST	STRENGTH lbs/sq. ft		● COMPRESSION TEST	Wp	W	WL
348.0	0	RIVER LEVEL																	
	5																		
341.5	6.5	RIVER BOTTOM																	
		Grey LIMESTONE BEDROCK			1	AxT RC	94 %												
	10	Sound																	
		END OF BOREHOLE																	

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED: *[Signature]*

LOG OF BOREHOLE 7


Our Reference No. 9-11-1

Enclosure No. 7

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL
LOCATION: HWY 33, FRANKFORD, ONT.
DATUM, ELEVATION: G. S. G.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING
Diameter: Bx & AxT.
Date: NOV. 11, 1969

SUBSURFACE PROFILE					SAMPLES			PENETRATION RESISTANCE					WATER CONTENT					REMARKS			
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT Wp	NATURAL W	% LIQUID LIMIT WL						
								20	40	60	80	100									
								UNDRAINED SHEAR STRENGTH								lbs/sq. ft.					
								+ FIELD VANE TEST								● COMPRESSION TEST					
346.9	0	RIVER LEVEL -																			
342.9	4.0	RIVER BOTTOM																			
		1																	AxT. RC	78 %	
		2																	AxT. RC	94 %	
337.7	9.2	END OF BOREHOLE																			

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED:

LOG OF BOREHOLE 8

Our Reference No. 9-11-1

Enclosure No. 8

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL
LOCATION: HWY. 33, FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING
Diameter: 8x 8 AxT.
Date: NOV. 10, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT					REMARKS
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT	NATURAL	% LIQUID LIMIT		
								20	40	60	80	100	W _p	W	W _L		
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST								STRENGTH ● COMPRESSION TEST lbs/sq. ft.	
347.3	0	RIVER LEVEL															
342.5	4.8	RIVER BOTTOM															
	5	Grey LIMESTONE BEDROCK Fractured			1	AxT. RC	56.6 %										
339.1	8.2	END OF BOREHOLE															

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED: *[Signature]*

LOG OF BOREHOLE 9

Our Reference No. 9-11-1

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL
LOCATION: HWY. 33. FRANKFORD. ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING
Diameter: Bx & AxT.
Date: NOV. 12. 1969

Enclosure No. 9

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %			REMARKS	
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT Wp	NATURAL W		LIQUID LIMIT WL
								20	40	60	80	100				
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST								
346.9	0	RIVER LEVEL														
343.8	3.1	RIVER BOTTOM														
343.4	3.5	SAND														
	5	Grey														
		LIMESTONE BEDROCK														
337.2	9.7	END OF BOREHOLE														

VERTICAL SCALE: 1 inch = 5 feet

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED: S.

LOG OF BOREHOLE 10

Our Reference No 9-11-1

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL
LOCATION: HWY. 33. FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING.
Diameter: Bx & AxT.
Date: NOV. 11. 1969

Enclosure No 10

SUBSURFACE PROFILE					SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %					REMARKS
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT Wp	NATURAL W	LIQUID LIMIT WL			
								20	40	60	80	100						
								UNDRAINED SHEAR STRENGTH								lbs/sq. ft.		
								+ FIELD VANE TEST									● COMPRESSION TEST	
346.9	0	RIVER LEVEL																
343.9	3.0	RIVER BOTTOM																
342.2	4.7	GRAVEL			1	SS	100/6"											
	5	Some SAND			2	AxT. RC.	38.3 %											
		Grey																
		LIMESTONE BEDROCK.			3	AxT. RC.	86.7 %											
336.4	10.5	END OF BOREHOLE																

VERTICAL SCALE: 1 inch to 5 feet

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED: [Signature]

LOG OF BOREHOLE II

Our Reference No 9-11-1

Enclosure No 11

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33, FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING
Diameter: 8x 8 AxT.
Date: NOV. 12, 1969

SUBSURFACE PROFILE					SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %			REMARKS
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT Wp	NATURAL W	LIQUID LIMIT WL	
								20	40	60	80	100				
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST								
346.9	0	RIVER LEVEL.														
344.8	2.1	RIVER BOTTOM														
344.0	2.9	GRAVEL, some SAND			1	SS	100/8"									
	5	Grey LIMESTONE BEDROCK			2	AxT. RC.	60 %									
					3	AxT. RC.	80 %									
339.9	7.0	END OF BOREHOLE														

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED:

LOG OF BOREHOLE 12.....

