

OFFICE LOCATION -

DOWNSVIEW AVE.
KEELE ST. - HIGHWAY 401
TORONTO, ONTARIO.



ONTARIO

DEPARTMENT OF HIGHWAYS

Bridge Division,
August 10, 1961.

POSTAL ADDRESS -

DEPARTMENT OF HIGHWAYS
PARLIAMENT BUILDINGS,
TORONTO 5, ONTARIO.

MEMORANDUM TO:

Mr. A. G. Stermac,
Foundation Office Engineer,
Department of Highways,
Room 107,
Downsview, Ontario.

RE: W.P. 58-59
Dunwich Twp. Bridge #9
District 2 - Hwy. 401

Further to your memo of August 9/61 we agree with you that abutment piles could be eliminated providing the embankment fill is properly compacted and protected from erosion.

We have at present several structures being constructed without the abutment piles and do not wish to go "overboard" until we are satisfied that these "experimental" bridges are successful. We would suggest the entire problem of the embankment fills be brought up at the next Construction Engineer's Conference.

BD/bm

A handwritten signature in dark ink, appearing to be 'B. Davis'.

B. Davis,
Bridge Design Engineer.

c.c. W. L. Fraser

COMPILE LIST OF THESE STRUCTURES
(ABUTMENTS WITHOUT PILES.)
WITH CONSTRUCTION DATES.
FOUND. SECTION HAS TO SUPERVISE
COMPACTION OF FILL AND INSTRUMENT
FOOTINGS.

OFFICE LOCATION -
DOWNSVIEW AVE.,
KEELE ST. - HIGHWAY 401
TORONTO, ONTARIO.



ONTARIO

DEPARTMENT OF HIGHWAYS

POSTAL ADDRESS -
DEPARTMENT OF HIGHWAYS
PARLIAMENT BUILDINGS,
TORONTO 5, ONTARIO.

Bridge Division,
December 15, 1961.

MEMORANDUM TO:

Mr. A. G. Stermac,
Principal Foundations Eng.,
Department of Highways,
Room 107,
Lab. Bldg.,
Downsview, Ontario.

Lundy
Dec 19, 1961
als

RE: Pile Load Tests
Currie Road Interchange Bridge
Highway 401, District 2
W.P. 58-59

Please find enclosed our special provision for the pile load tests which will be included with the contract for the above bridge as a lump sum item.

We would appreciate your comment on the special provision before we include it in the contract.

Would you please have a drawing made showing the details of the test, similar to the sketch you sent us.

Please also indicate on the enclosed Drawing D 4878-1, the location where the test piles will be driven.

DMcC/et

D. McCune

D. McCune,
for M. Stoyanoff,
Bridge Contract Engineer.

Note: This load test at the above location will not be carried out at the above mentioned location. This was decided by Mr Stermac of Foundation section and Mr Davis of Bridge office.

M. Devata
Jan 15 1962

PILE LOAD TESTS

Under this item and for the lump sum bid the Contractor shall supply all necessary equipment, labour and material, other than the piling, jacks and dial gauges and shall carry out the pile load tests, at the locations shown on the drawings.

The pile load tests shall be carried out as specified in the National Building Code of Canada, Appendix 4.2.C., and as specified herein, and as directed by the Engineer.

The following piling for the load tests will be supplied by the Department to the point designated in the material list at the end of the tender.

Steel "H" Piles

3 pieces 12 BP 53 each 30 feet long

Steel Tube Piles 12" O.D. x .25" wall thickness

1 piece 30 feet long

1 piece 1 foot long

The Contractor shall be responsible for checking the piling on delivery, and reporting any shortages or errors, and for unloading, storage, handling, moving and proper care of the piling until it is placed in the work.

Payment for this work shall be included in the lump sum bid for this item.

The Department will supply the jacks and dial gauges for carrying out the load test.

The Contractor shall supply all other material necessary to carry out the load test including the following:

1 piece 12" I.D. 13" O.D. ring 6" long	
2 Steel clamps - 8" opening	
1 piece 24 WF 100# x 7 feet	(Beam)
8 pieces $\frac{1}{2}$ " x 5" x 94" Plate	(Straps)
6 pieces $\frac{1}{2}$ " x 6" x 25" Plate	(Stiffeners)
2 pieces $\frac{1}{2}$ " x 12" x 12" Plate	(Bearing Plate)
1 piece 1" x 13" x 13" Plate	(Bearing Plate)
2 pieces 3" x 2" x $\frac{1}{4}$ " Angles, 17 feet long	
24 pieces 2" x 4" x 48" Lumber	
4 pieces 2" x 4" x 84" Lumber	
File Shoe for Steel Tube Test Pile	

The Contractor shall supply all equipment necessary to carry out the load test including the following:

1. Portable, diesel driven, Electric Arc Welding equipment.
2. Oxy-Acetylene Welding Equipment.
3. Equipment for Driving Test Piles. Driving Equipment shall be approved by the Bridge Engineer before driving commences.

The Contractor shall supply all labour required to carry out the load test. The Engineer may require the assistance of one or more labourer while load is being applied to, or removed from, a pile. The Contractor shall provide at the site semi-skilled workmen as required by the Engineer including any necessary hand tools. The Contractor shall provide the welding operator at the site.

FILE LOAD TESTS-Cont'd.

All welding shall conform to the provisions of C.S.A. Specifications W59, latest issue, and shall be done by a welder qualified under the provision of C.S.A. Specification W47, latest issue. Electrodes shall conform to C.S.A. Specification W48.1, latest issue.

Procedure for carrying out the pile load tests shall be as follows:

- (a) Drive Steel "H" and Steel Tube Test Piles as shown on the drawings and as directed by the Engineer.
- (b) Place pile shoe on steel tube test pile.
- (c) Cut off tops of test piles to the required elevation if necessary.
- (d) Place 3,000 lb. concrete in tube piles. The pile shall be thoroughly cleaned out and filled with concrete. The concrete shall be placed in one continuous operation and shall be continuously and adequately tamped. The Department will supply the cement. The Contractor shall supply all other material.
- (e) Fabricate and Place cross beam for load test on steel tube pile.
- (f) Fabricate and Erect reference beams and supports.
- (g) Carry out load test on steel tube pile. The Department will take all readings for and interpret the results of the load tests and will supervise the tests. The Contractor must do all applying, maintaining and removing of loads. A Compensator may be used to maintain pressure on the jack.
- (h) Remove crossbeam
- (i) Splice 12" long piece to top of tube pile.
- (j) Cut off top of interior Steel "H" Pile to 12" below level of tops of other test piles as shown on the drawings.
- (k) Place cross beam for load test on Steel "H" Pile.
- (l) Carry out load test on Steel "H" Pile.
- (m) Remove crossbeam and test equipment.
- (n) Pull out test piles and stockpile them at site. Piles shall remain the property of the Department.
- (o) Remove all material from site of test except piles.

The Contractor shall notify the Materials and Research Branch 3 days prior to commencing the driving of test piles.

Test piles shall be driven before driving the piles for the structure.

Mr. A. M. Toye,
Bridge Engineer.

December 1, 1961.

Materials & Research Division,
(Foundation Section).

PILE LOADING TEST --

Attention: Mr. Dave McCune.

Re: Currie Street Interchange,
W.P. 58-59 -- District No. 2.

A number of structures along the new portion of Hwy. 401 (Twps. Delaware, Southwold, Dunwich, Aldborough, Oxford, Harwich, Raleigh), is planned for construction in 1963, 1964, or even later.

The soil conditions at many of these locations are comparable and also similar to the conditions at the site of the Currie Street Interchange, 6.8 Mi. East of Hwy. No. 76. This structure is scheduled for construction in April, 1962.

It is our opinion that a pile loading test should be carried out at this site because the gathered information may prove to be valuable and useful for all the other structures. Piles will be used at this site and the additional cost for a pile loading test will therefore be very small. We would not test the piles used for the structure, but piles driven adjacent to the approach fill. The piles could be pulled out of the ground after the test. It is impossible to foresee the duration of the test, but it is believed that it will be a short-term test. It is therefore suggested that these piles be driven first.

Testing will be carried out by using two adjacent piles as supports - i.e., anchors for the middle one which is tested. Attached to this memo, we are sending you a sketch showing the necessary arrangement of piles to be tested and the Bill of Materials. (Please ignore title of drawing.) We would appreciate

cont'd. /2 ...

Mr. A. M. Toye

December 4, 1961.

Att'n: Mr. D. McCune

it if this could be included in the Currie St. Interchange contract.

Should there be any additional information that you require, please feel free to contact this Office.

AGS/MdeF

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. B. Davis
J. Keen

Foundations Office ✓
Gen. Files.

MATERIAL FOR SPLICING

For 12 BP 53 Beams -

9 only 1/2" x 6" x 6" PL

For 12" Ø Tubular Pile -

2 only Rings 6" long, 12" I.D., 13" O.D.

2 only Steel Clamps - 8" opening.

EQUIPMENT REQUIRED

Pile driving equipment

Electric Arc Welder - Portable - Diesel Driven.

Oxy-Acetylene Welding equipment.

BILL OF MATERIALS

I Files

(a) 12 BP 53 -

3 only 12 BP 53 x 37 ft.

(3 only 12 BP 53 x 25 ft.)

(b) 12" Ø Tubular -

1 only 12" Ø x 37 ft.

1 only 12" Ø x 1.5 ft.

1 only 12" Ø x 40 ft.