Our Reference No 9-11-1

Enclosure No 12

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33, FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING
Diameter: Bx & AxT.
Date: NOV. 13, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %					REMARKS
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT	NATURAL	LIQUID LIMIT		
								20	40	60	80	100					
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST					lb/sq. ft. @ COMPRESSION TEST				
346.9	0	RIVER LEVEL.															
345.6	1.3	RIVER BOTTOM															
		SAND, GRAVEL and COBBLES			1	AxT. RC.											
343.2	3.7	LIMESTONE BEDROCK			2	AxT. RC.	5/16										
342.4	4.5	END OF BOREHOLE															

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED:

LOG OF BOREHOLE 13

Our Reference No 9-11-1

Enclosure No 13

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33. FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method:
Diameter:
Date: NOV. 13, 1969

SUBSURFACE PROFILE				SAMPLES		PENETRATION RESISTANCE					WATER CONTENT %			REMARKS		
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT		NATURAL	LIQUID LIMIT
								20	40	60	80	100	Wp		W	WL
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST								
349.4	0	GROUND SURFACE														
341.4	8.0	END OF CONE TEST														REFUSAL AT. 341.4' PROBABLY BEDROCK

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED:

LOG OF BOREHOLE.....14.....











Our Reference N^o 9-11-1

Enclosure N^o 14

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33. FRANKFORD, ONT.
DATUM ELEVATION: C.S.C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING
Diameter: Bx. & AxT.
Date: NOV. 14, 1969.

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT			REMARKS	
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT	NATURAL		LIQUID LIMIT
								20	40	60	80	100	W _p	W		W _L
								UNDRAINED SHEAR + FIELD VANE TEST		STRENGTH		lbs/sq. ft.				
349.3	0	GROUND SURFACE														
	1.0	MUSKEG														
		SANDY GRAVEL														
346.3	3.0	COMPACT SILT			1	SS	18									
344.8	4.5	COMPACT, Grey														
	5	COMPACT, Grey GRAVELLY SAND			2	SS	26									
		Some SILT.														
341.8	7.5	Grey														
	10	LIMESTONE BEDROCK			3	AxT. RC.	91.7 %									
		Sound.														
336.8	12.5	END OF BOREHOLE														

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED:


LOG OF BOREHOLE 15

Our Reference No. 9-11-1

Enclosure No. 15

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33, FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA
Method: WASHBORING & DIAMOND DRILLING
Diameter: Bx. & AxT.
Date: NOV. 14-17, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %			REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	N' Blows / Foot	Blows / Foot					PLASTIC LIMIT	NATURAL		LIQUID LIMIT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
								20	40	60	80	100	W _p	W		W _L																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST									lbs./sq.ft. ● COMPRESSION TEST																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
364.8	0	GROUND SURFACE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	5	COMPACT TO LOOSE GRAVELLY SAND Some SILT FILL		CAVE - IN EL. 350.8' NOV. 20, 1969.	1	SS	12	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

GRAIN SIZE DISTR.
Encl. 25

GRAIN SIZE DISTR.
Encl. 25

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED:

LOG OF BOREHOLE 16

Our Reference No. 9-11-1

Enclosure No. 16

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL
LOCATION: HWY. 33, FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA
Method:
Diameter:
Date: NOV. 14, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT			REMARKS	
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	N Blows / Foot	Blows / Foot					PLASTIC LIMIT W _p	NATURAL W		LIQUID LIMIT W _L
								20	40	60	80	100				
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST								
364.9	0	GROUND SURFACE														
	5															
	10															
	15															
	20															
341.6	23.3	END OF CONE TEST													REFUSAL AT 341.6' PROBABLY ON BEDROCK	

LOG OF BOREHOLE17.....

Our Reference No. 9-11-1

Enclosure No. 17

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33. FRANKFORD, ONT.
DATUM ELEVATION: G.S.C.

DRILLING DATA

Method:
Diameter:
Date: NOV. 17, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %			REMARKS	
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT	NATURAL		LIQUID LIMIT
								20	40	60	80	100	W _p	W		W _L
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST								
365.1	0	GROUND SURFACE														
	5															
357.3	7.8	END OF CONE TEST														

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED:

LOG OF BOREHOLE 18

Our Reference No 9-11-1

Enclosure No 18

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33, FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA
Method: WASHBORING & DIAMOND DRILLING
Diameter: Bx & AxT
Date: NOV. 17-18, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE Blows / Foot					WATER CONTENT %			REMARKS
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N'	Blows / Foot				PLASTIC LIMIT	NATURAL	LIQUID LIMIT	
									20	40	60	80	100		
									UNDRAINED SHEAR STRENGTH + FIELD VANE TEST	STRENGTH		lbs./sq. ft.			
365.1	0	GROUND SURFACE													
		12" TOPSOIL													
		Brown													
		FINE TO MEDIUM SAND													
361.1	4.0														
	5	VERY DENSE													
		Brown			1	SS	94								
		SAND & GRAVEL													
		Well graded			2	SS	100/6"								
		Dry													
	10				3	SS	100/6"								
					4	CS									
352.3	12.0	COMPACT			5	SS	10		0						
	15	Light grey			6	SS	15		0						
		SILT													
		Some FINE SAND													
346.6	18.5														
	20	VERY DENSE			7	SS	100/7"								
		Brown													
		SAND & GRAVEL													
342.5	22.0														
		Grey													
	25	LIMESTONE BEDROCK			8	AxT.	100								
		Sound.				RC.	%								
337.6	27.5	END OF BOREHOLE													

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED:

LOG OF BOREHOLE...19.....

Our Reference No. 9-11-1

Enclosure No. 19

CLIENT: DEPARTMENT OF HIGHWAYS.
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33 FRANKFORD, ONT.
DATUM ELEVATION: G.S.C.

DRILLING DATA

Method: WASHBORING
Diameter: Bx. & AxT.
Date: NOV. 18-19, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT			REMARKS						
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	Blows / Foot					PLASTIC LIMIT	NATURAL		LIQUID LIMIT					
								20	40	60	80	100									
								UNDRAINED SHEAR STRENGTH					lbs/sq. ft.								
								+ FIELD VANE TEST					● COMPRESSION TEST								
<div><div><div>366.0 0</div><div>GROUND SURFACE</div></div><div><div>12" TOPSOIL</div><div>Brown</div><div>FINE TO MEDIUM</div><div>SAND</div></div><div><div>5</div><div>VERY DENSE</div><div>Brown</div><div>SAND & GRAVEL</div><div>Well graded</div></div><div><div>359.0 7.0</div><div>LOOSE TO</div><div>COMPACT</div><div>SILT &</div><div>VERY FINE</div><div>SAND</div><div>wet</div></div><div><div>15</div><div>Brown</div><div>Light grey</div></div><div><div>347.5 18.0</div><div>VERY DENSE, Grey</div><div>SAND & GRAVEL</div><div>wet</div></div><div><div>344.5 21.5</div><div>Grey</div><div>Fractured</div><div>Sound</div><div>LIMESTONE</div><div>BEDROCK</div></div><div><div>336.3 29.7</div><div>END OF BOREHOLE</div></div></div> <div><div>CAVE-IN EL. 353.4</div><div>NOV. 20, 1969</div></div> <div><div>1</div><div>SS</div><div>95</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div>2</div><div>SS</div><div>18</div><div>0</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div>3</div><div>SS</div><div>8</div><div>0</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div>4</div><div>SS</div><div>10</div><div>0</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div>5</div><div>SS</div><div>22</div><div>0</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div>6</div><div>SS</div><div>65</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div>7</div><div>AxT.</div><div>65</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div>8</div><div>AxT.</div><div>100</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>																					

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z.A. CHECKED:

LOG OF BOREHOLE 20

Our Reference No 9-11-1

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL
LOCATION: HWY. 33. FRANKFORD. ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method:

Diameter:

Date: NOV. 18 . 1969

Enclosure № 20

[illegible]

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED:

LOG OF BOREHOLE 21

Our Reference No. 9-11-1

Enclosure No. 21

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL
LOCATION: HWY. 33, FRANKFORD ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA
Method:
Diameter:
Date: NOV. 19, 1969

SUBSURFACE PROFILE				SAMPLES		PENETRATION RESISTANCE					WATER CONTENT %			REMARKS		
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	N' Blows / Foot	Blows / Foot					PLASTIC LIMIT		NATURAL	LIQUID LIMIT
								20	40	60	80	100	W _p		W	W _L
								UNDRAINED SHEAR STRENGTH + FIELD VANE TEST								
368.7	0	GROUND SURFACE														
	5															
	10															
	15															
	20															
346.2	22.5	END OF BOREHOLE														

Cone Test

REFUSAL AT
346.2'
PROBABLY BEDROCK

VERTICAL SCALE: 1 inch to 5 feet

DOMINION SOIL INVESTIGATION LIMITED

MADE: Z.A. CHECKED: J.Z.

LOG OF BOREHOLE 22

Our Reference No 9 - 11 - 1

Enclosure No 22

CLIENT: DEPARTMENT OF HIGHWAYS
PROJECT: CROSSING AT TRENT RIVER & CANAL.
LOCATION: HWY. 33 FRANKFORD, ONT.
DATUM ELEVATION: G. S. C.

DRILLING DATA

Method: WASHBORING & DIAMOND DRILLING
Diameter: Bx. & AxT.
Date: NOV. 19, 1969

SUBSURFACE PROFILE				SAMPLES			PENETRATION RESISTANCE					WATER CONTENT %			REMARKS	
ELEVATION Ft.	DEPTH Ft.	DESCRIPTION	SYMBOL	GROUND WATER	NUMBER	TYPE	'N' Blows / Foot	RESISTANCE					PLASTIC LIMIT	NATURAL		LIQUID LIMIT
								20	40	60	80	100				
								UNDRAINED SHEAR STRENGTH					WATER CONTENT			
								+ FIELD VANE TEST					W _p W W _L			
								COMPRESSION TEST								

368.0	0	GROUND SURFACE.															
		6" TOPSOIL															
	5	COMPACT			1	SS	22		0								GRAIN SIZE DISTR. Encl. 27
		SILTY			2	SS	26		0								
	10	FINE SAND			3	SS	15		0								
		Damp wet			4	SS	12		0								GRAIN SIZE DISTR. ENCL. 27
	15	Light brown			5	SS	13		0								
		Greyish			6	SS	14		0								
	20				7	SS	100/NP		0								
344.7	23.3	Grey			8	AxT. RC	65 %										
	25	LIMESTONE			9	AxT. RC	100 %										
	30	BEDROCK															
335.3	32.7	END OF BOREHOLE															