II To Make Up Beam -

1 only 24 WF 100 x 7 ft. (Beam)

8 only 1/2" x 5" x 94" PL (Straps)

6 only 1/2" x 6" x 25" PL (Stiffeners)

2 only 1/2" x 12" x 12" PL (Bearing PL)

1 only 1" x 13" x 13" PL (Bearing PL)

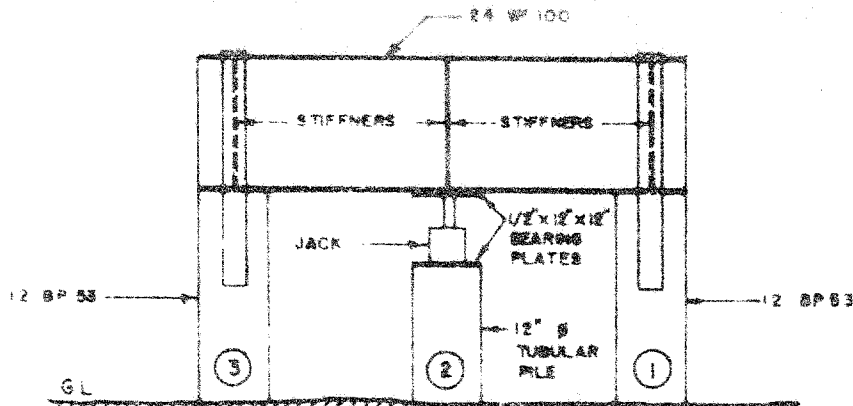
III Reference Bars -

2 only 3" x 2" x 1/4" x 17 ft. (Reference Angles
Approx. Size)

24 only 2" x 4" x 48" Lumber

4 only 2" x 4" x 84" Lumber

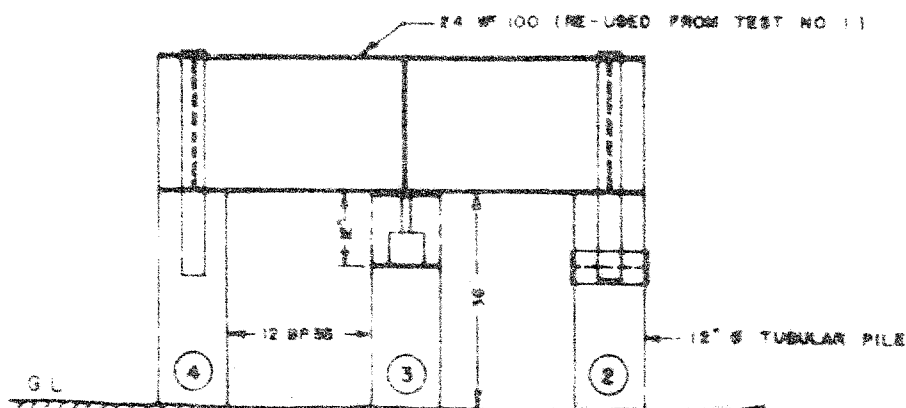
TEST NO. 1



NOTE: Piles may be driven to a greater depth and re-tested.

SCALE: 3/8" = 1' 0

TEST NO. 2



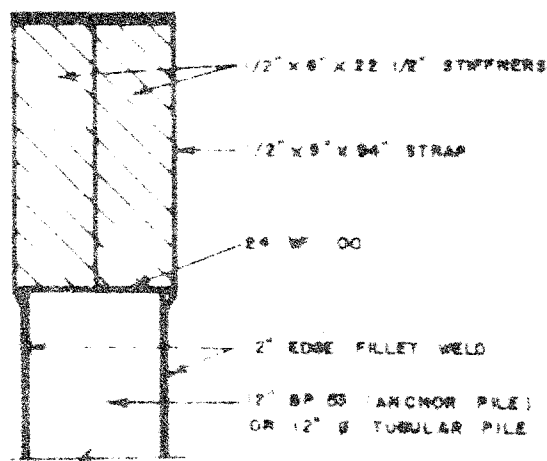
NOTE: For pile 2 an additional length of 1 ft. should be added.

For pile 3, the pile should be cut off approximately 2 ft. above ground.

Piles may be driven to a greater depth and re-tested.

SCALE: 3/8" = 1' 0

DETAILED LAYOUT OF THE
HORIZONTAL BEAM TO THE
REACTION PILES.



SCALE: 3/8" = 1' 0

ORIGINATED M. DE VATA

DRAWN D. MUMFORD

CHECKED *HR* 11/5

APPROVED *ays*

DATE 12 OCT. 1961

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH SECTION

PILE LOADING TEST DETAILS

PROPOSED IONA, MELBOURNE COUNTY RD.

AND

HIGHWAY NO. 401

SCALE AS SHOWN

W- NO. 51-59

JOB NO.

DWG. NO. X-30

Mr. J. L. Keen,
Bridge Design Engr.
Materials & Research Section.

May 2, 1960.
Review of Report to Determine
Pile Lengths.

Attention: Mr. L. N. Francis.

Re: Dunwich Twp. Bridge #9,
Hwy. 401 - W.P. 58-59,
District #2.

As requested, we have reviewed the above report in an attempt to determine pile lengths. A design load of 40 tons per pile, has been specified by the Bridge Section.

Our comments are as follows:-

1. A steel 'H' pile foundation is not recommended for the bridge abutments. If steel 'H' piles are used, these piles will penetrate through the stiff upper crust into the softer underlying material. The tip elevation of steel 'H' piles, when refusal to driving is encountered, cannot be determined accurately.

If steel 'H' piles must be used on this project, they should be driven to a depth of 25 feet from ground surface. Refusal to driving is not to be expected at this depth. The load-carrying capacity of the pile driven to a depth of 25 feet, is estimated to be approx. 30 to 40 tons. The safe load carrying capacity of the steel 'H' pile can only be determined by a pile load test.

2. If piles must be used to support the bridge abutments, it is recommended that steel tube piles, 12 inches in diameter, be used. These steel tube piles will meet refusal at approx. 10 to 15 feet below ground surface. The steel tube pile may be designed to carry a load of 40 tons per pile. Care should be taken to ensure that large stones or boulders are not placed in the fill if these steel tube piles are to be driven in the vicinity.

cont'd. /2 ...

If we can be of further assistance in this matter,
please contact our Office.

L. G. Soderman,
PRINCIPAL SOILS & FOUNDATIONS ENGR.

Per:



(K. Peaker,
FIELD FOUNDATIONS SUPERVISING ENGR.)

KP/MdeF

cc: Foundations Office
Gen. Files.

ONTARIO
DEPARTMENT OF HIGHWAYS

Memo to Mr. L. G. Scderman.

Date April 25, 1960.

Principal Soils & Foundation Engr.

Subject Dunwich Twp. Br. #9,

W.P. 58-59,

Hwy. #401, Dist. #2

From L.N.Francis, Bridge Division

Co. Elgin, Lots 12 & 13,
Con. V N.

We enclose herewith, one copy of our drawing D-4621-P1, and would like to know the length of pile embedment required to sustain a design load of 40 tons per pile.

LNF/r
encl.


L. N. Francis,
for J.L. Keen,
Senior Engineer,
Bridge Design Office

Mr. A. M. Toye,
Bridge Engineer.
Materials & Research Section,
(Foundations Office).

August 9, 1961.

Review of Preliminary Plan
No. D-4621-P1
by Foundations Office.

Attention: Mr. E. Davis.

Re: Hwy. 401, Line 'A' & County Rd. Crossing
Dunwich Twp., Br. #9, District No. 2,
W.P. 58-59.

We have received and reviewed the preliminary drawing No. D-4621-P1 for the above bridge and are herewith submitting our comments for your consideration:-

1) The abutments should be, as well as the piers, founded on spread footings and not on piles as shown on the drawing. The footings should be placed on the properly compacted approach fill and a safe load of 2.5 T/sq.ft. should be used.

Piles, as indicated on the drawing, are not a suitable solution in this case because the density of the subsoil decreases with increasing depth. The upper very stiff to stiff layer is not thick enough to provide for the mobilization of adequate bearing capacity of the piles and the piles have to be driven into the medium stiff underlying layer for quite a distance before the desired bearing capacity is achieved. Therefore, the piles should be considered as the last resort, only.

In the area, adequate quantities of granular material (sand) are available and it is our recommendation that the end portions of the approach fills, where the footings of the abutments will be placed, be constructed of this granular material. The main reason for this recommendation is the relative simplicity with which satisfactory compaction of this material is obtained, thus insuring that no settlements will occur. Nevertheless, the compaction operation should be well supervised and controlled.

To make sure that any unforeseeable situation can be dealt with, provisions for jacking up of the bridge structure should be made at both abutments.

2) The pier footings can be raised from 711.0' to 712.5'. The desired bearing capacity is also obtainable at this elevation and there will still be adequate frost protection.

Should there be any other problem that you would like to discuss, or any additional information that you might require, please feel free to contact our Office.

ACS/MdeF

A. G. Stermac
A. G. Stermac,
SUPERVISING FOUNDATION ENGINEER

cc: Messrs. S. McCombie
J. Keen
Foundations Office
Gen. Files.

Notes:-

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. $12\frac{3}{4}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. $12\frac{3}{4}$ " x $\frac{1}{2}$ " steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. _____ CONTRACT NO. _____ STRUCTURE *TEL: BUTTON 621-R-2*

CONTRACTOR _____ DESIGN LOAD OF PILE _____

HAMMER DETAILS: TYPE _____ WEIGHT _____ HEIGHT OF FALL OR ENERGY _____

TYPE OF ANVIL OR CAP _____ WEIGHT OF ANVIL OR CAP _____

PILE DETAILS _____

PILE NO. _____ LOCATION _____ DATE DRIVEN _____

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
	1			26			51			76	
	2			27			52			77	
	3			28			53			78	
	4			29			54			79	
	5			30			55			80	
	6			31			56			81	
	7			32			57			82	
	8			33			58			83	
	9			34			59			84	
	10			35			60			85	
	11			36			61			86	
	12			37			62			87	
	13			38			63			88	
	14			39			64			89	
	15			40			65			90	
	16			41			66			91	
	17			42			67			92	
	18			43			68			93	
	19			44			69			94	
	20			45			70			95	
	21			46			71			96	
	22			47			72			97	
	23			48			73			98	
	24			49			74			99	
	25			50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE	FINAL CUT OFF ELEVATION					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
MATERIALS & RESEARCH DIVISION
DEPARTMENT OF HIGHWAYS
PARLIAMENT BUILDINGS
TORONTO, ONTARIO

SIGNED _____

NAME (PRINT) _____

DATE _____

ATTACH SKETCH OF PILE NUMBERING SYSTEM

23-62-90

Mr. A. M. Toye,
Bridge Engineer.
Materials & Research Section.

March 7, 1960.

D.H.C. FOUNDATION INVESTIGATION
W.P. 58-59 -- W.J. F-59-93.

Attention: Mr. S. McCombie.

Re: Hwy. 401 Line 'A' & County Road Crossing
Twp. of Dunwich, approx. 1 Mile N.W. of
Dutton. -- District No. 2.

Enclosed herewith is our Foundation Report on the above noted structure location. Reference to the contents of the report shows that subsoil at the site consists of a deep deposit of stiff silty clay. This stratum of stiff silty clay has been explored to a depth of approximately 70 ft. below the existing ground surface.

For your convenience, recommendations pertinent to the foundation design, are summarized as follows:-

1. Simple spread footings founded in the stiff silty clay stratum are recommended. For footings typically 5' to 10' wide, a safe allowable footing pressure of 3-1/2 t.s.f. can be used for design. The recommended footing placement elevation is 711' or below. Little differential settlement of any consequence, need be anticipated.
2. No serious ground water seepage problems during footing excavations are anticipated. The impermeable nature of the clay will allow excavations to be carried out in the dry.
3. No approach fill stability problems are anticipated.

AKL/MdeF
Attach.

cc: Messrs.

A. M. Toye (2)
H. A. Tregaskes
D. C. Ramsay
A. Cater
W. L. Fraser
J. Roy
A. Watt
Foundations Office ✓
Gen. Files.

L. G. Soderman,
PRINCIPAL SOILS & FOUNDATIONS ENGR.
per:

AKGL
(A. E. Loh,
PROJECT FOUNDATION ENGR.)

Hwy. 401 Line 'A' and County Road Crossing
Twp. of Dunwich, approx. 1 Mile N.W. of -
Dutton - W.P. 58-59 - W.J. F-59-93 - Dist.2.

INTRODUCTION:

This report presents the results of a subsoil investigation carried out at a structure location approximately 1 mile North-west of Dutton, where proposed Hwy. 401 Line 'A' underpasses the County road in lots 12 and 13, Township of Dunwich.

The field work commenced on September 15, 1959 and was completed on September 23, 1959.

DESCRIPTION OF SITE AND GEOLOGY:

The site and its surrounding area is generally flat farmland. The area on both sides of the County road is presently under cultivation.

The site under consideration is located on the Ekfrid Clay Plain. According to available geological information, these extensive plains which cover a large part of South-western Ontario, are covered by a deep deposit of clay overlying limestone or shale bedrock. Also, a shallow veneer of sand and gravel is prevalent in certain areas. At this site, the thick stratum of stiff clay was found to be overlain by the topsoil only.

DESCRIPTION OF FIELD AND LABORATORY WORK:

Field work, consisting of four sampled boreholes, was carried out by a standard diamond drill adapted for soil sampling. Conventional wash boring procedures were followed and samples were recovered at depths required. Samples were recovered by 2" I.D. thin-walled Shelby tube samplers.

In addition, a dynamic cone penetration profile was also obtained adjacent to each of the sampled boreholes.

cont'd. /2 ...

DESCRIPTION OF FIELD AND LABORATORY WORK: (cont'd.) ...

Upon receipt in the laboratory, samples were visually examined and identified. Routine index tests were performed on selected, representative samples. Laboratory test results have been presented in the borehole logs and detailed in tabular form, and are included in this report under Appendix I. The location plan and subsoil profile are shown in Drawing No. F-59-93A.

SUBSOIL CONDITIONS:

In each of the sampled boreholes, the topsoil was found to be immediately underlain by a 30-ft. crust of very stiff silty clay extending from elevation 717.0' to 687.0' approximately. Underneath this very stiff crust, a stratum of stiff to medium stiff grey silty clay containing a very small amount of gravel was encountered. This stratum was explored to a depth of 70' below the existing ground surface (i.e., at approx. elevation of 645.0'). The upper 6 ft. of the clay strata has been subjected to oxidation, resulting in its present brown colour. Below the oxidized zone, the colour is predominantly grey. The material contains approximately 69% clay, 21% silt, and 10% sand and gravel. The average unit weight and moisture content were found to be 131 p.c.f. and 21%, respectively. Liquid and plastic limits averaged 36% and 19%, respectively.

Laboratory shear strength tests show an average of 4000 p.s.f. to be representative for the upper 25 ft. and below this depth, a value of 1700 p.s.f. appears to be the average. Due to the impermeable nature of the clay, it was not feasible to accurately establish the ground water table during exploration. All the samples obtained below the existing ground surface, were saturated and it has been assumed that the ground water table at the site is at or slightly below the existing ground surface.

cont'd. /3 ...

FOUNDATION CONSIDERATIONS:

Laboratory and field test results are such that spread footing support can be obtained in the stiff upper clay crust at elevation 711.0' or below (i.e., approx. 6 ft. below existing ground surface). At this elevation or below, for footings typically 5 to 10 feet in width, a bearing pressure of 3-1/2 t.s.f., incorporating a safety factor of 3, can be provided.

Settlements resulting from the application of this bearing pressure of 3-1/2 t.s.f., as recommended, will be within tolerable limits.

No approach fill stability problems are anticipated.

No serious ground water seepage problems with respect to footing excavations, are anticipated.

SUMMARY:

1. The site is underlain by a deep deposit of stiff silty clay.
2. Subsoil conditions are such that spread footings founded in the stiff silty clay stratum at Elev. 711.0', or below, are recommended.
3. At this recommended footing placement elevation, or below, a safe allowable bearing pressure of 3-1/2 t.s.f. can be used for spread footing design.
4. Total and differential settlements are considered tolerable.
5. No serious ground water seepage problems with respect to footing excavations, are anticipated. The impermeable nature of the clay will allow excavations to be carried out in the dry.
6. No approach fill instability problem exists.

AKG
for B.M. Ghadiali.
Project Foundation Engineer.

APPENDIX I.

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-93

W.P. 58-59

OLE NO.	SAMP. NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOWS/FT.	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
1	T1	3'-4.5'	very stiff, brown, silty clay	22	19.2	19.9	36.0	4370	130.0	
	T2	4.5'-6'	stiff grey silty clay	74	19.2	19.3	35.5	4820	133.6	
	T3	9'-10.5'	"	60	20.6	19.3	39.0	4430	131.9	
	T4	15'-16.5'	"	45	20.5	-	-	3330	131.8	
	T5	20'-21.5'	"	33	20.8	19.6	31.5	2680	131.2	
	T6	25'-26.5'	"	35	22.3	-	-	2610	130.6	
	T7	30'-31.5'	medium stiff grey silty clay	42	22.9	18.8	32.4	-	132.1	
	T8	40'-41.5'	"	29	22.4			132.8	126.1	
	T9	50'-51.5'	"	24	-	-	-	-	-	
2	T1	3'-4.5'	very stiff, brown, silty clay	30	19.4	20.5	44.0	6920	130.3	
	T2	6'-7.5'	stiff grey silty clay	54	19.0	19.7	40.3	5010	127.5	
	T3	9.2'-10.7'	"	38	20.9	18.5	33.8	4910	129.5	
	T4	15'-16.5'	"	31	22.1	-	-	4510	129.9	
	T5	20'-21.5'	"	34	21.3	-	-	2679	129.0	
	T6	25'-26.5'	"	34	18.1	16.8	26.2	-	133.0	
	T7	30'-31.5'	Medium stiff grey silty clay	27	21.3	-	-	-	-	
	T8	35'-36.5'	"	15	24.3	-	-	1565	127.0	

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-93

W.P. 58-59

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOWS/FT.	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
2	T9	40'-41.5'	medium stiff grey silty clay	24	23.2	-	-	-	127.0	
	T9A	45'-46.5'	"	29	-	-	-	-	-	
	T10	50'-51.5'	medium stiff grey silty clay	23	23.1	-	-	1871	129.0	
	T11	60'-61.5'	"	33	21.8	-	-	2060	129.0	
	T12	70'-71.5'	"	33	18.9	17.5	26.2	1728	134.0	
3	T1	3'-4.5'	very stiff brown silty clay	39	20.0	19.6	36.2	-	131.0	
	T2	5.5'-7.0'	"	46	18.1	-	-	4680	131.0	
	T3	9.5'-10.5'	"	23	25.0	-	-	4250	132.0	
	T4	15'-16.5'	stiff grey silty clay	43	-	-	-	-	-	
	T5	20'-21.5'	"	36	19.6	-	-	-	134.0	
	T6	25'-26.5'	"	35	-	-	-	-	-	
	T6A	29.5'-31.0'	medium stiff grey plastic clay	35	-	-	-	-	-	
	T7	35'-36.5'	"	24	-	-	-	-	-	
	T8	45'-46.5'	"	22	23.6	-	-	1840	128.0	
	T9	55'-56.5'	"	29	-	-	-	-	-	

W.P. 58-59

T Denotes thin walled Shelby
Tube sample.

MATERIALS AND RESEARCH SECTION

W.P. 58-59 _____ BORE HOLE NO. _____ 1 _____

JOB F59-93 STATION 290+12 (50' Rt.)

DATUM 712.0' _____ COMPILED BY B.K. _____

BORING DATE Sept. 15/59 CHECKED BY BMG.

2" DIA. SPLIT TUBE _____
2" SHELBY TUBE _____
2" SPLIT TUBE _____
2" DIA. CONE _____
2" SHELBY _____
CASING _____

LEGEND

1/2 UNCONFINED COMPRESSION (Qu)	---	O
VANE TEST (C) AND SENSITIVITY (S)	---	+ ^S
NATURAL MOISTURE AND		
LIQUIDITY INDEX	---	X
LIQUID LIMIT	---	
PLASTIC LIMIT	---	

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				2000	4000	6000	8000
				P.S.F.			
	↓ Ground level	727.0	0	50	100	150	200
	Topsoil	726.0					
	Very stiff, brown silty clay	721.0					
	Stiff grey silty clay						
		687.0					
	Medium stiff grey silty clay						
	End of Borehole	665.5					
	Penetration resistance profile shown; obtained by driving a 2" dia. cone from ground surface to depth noted with an energy of 350 ft. lb. per blow.						