VERTICAL SCALE: 1 inch to 5 feet

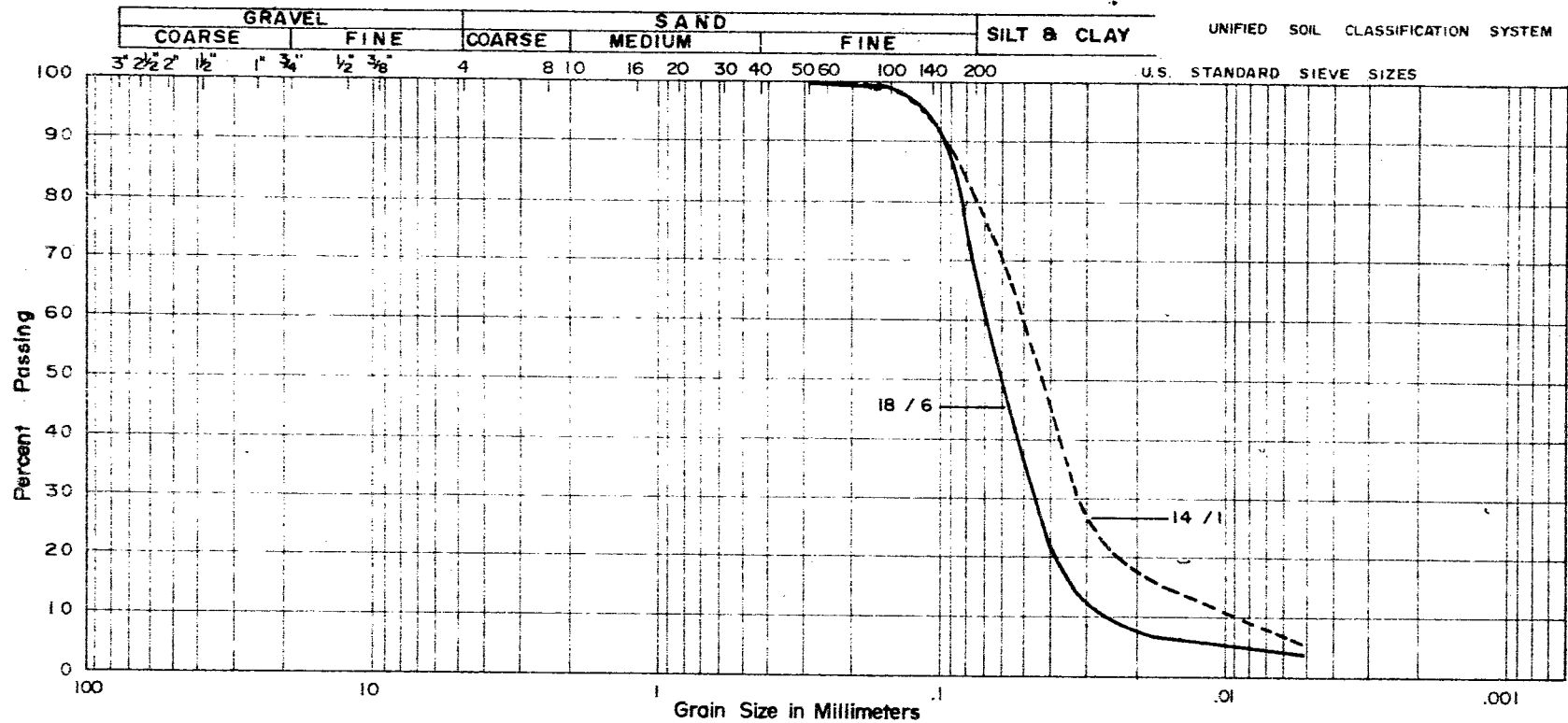
DOMINION SOIL INVESTIGATION LIMITED

MADE: Z. A. CHECKED: *[Signature]*

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE № 9-11-1



PROJECT: CROSSING AT TRENT RIVER & CANAL

LOCATION: HWY 33, FRANKFORD, ONT.

BOREHOLE №: 14, 18

SAMPLE №: 1, 6

DEPTH: 4', 16.5'

ELEVATION:

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SILT with some fine SAND

PLASTIC PROPERTIES

LIQUID LIMIT % =

PLASTIC LIMIT % =

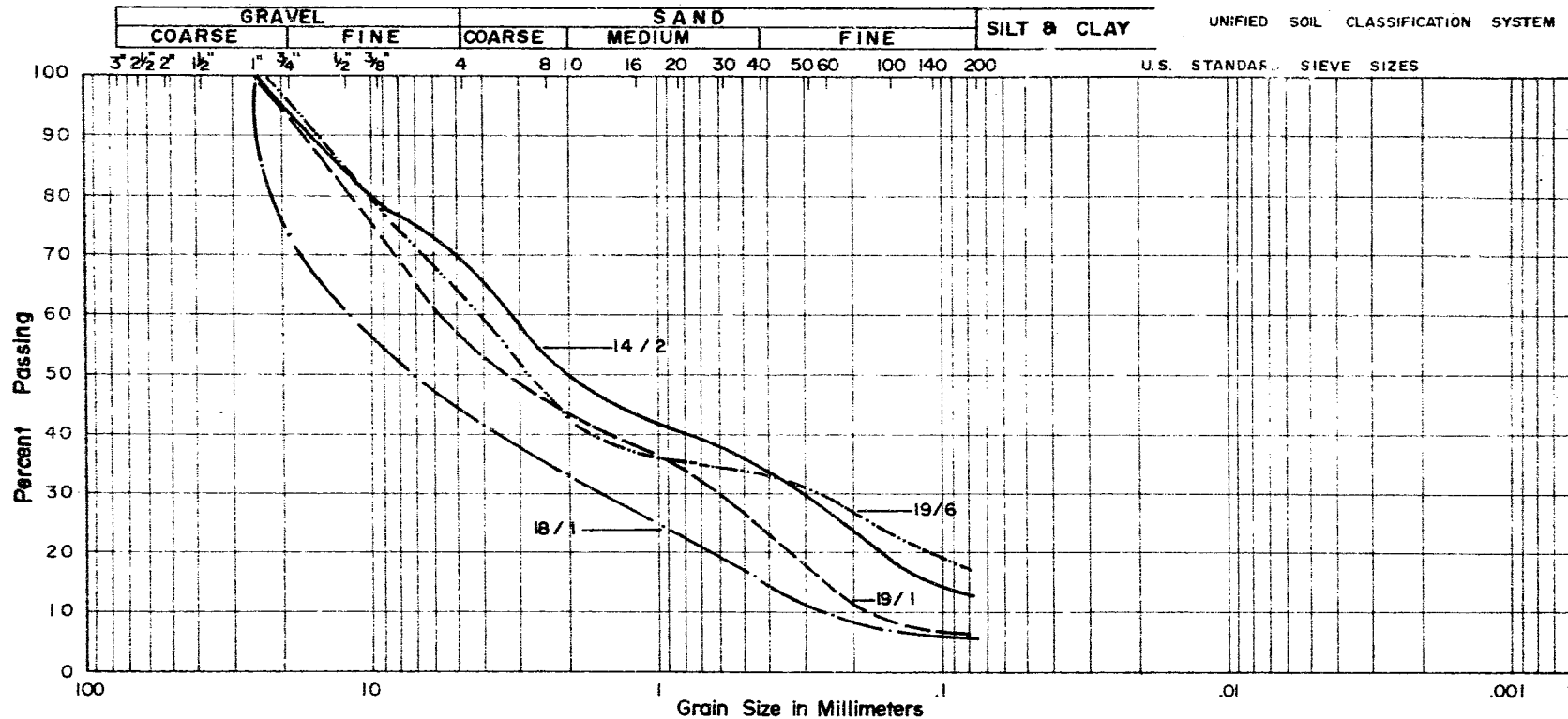
PLASTICITY INDEX % =

MOISTURE CONTENT % =

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE № 9-11-1



PROJECT: CROSSING AT TRENT RIVER & CANAL
 LOCATION: HWY. 33. FRANDFORD.
 BOREHOLE №: 14, 18, 19, 19
 SAMPLE №: 2, 1, 1, 6
 DEPTH: 6.5', 6.5', 6.5', 21.5'
 ELEVATION:

COEFFICIENT OF UNIFORMITY:
 COEFFICIENT OF CURVATURE:

PLASTIC PROPERTIES

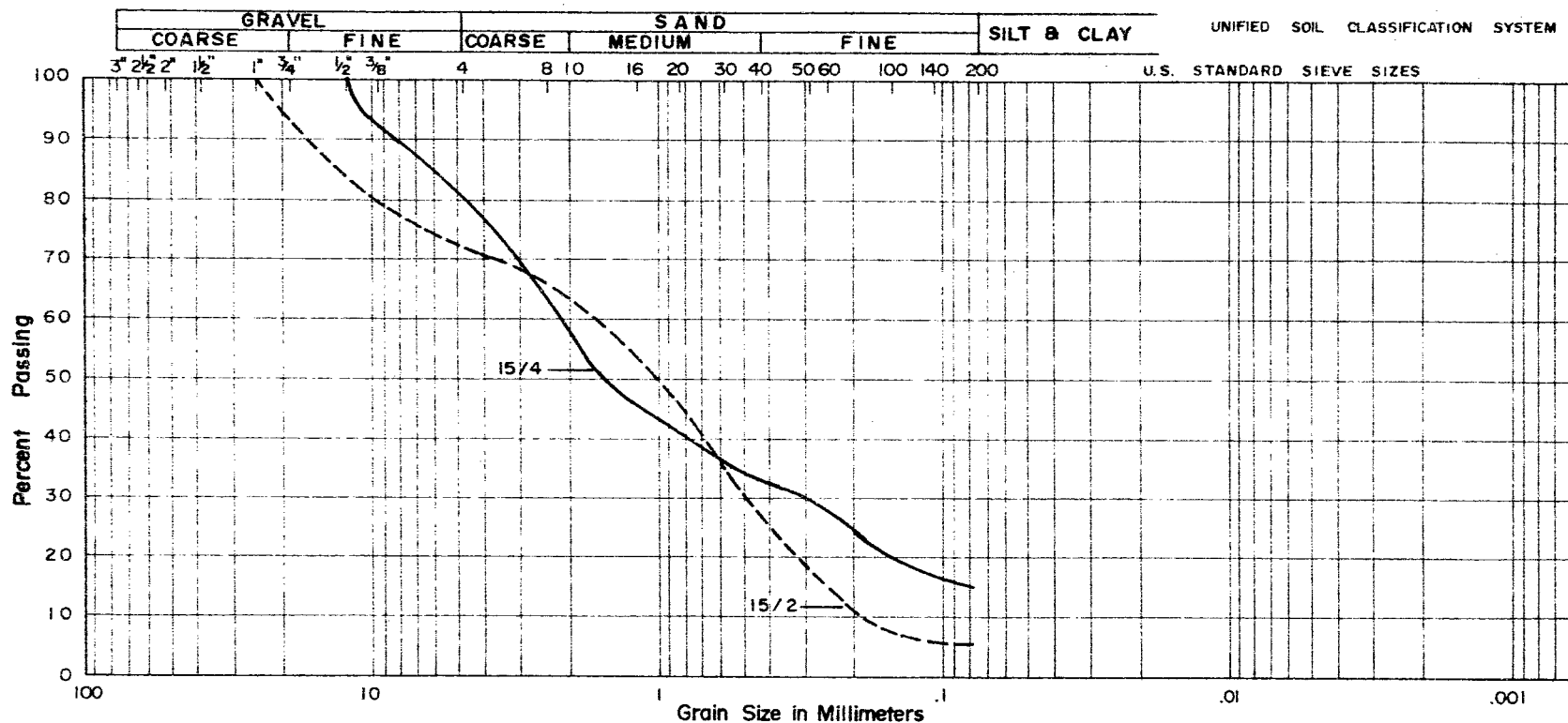
LIQUID LIMIT % =
 PLASTIC LIMIT % =
 PLASTICITY INDEX % =
 MOISTURE CONTENT % =

Classification of Sample and Group Symbol:
WELL GRADED SAND & GRAVEL
 with some SILT.

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO 9-11-1



PROJECT: CROSSING AT TRENT RIVER & CANAL.

LOCATION: HWY. 33. FRANKFORD. ONT.

BOREHOLE NO: 15, 15

SAMPLE NO: 2, 4

DEPTH: 9', 14'

ELEVATION:

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

PLASTIC PROPERTIES

LIQUID LIMIT % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

Classification of Sample and Group Symbol:

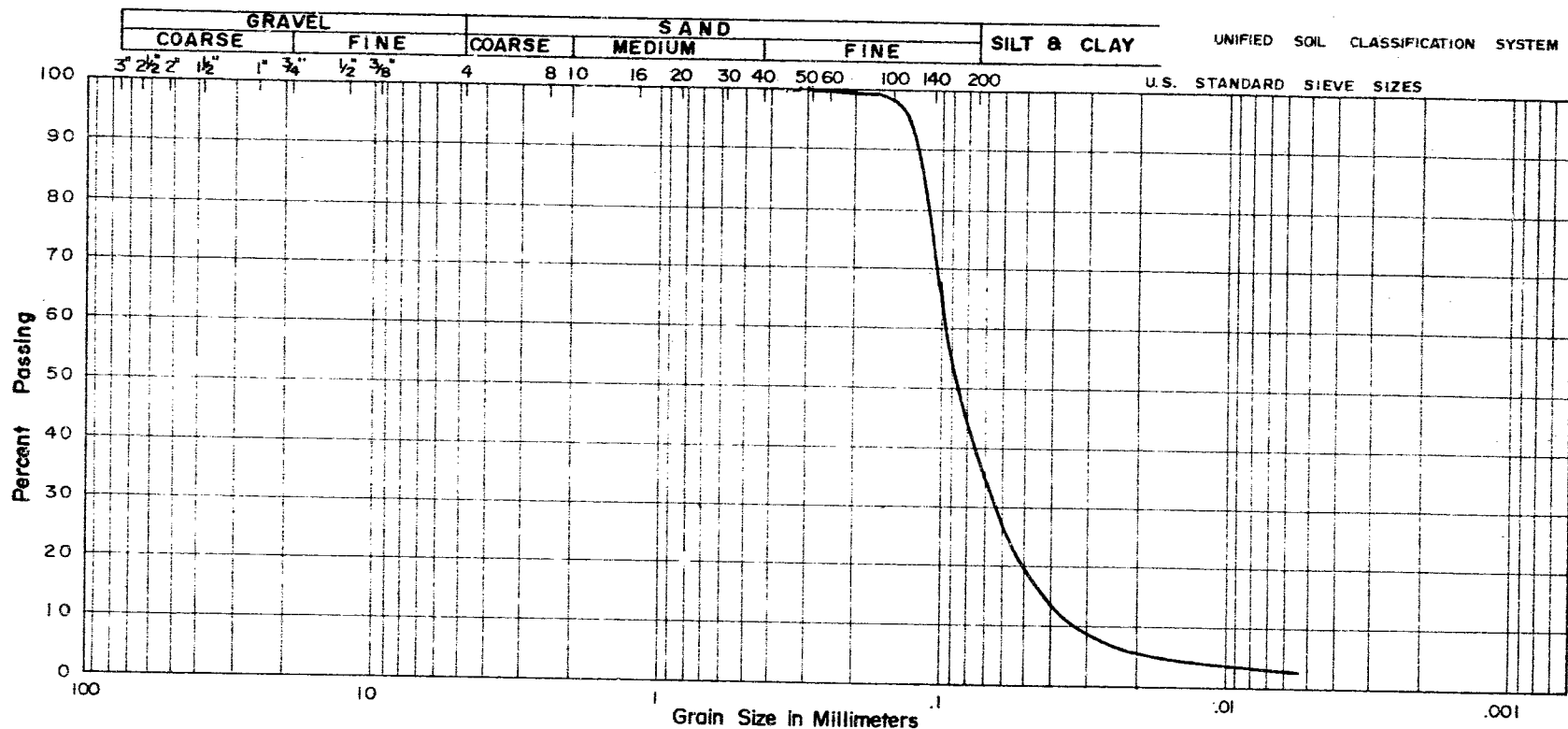
GRAVELLY SAND
some SILT. **FILL.**

ENCLOSURE NO 25

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE No 9-11-1



PROJECT: CROSSING AT TRENT RIVER & CANAL. COEFFICIENT OF UNIFORMITY :
 LOCATION: HWY 33, FRANKFORD, ONT. COEFFICIENT OF CURVATURE :
 BOREHOLE No: 19
 SAMPLE No: 3
 DEPTH: 11.5'
 ELEVATION:

Classification of Sample and Group Symbol:
 VERY FINE SAND & SILT.