CONSISTENCY		SAMPLE	NATURAL
MOIST. CONTENT- % DRY WT.			UNIT WT. P.C.F.
20	40	60	
X	—	○	T1 130.0
X	—	○	T2 133.6
X	—	○	T3 131.9
X			T4 131.8
X	—	○	T5 131.2
X			T6 130.6
X	—	○	T7 132.1
X			T8 126.1
			T9 —

MATERIALS AND RESEARCH SECTION

DRILLING DATE Sept. 15/59 CHECKED BY B.M.G.

2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

1/2 UNCONFINED COMPRESSION (Qu) _____	O
VANE TEST (C) AND SENSITIVITY (S) _____	+ ^s
NATURAL MOISTURE AND	
LIQUIDITY INDEX _____	LI
LIQUID LIMIT _____	X
PLASTIC LIMIT _____	—

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				2000	4000	6000	8000
				P.S.F.			
				BLOWS/FT.			
	↓ Ground Level	716.9	0	50	100	150	200
	Topsoil	715.9					
	Very stiff, brown silty clay	710.9					
	Stiff grey silty clay						
		686.9					
	Medium stiff grey silty clay						
		645.4					
	End of borehole						
	Penetration resistance profile shown obtained by driving a 2" dia. cone from ground level to a depth noted with an energy of 350 Ft. lb. per blow.						

CONSISTENCY		SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.			
20	40	60	
x	—	o	T1 130.3
x	—	o	T2 127.5
x	—	o	T3 129.5
x			T4 129.9
x			T5 129.0
x	—	o	T6 133.0
x			T7 -
x			T8 127.0
x			T9 127.0
x			T9A -
x			T10 129.0
x			T11 129.0
x	—	o	T12 134.0

DEPARTMENT OF HIGHWAYS - ONTARIO

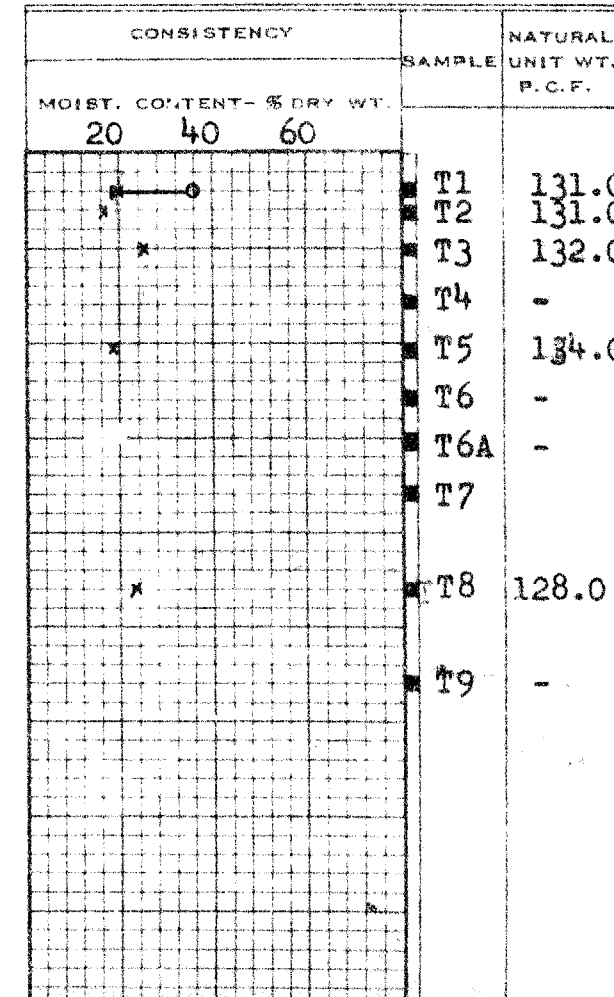
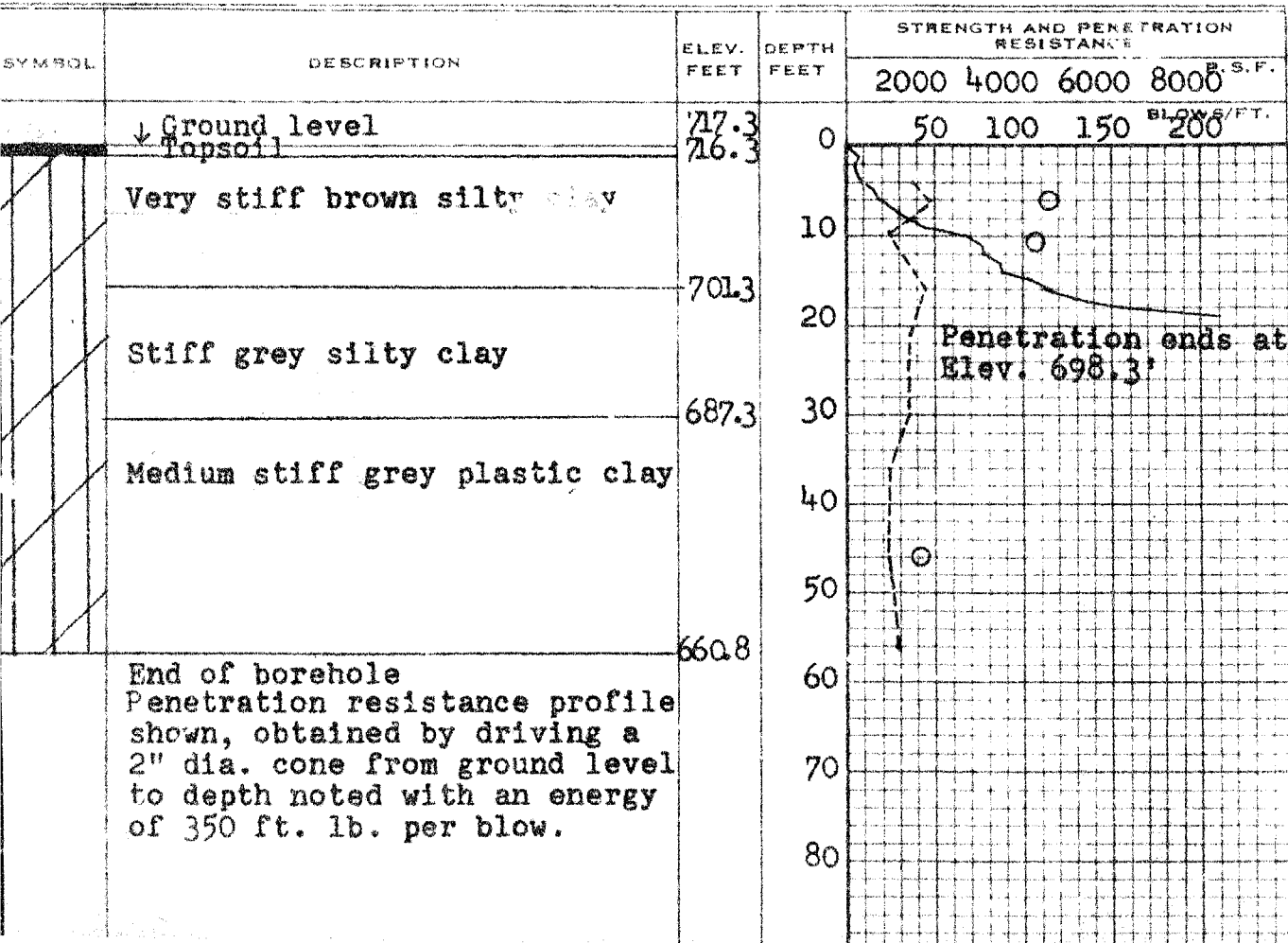
MATERIALS AND RESEARCH SECTION

W.P. 58-59 BORE HOLE NO. 3
 JOB F 59-93 STATION 289+59 (50' Lt)
 DATUM 717.3' COMPILED BY B.K.
 BORING DATE Sept. 18/59 CHECKED BY B.M.G.

2" DIA. SPLIT TUBE
 2" SHELBY TUBE
 2" SPLIT TUBE
 2" DIA. CONE
 2" SHELBY
 CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Qu) O
 VANE TEST (C) AND SENSITIVITY (S) +S
 NATURAL MOISTURE AND LIQUIDITY INDEX LI
 LIQUID LIMIT X
 PLASTIC LIMIT



DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 58-59 BORE HOLE NO. 4

JOB F 59-93 STATION 289+55 (50' Rt.)

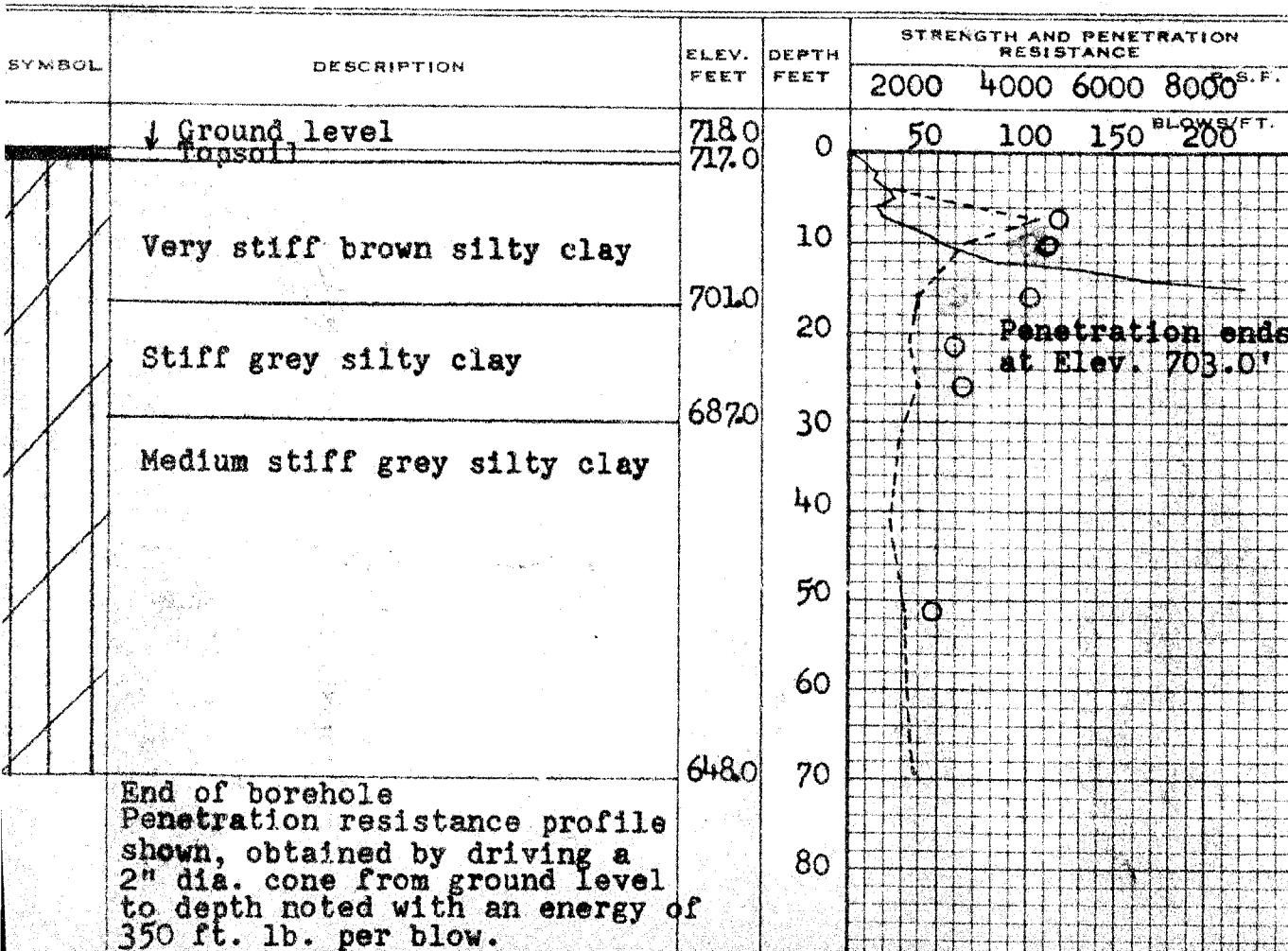
DATUM 718.0' COMPILED BY B.K.

BORING DATE Sept. 22/59 CHECKED BY B.M.G.

2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Qu) O
VANE TEST (C) AND SENSITIVITY (S) +S
NATURAL MOISTURE AND LIQUIDITY INDEX X
LIQUID LIMIT X
PLASTIC LIMIT



CONSISTENCY		SAMPLE	NATURAL UNIT WT. P. C. F.
MOIST. CONTENT - % DRY WT.			
20	40	60	
X		T1	129.0
X		T2	134.0
X		T3	130.0
X		T4	132.0
X		T5	132.0
X		T6	130.0
		T7	-
		T8	-
X		T9	129.0
X		T10	128.0
X		T11	-

Mr. A. M. Toye,
Bridge Engineer.
Materials & Research Section,
(Foundations Office).

August 9, 1961.

Review of Preliminary Plan
No. D-4621-P1
by Foundations Office.

Attention: Mr. B. Davis.

Re: Hwy. 401, Line 'A' & County Rd. Crossing
Dunwich Twp., Br. #9, District No. 2,
W.P. 58-59.

We have received and reviewed the preliminary drawing No. D-4621-P1 for the above bridge and are herewith submitting our comments for your consideration:-

1) The abutments should be, as well as the piers, founded on spread footings and not on piles as shown on the drawing. The footings should be placed on the properly compacted approach fill and a safe load of 2.5 T/sq.ft. should be used.

2) says to leave piles in.
Piles, as indicated on the drawing, are not a suitable solution in this case because the density of the subsoil decreases with increasing depth. The upper very stiff to stiff layer is not thick enough to provide for the mobilization of adequate bearing capacity of the piles and the piles have to be driven into the medium stiff underlying layer for quite a distance before the desired bearing capacity is achieved. Therefore, the piles should be considered as the last resort, only.

In the area, adequate quantities of granular material (sand) are available and it is our recommendation that the end portions of the approach fills, where the footings of the abutments will be placed, be constructed of this granular material. The main reason for this recommendation is the relative simplicity with which satisfactory compaction of this material is obtained, thus insuring that no settlements will occur. Nevertheless, the compaction operation should be well supervised and controlled.

To make sure that any unforeseeable situation can be dealt with, provisions for jacking up of the bridge structure should be made at both abutments.

cont'd. /2 ...

2) The pier footings can be raised from 711.0' to 712.5'. The desired bearing capacity is also obtainable at this elevation and there will still be adequate frost protection.

Should there be any other problem that you would like to discuss, or any additional information that you might require, please feel free to contact our Office.

AGS/MdeF

A. G. Stermac
A. G. Stermac,
SUPERVISING FOUNDATION ENGINEER

cc: Messrs. S. McCombie
J. Keen
Foundations Office
Gen. Files.

712.50
1.75
716.25

Mr. J. L. Keen,

May 2, 1960.

Bridge Design Engr.

Review of Report to Determine

Materials & Research Section.

Pile Lengths.

Attention: Mr. L. N. Francis.

Re: Dunwich Twp. Bridge #9,
Hwy. 401 - W.P. 58-59,
District #2.

As requested, we have reviewed the above report in an attempt to determine pile lengths. A design load of 40 tons per pile, has been specified by the Bridge Section.

Our comments are as follows:-

1. A steel 'H' pile foundation is not recommended for the bridge abutments. If steel 'H' piles are used, these piles will penetrate through the stiff upper crust into the softer underlying material. The tip elevation of steel 'H' piles, when refusal to driving is encountered, cannot be determined accurately.

If steel 'H' piles must be used on this project, they should be driven to a depth of 25 feet from ground surface. Refusal to driving is not to be expected at this depth. The load-carrying capacity of the pile driven to a depth of 25 feet, is estimated to be approx. 30 to 40 tons. The safe load carrying capacity of the steel 'H' pile can only be determined by a pile load test.

2. If piles must be used to support the bridge abutments, it is recommended that steel tube piles, 12 inches in diameter, be used. These steel tube piles will meet refusal at approx. 10 to 15 feet below ground surface. The steel tube pile may be designed to carry a load of 40 tons per pile. Care should be taken to ensure that large stones or boulders are not placed in the fill if these steel tube piles are to be driven in the vicinity.

cont'd. /2 ...

If we can be of further assistance in this matter,
please contact our Office.

L. G. Soderman,
PRINCIPAL SOILS & FOUNDATIONS ENGR.

Per:



(K. Peaker,
FIELD FOUNDATIONS SUPERVISING ENGR.)

KP/MdeF

cc: Foundations Office
Gen. Files.

Mr. L. G. Soderman,
Principal Soils & Foundation Engr.
L.N.Francis, Bridge Division

April 25, 1960.
Dunwich Twp. Br. #9,
W.P. 58-59,
Hwy. #401, Dist. #2
Co. Elgin, Lots 12 & 13,
Con. V N.

We enclose herewith, one copy of our
drawing D-4621-P1, and would like to know
the length of pile embedment required to
sustain a design load of 40 tons per pile.

LNF/r
encl.

L. N. Francis,
for J.L. Keen,
Senior Engineer,
Bridge Design Office

Mr. A. M. Toye,
Bridge Engineer.
Materials & Research Section.

March 7, 1960.

D.H.O. FOUNDATION INVESTIGATION
W.P. 58-59 -- W.J. F-59-93.

Attention: Mr. S. McCombie.

Re: Hwy. 401 Line 'A' & County Road Crossing
Twp. of Dunwich, approx. 1 Mile N.W. of
Dutton. -- District No. 2.

Enclosed herewith is our Foundation Report on the above noted structure location. Reference to the contents of the report shows that subsoil at the site consists of a deep deposit of stiff silty clay. This stratum of stiff silty clay has been explored to a depth of approximately 70 ft. below the existing ground surface.

For your convenience, recommendations pertinent to the foundation design, are summarized as follows:-

1. Simple spread footings founded in the stiff silty clay stratum are recommended. For footings typically 5' to 10' wide, a safe allowable footing pressure of 3-1/2 t.s.f. can be used for design. The recommended footing placement elevation is 711' or below. Little differential settlement of any consequence, need be anticipated.
2. No serious ground water seepage problems during footing excavations are anticipated. The impermeable nature of the clay will allow excavations to be carried out in the dry.
3. No approach fill stability problems are anticipated. ✓

AKL/MdeF
Attach.

cc: Messrs. A. M. Toye (2) ✓
H. A. Tregaskes
D. G. Ramsay
A. Gater
W. L. Fraser
J. Roy
A. Watt
Foundations Office
Gen. Files.

L. G. Soderman,
PRINCIPAL SOILS & FOUNDATIONS ENGR
per:

AKGL
(A. K. Loh,
PROJECT FOUNDATION ENGR.)

Hwy. 401 Line 'A' and County Road Crossing
Twp. of Dunwich, approx. 1 Mile N.W. of -
Dutton - W.P. 58-59 - W.J. F-59-93 - Dist.2.

INTRODUCTION:

This report presents the results of a subsoil investigation carried out at a structure location approximately 1 mile North-west of Dutton, where proposed Hwy. 401 Line 'A' underpasses the County road in lots 12 and 13, Township of Dunwich.

The field work commenced on September 15, 1959 and was completed on September 23, 1959.

DESCRIPTION OF SITE AND GEOLOGY:

The site and its surrounding area is generally flat farmland. The area on both sides of the County road is presently under cultivation.

The site under consideration is located on the Ekfrid Clay Plain. According to available geological information, these extensive plains which cover a large part of South-western Ontario, are covered by a deep deposit of clay overlying limestone or shale bedrock. Also, a shallow veneer of sand and gravel is prevalent in certain areas. At this site, the thick stratum of stiff clay was found to be overlain by the topsoil only.

DESCRIPTION OF FIELD AND LABORATORY WORK:

Field work, consisting of four sampled boreholes, was carried out by a standard diamond drill adapted for soil sampling. Conventional wash boring procedures were followed and samples were recovered at depths required. Samples were recovered by 2" I.D. thin-walled Shelby tube samplers.

In addition, a dynamic cone penetration profile was also obtained adjacent to each of the sampled boreholes.

cont'd. /2 ...

DESCRIPTION OF FIELD AND LABORATORY WORK: (cont'd.) ...