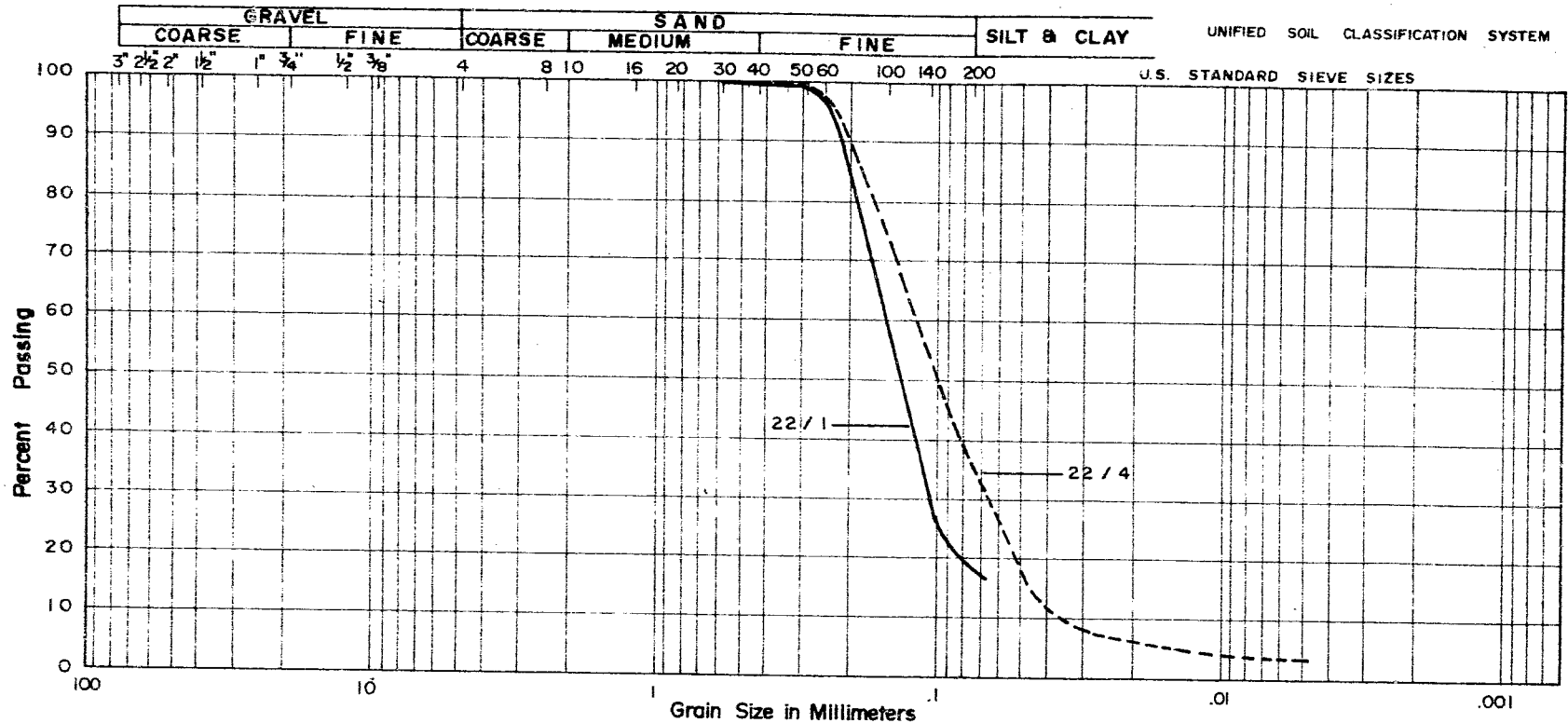
PLASTIC PROPERTIES

LIQUID LIMIT % =
 PLASTIC LIMIT % =
 PLASTICITY INDEX % =
 MOISTURE CONTENT % =

DOMINION SOIL INVESTIGATION LIMITED

GRAIN SIZE DISTRIBUTION

OUR REFERENCE № 9-11-1



PROJECT: CROSSING AT TRENT RIVER & CANAL COEFFICIENT OF UNIFORMITY :

LOCATION: HWY. 33, FRANKFORD - ONT. COEFFICIENT OF CURVATURE :

BOREHOLE №: 22, 22

SAMPLE №: 1, 4.

DEPTH: 6.5', 14'

ELEVATION:

Classification of Sample and Group Symbol:

SILTY FINE SAND.

PLASTIC PROPERTIES

LIQUID LIMIT % =

PLASTIC LIMIT % =

PLASTICITY INDEX % =

MOISTURE CONTENT % =

MEMORANDUM

198

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

FROM: C.S. Grebski,
Bridge Office

ATTENTION:

DATE: October 30, 1970

OUR FILE REF.

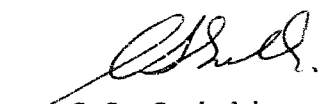
IN REPLY TO

SUBJECT: Trent Canal Bridge in Frankford
W.P. 349-63-04, Site No. 11-280
Highway 33, District No. 8

Wom - 1st/69

Attached herewith we are submitting the final
bridge drawings which show the foundation design for
this structure.

Kindly give us your comments at your earliest
convenience.



C.S. Grebski,
Bridge Design Engineer

CSG:rd

Attach.

c.c. Foundation Office

16. Nov. 70

NO COMMENTS

A. N. B.

K. S. L.

2 Dec 70

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

**Mr. T.C. Kingsland,
Reg. Bridge Planning Engineer,
Kingston Regional Office**

**C.S. Grebaki,
Bridge Office**

April 10, 1970

**Trent River and Canal Bridge in Frankford
W.P. 349-63-02 & 04, Site Nos. 11-145, 11-280
Highway 33, District No. 8**

Dom/69

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-6794-P1 and D-6795-P1 for the above-mentioned structures.

The estimated cost of the proposed structures is \$700,000. This cost includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

CSG:rd

**C.S. Grebaki,
Bridge Design Engineer**

Attach.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

No comments

K. G. Grebaki

April 13th 1970

MEMORANDUM

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

FROM: C.S. Grebski,
Bridge Office

ATTENTION:

DATE: October 30, 1970

DUP FILE REF.

IN REPLY TO

SUBJECT: Trent River Bridge in Frankford
W.P. 349-63-02, Site No. 11-145
Highway 33, District No. 8

Comm. Sailed 1/69

Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

C.S. Grebski

C.S. Grebski,
Bridge Design Engineer

CSG:rd

Attach.

c.c. Foundation Office

16. NOV 70

NO COMMENTS

A.E.B.

26/11/70

[Signature]
26/11/70

MEMORANDUM

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Office,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Office,
Room 107, Lab. Bldg.

ATTENTION: Mr. S. McCombie

DATE: December 12, 1969

OUR FILE REF.

IN REPLY TO

DEC 12 1969

SUBJECT:

FOUNDATION INVESTIGATION REPORT --
BY: Dominion Soil Investigation Limited
Proposed Crossing of Trent River and Canal
King's Hwy. #33, Frankford, Ontario
W.P. 349-63-02 -- District 3 (Kingston)

Attached, please find the above mentioned report report prepared and submitted by the Consultant, Dominion Soil Investigation Limited.

We have reviewed the report and believe that it contains all the information necessary for you to proceed with the design of the structure.

It would appear to us that a possibly better solution for the Trent Canal structure would be to have all the footings founded on piles rather than have two founded on spread footings and the remainder on piles. Large diameter caissons should also be considered since they would eliminate the need for footings.

Should you wish to discuss the report, or any part thereof, please feel free to contact this Office.

A. G. Sternes

A. G. Sternes
PRINCIPAL FOUNDATION ENGINEER

AGS/MEP
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Parren
S. J. Markiewicz
V. A. Snell
T. C. Kingsland (2)
J. E. Gruspier
B. A. Singh
Foundations Files ✓
Gen. Files