Upon receipt in the laboratory, samples were visually examined and identified. Routine index tests were performed on selected, representative samples. Laboratory test results have been presented in the borehole logs and detailed in tabular form, and are included in this report under Appendix I. The location plan and subsoil profile are shown in Drawing No. F-59-93A.

SUBSOIL CONDITIONS:

In each of the sampled boreholes, the topsoil was found to be immediately underlain by a 30-ft. crust of very stiff silty clay extending from elevation 717.0' to 687.0' approximately. Underneath this very stiff crust, a stratum of stiff to medium stiff grey silty clay containing a very small amount of gravel was encountered. This stratum was explored to a depth of 70' below the existing ground surface (i.e., at approx. elevation of 645.0'). The upper 6 ft. of the clay strata has been subjected to oxidation, resulting in its present brown colour. Below the oxidized zone, the colour is predominantly grey. The material contains approximately 69% clay, 21% silt, and 10% sand and gravel. The average unit weight and moisture content were found to be 131 p.c.f. and 21%, respectively. Liquid and plastic limits averaged 36% and 19%, respectively.

Laboratory shear strength tests show an average of 4000 p.s.f. to be representative for the upper 25 ft. and below this depth, a value of 1700 p.s.f. appears to be the average. Due to the impermeable nature of the clay, it was not feasible to accurately establish the ground water table during exploration. All the samples obtained below the existing ground surface, were saturated and it has been assumed that the ground water table at the site is at or slightly below the existing ground surface.

cont'd. /3 ...

FOUNDATION CONSIDERATIONS:

Laboratory and field test results are such that spread footing support can be obtained in the stiff upper clay crust at elevation 711.0' or below (i.e., approx. 6 ft. below existing ground surface). At this elevation or below, for footings typically 5 to 10 feet in width, a bearing pressure of 3-1/2 t.s.f., incorporating a safety factor of 3, can be provided.

Settlements resulting from the application of this bearing pressure of 3-1/2 t.s.f., as recommended, will be within tolerable limits.

No approach fill stability problems are anticipated.

No serious ground water seepage problems with respect to footing excavations, are anticipated.

SUMMARY:

1. The site is underlain by a deep deposit of stiff silty clay.
2. Subsoil conditions are such that spread footings founded in the stiff silty clay stratum at Elev. 711.0', or below, are recommended.
3. At this recommended footing placement elevation, or below, a safe allowable bearing pressure of 3-1/2 t.s.f. can be used for spread footing design.
4. Total and differential settlements are considered tolerable.
5. No serious ground water seepage problems with respect to footing excavations, are anticipated. The impermeable nature of the clay will allow excavations to be carried out in the dry.
6. No approach fill instability problem exists.

AKCh
for B.M. Ghadiali,
Project Foundation Engineer.

APPENDIX I.

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-93

W.P. 58-59

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOWS/FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT d.c.f.	REMARKS
1	T1	3'-4.5'	very stiff, brown, silty clay	22	19.2	19.9	36.0	4370	130.0	
	T2	4.5'-6'	stiff grey silty clay	74	19.2	19.3	35.5	4820	133.6	
	T3	9'-10.5'	"	60	20.6	19.3	39.0	4430	131.9	
	T4	15'-16.5'	"	45	20.5	-	-	3330	131.8	
	T5	20'-21.5'	"	33	20.8	19.6	31.5	2680	131.2	
	T6	25'-26.5'	"	35	22.3	-	-	2610	130.6	
	T7	30'-31.5'	medium stiff grey silty clay	42	22.9	18.8	32.4	-	132.1	
	T8	40'-41.5'	"	29	22.4			132.8	126.1	
	T9	50'-51.5'	"	24	-	-	-	-	-	
2	T1	3'-4.5'	very stiff, brown, silty clay	30	19.4	20.5	44.0	6920	130.3	
	T2	6'-7.5'	stiff grey silty clay	54	19.0	19.7	40.3	5010	127.5	
	T3	9.2'-10.7'	"	38	20.9	18.5	33.8	4910	129.5	
	T4	15'-16.5'	"	31	22.1	-	-	4510	129.9	
	T5	20'-21.5'	"	34	21.3	-	-	2679	129.0	
	T6	25'-26.5'	"	34	18.1	16.8	26.2	-	133.0	
	T7	30'-31.5'	Medium stiff grey silty clay	27	21.3	-	-	-	-	
	T8	35'-36.5'	"	15	24.3	-	-	1565	127.0	

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-93

W.P. 58-59

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOWS/FT.	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
2	T9	40'-41.5'	medium stiff grey silty clay	24	23.2	-	-	-	127.0	
	T9A	45'-46.5'	"	29	-	-	-	-	-	
	T10	50'-51.5'	medium stiff grey silty clay	23	23.1	-	-	1871	129.0	
	T11	60'-61.5'	"	33	21.8	-	-	2060	129.0	
	T12	70'-71.5'	"	33	18.9	17.5	26.2	1728	134.0	
3	T1	3'-4.5'	very stiff brown silty clay	39	20.0	19.6	36.2	-	131.0	
	T2	5.5'-7.0'	"	46	18.1	-	-	4680	131.0	
	T3	9.5'-10.5'	"	23	25.0	-	-	4250	132.0	
	T4	15'-16.5'	stiff grey silty clay	43	-	-	-	-	-	
	T5	20'-21.5'	"	36	19.6	-	-	-	134.0	
	T6	25'-26.5'	"	35	-	-	-	-	-	
	T6A	29.5'-31.0'	medium stiff grey plastic clay	35	-	-	-	-	-	
	T7	35'-36.5'	"	24	-	-	-	-	-	
	T8	45'-46.5'	"	22	23.6	-	-	1840	128.0	
	T9	55'-56.5'	"	29	-	-	-	-	-	

JOB # 59-93
W.P. 58-59

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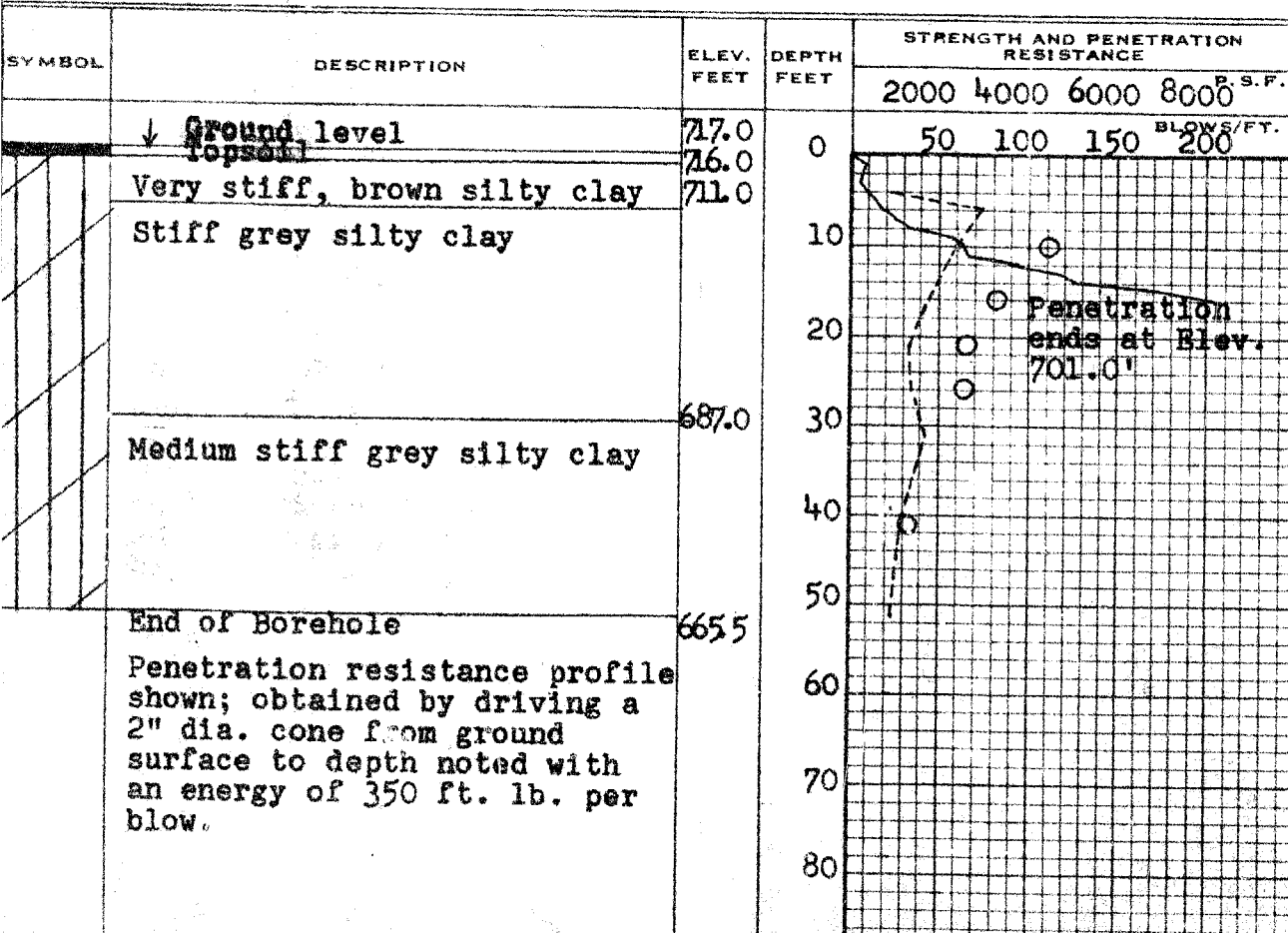
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. 58-59 ----- BORE HOLE NO. 1
 JOB F59-93 ----- STATION 290+12 (50' Rt.)
 DATUM 712.0' ----- COMPILED BY B.K.
 BORING DATE Sept. 15/59 CHECKED BY BMG.

2" DIA. SPLIT TUBE -----
 2" SHELBY TUBE -----
 2" SPLIT TUBE -----
 2" DIA. CONE -----
 2" SHELBY -----
 CASING -----

LEGEND

1/2 UNCONFINED COMPRESSION (Qu) ----- O
 VANE TEST (C) AND SENSITIVITY (S) ----- +
 NATURAL MOISTURE AND LIQUIDITY INDEX ----- X
 LIQUID LIMIT -----
 PLASTIC LIMIT -----



SAMPLE	NATURAL UNIT WT. P.C.F.	CONSISTENCY	
		MOIST. CONTENT - % DRY WT.	
		20	40 60
T1	130.0		
T2	133.6		
T3	131.9		
T4	131.8		
T5	131.2		
T6	130.6		
T7	132.1		
T8	126.1		
T9	-		

DEPARTMENT OF HIGHWAYS - ONTARIO

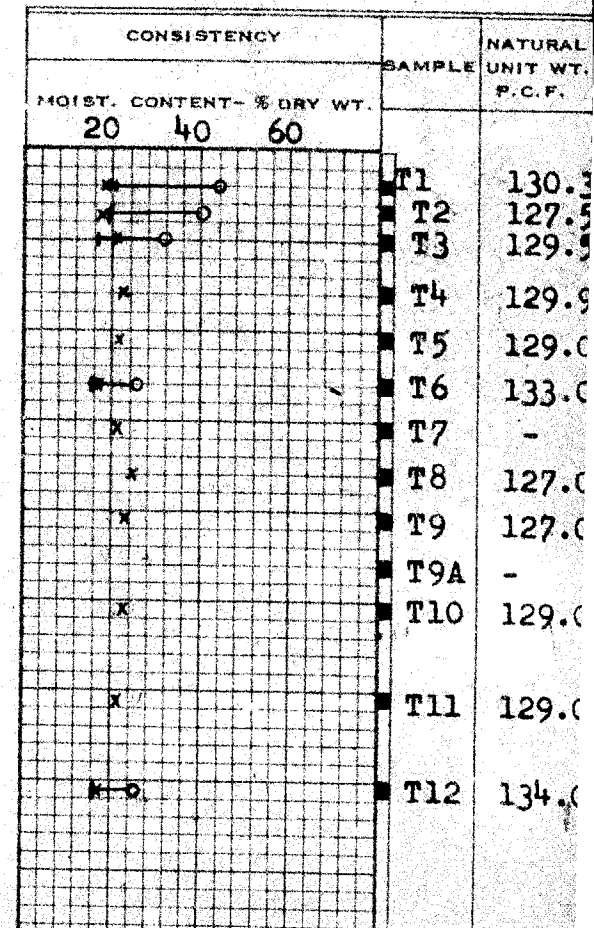
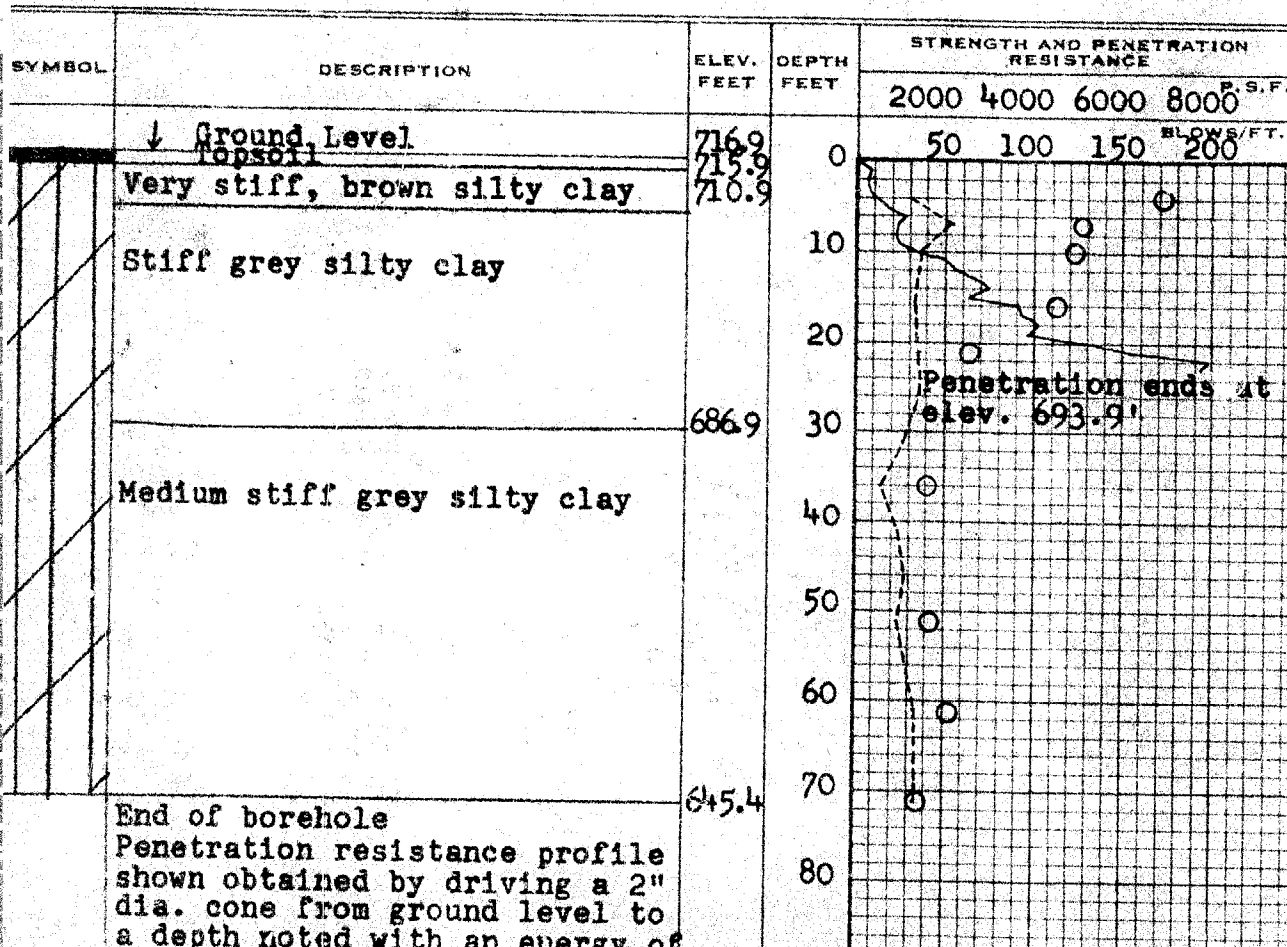
MATERIALS AND RESEARCH SECTION

W.P. 58-59 BORE HOLE NO. 2
 JOB F59-93 STATION 290+12 (50!Lt.)
 DATUM 716.9' COMPILED BY B.K.
 BORING DATE Sept. 15/59 CHECKED BY B.M.G.

2" DIA. SPLIT TUBE
 2" SHELBY TUBE
 2" SPLIT TUBE
 2" DIA. CONE
 2" SHELBY
 CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Qu) O
 VANE TEST (C) AND SENSITIVITY (S) +
 NATURAL MOISTURE AND LIQUIDITY INDEX LI
 LIQUID LIMIT X
 PLASTIC LIMIT



DEPARTMENT OF HIGHWAYS - ONTARIO

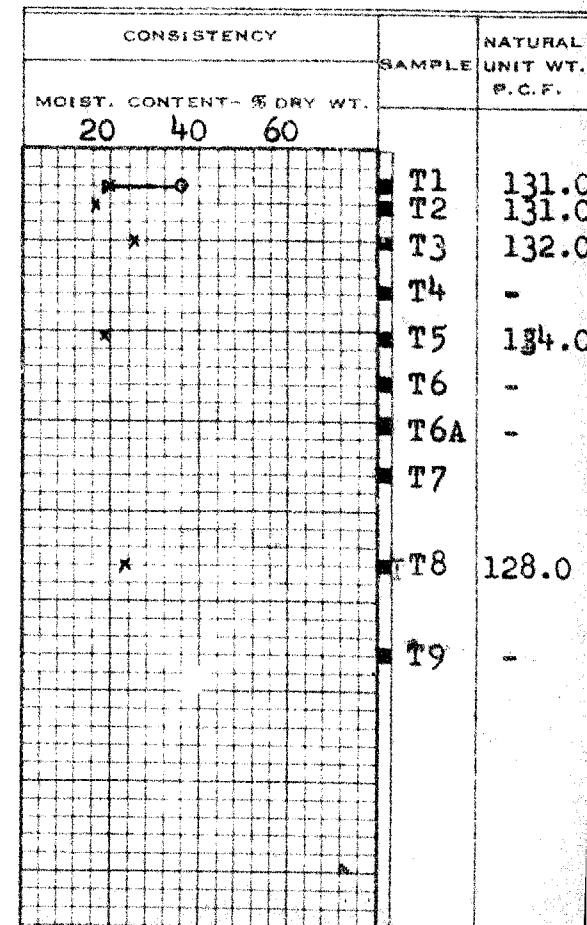
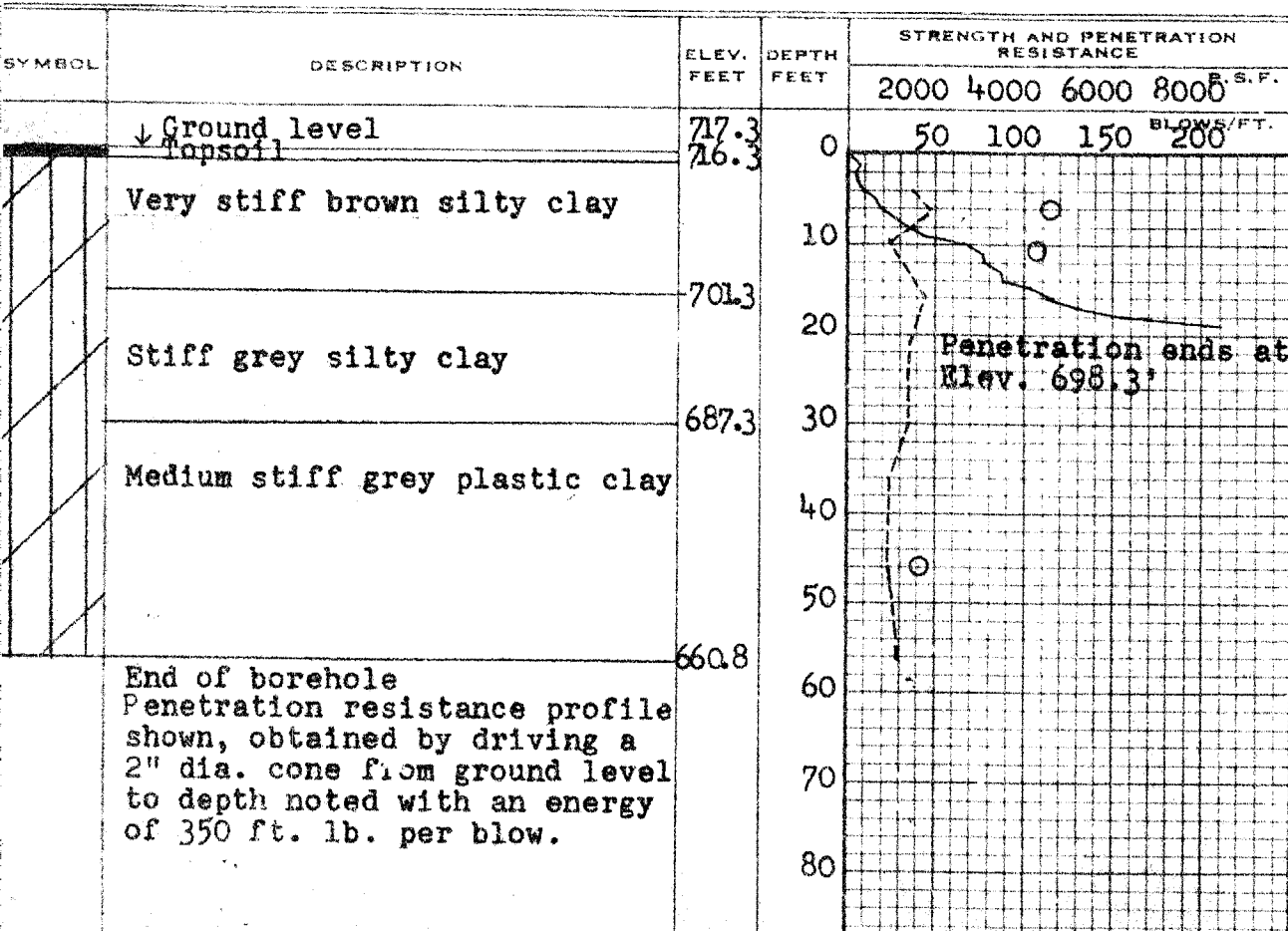
MATERIALS AND RESEARCH SECTION

W.P. 58-59 BORE HOLE NO. 3
 JOB F 59-93 STATION 289+59 (50' Lt)
 DATUM 717.3' COMPILED BY B.K.
 BORING DATE Sept. 18/59 CHECKED BY B.M.G.

2" DIA. SPLIT TUBE
 2" SHELBY TUBE
 2" SPLIT TUBE
 2" DIA. CONE
 2" SHELBY
 CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Qu) O
 VANE TEST (C) AND SENSITIVITY (S) +S
 NATURAL MOISTURE AND LIQUIDITY INDEX X
 LIQUID LIMIT
 PLASTIC LIMIT



DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 58-59 BORE HOLE NO. 4

JOB F 59-93 STATION 289+55 (50' Rt.)

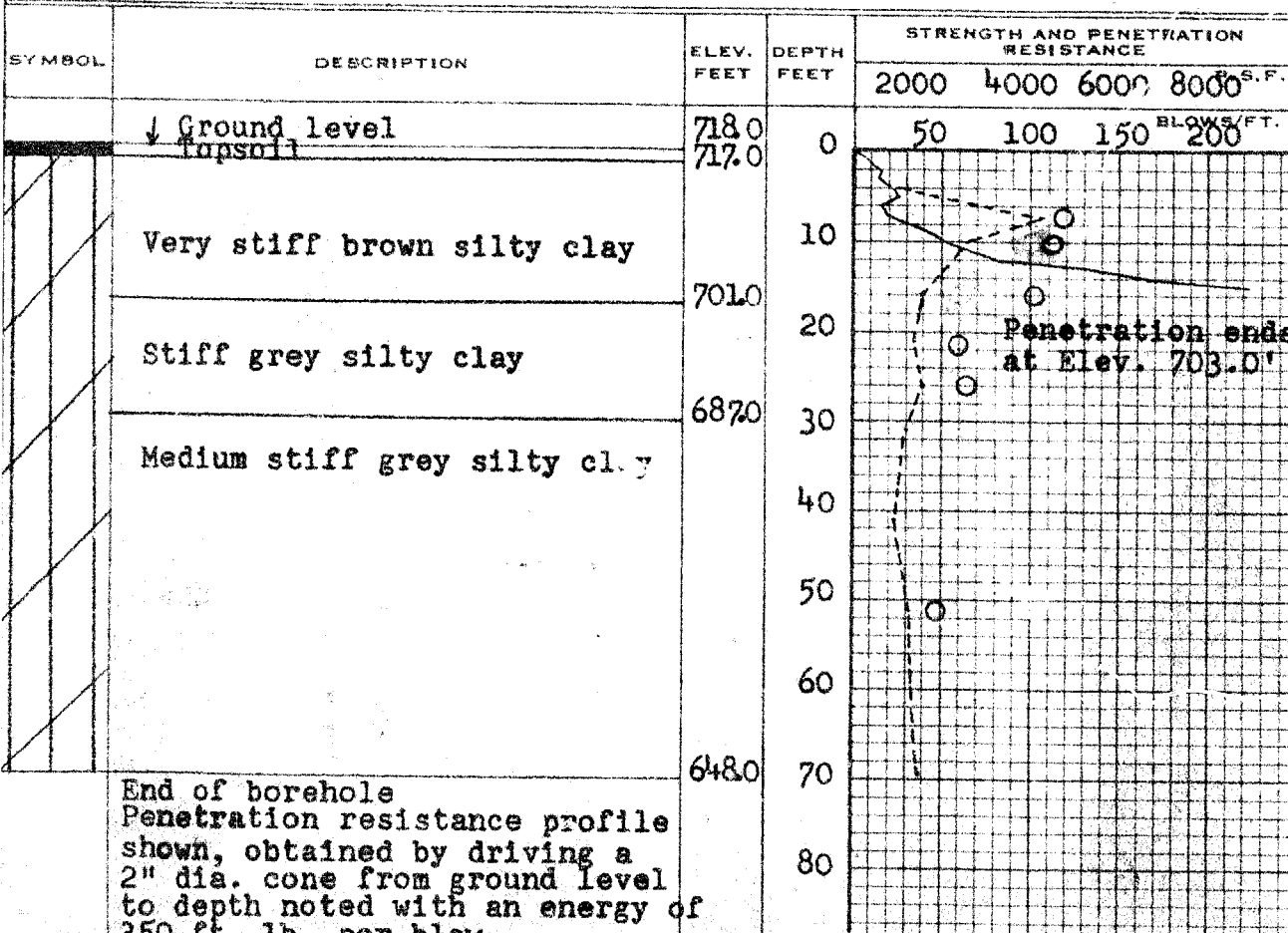
DATUM 718.0' COMPILED BY B.K.

BORING DATE Sept. 22/59 CHECKED BY B.M.G.

2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Qu) O
VANE TEST (C) AND SENSITIVITY (S) +
NATURAL MOISTURE AND LIQUIDITY INDEX LI
LIQUID LIMIT X
PLASTIC LIMIT



CONSISTENCY			SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT- % DRY WT.				
20	40	60		
			T1	129.0
			T2	134.0
			T3	130.0
			T4	132.0
			T5	132.0
			T6	130.0
			T7	-
			T8	-
			T9	129.0
			T10	128.0
			T11	-



DEPARTMENT OF HIGHWAYS

POSTAL ADDRESS -
DEPARTMENT OF HIGHWAYS
PARLIAMENT BUILDINGS
TORONTO 5, ONTARIO

Bridge Division,
December 15, 1961.

MEMORANDUM TO:

Mr. A. G. Stermac,
Principal Foundations Eng.,
Department of Highways,
Room 107,
Lab. Bldg.,
Downsview, Ontario.

Curry
Dec 19, 1961
AK

RE: Pile Load Tests
Currie Road Interchange Bridge
Highway 401, District 2
W.P. 58-59

Please find enclosed our special provision for the pile load tests which will be included with the contract for the above bridge as a lump sum item.

We would appreciate your comments on the special provision before we include it in the contract.

Would you please have a drawing made showing the details of the test, similar to the sketch you sent us.

Please also indicate on the enclosed Drawing D 4878-1, the location where the test piles will be driven.

DMcC/et

D. McCune
D. McCune,
for M. Stoyanoff,
Bridge Contract Engineer.

Note This load test at the above location will not be carried out at the above mentioned location. It was decided by Mr Stermac of Foundation section and Mr Davis of Bridge office.

M. Sevata
Dec 1961

PILE LOAD TESTS

Under this item and for the lump sum bid the Contractor shall supply all necessary equipment, labour and material, other than the piling, jacks and dial gauges and shall carry out the pile load tests, at the locations shown on the drawings.

The pile load tests shall be carried out as specified in the National Building Code of Canada, Appendix 4.2.C., and as specified herein, and as directed by the Engineer.

The following piling for the load tests will be supplied by the Department to the point designated in the material list at the end of the tender.

Steel "H" Piles

3 pieces 12 BP 53 each 30 feet long

Steel Tube Piles 12" O.D. x .25" wall thickness

1 piece 30 feet long

1 piece 1 foot long

The Contractor shall be responsible for checking the piling on delivery, and reporting any shortages or errors, and for unloading, storage, handling, moving and proper care of the piling until it is placed in the work.

Payment for this work shall be included in the lump sum bid for this item.

The Department will supply the jacks and dial gauges for carrying out the load test.

The Contractor shall supply all other material necessary to carry out the load test including the following:

- 1 piece 12" I.D. 13" O.D. ring 6" long
- 2 Steel clamps - 8" opening
- 1 piece 24 WF 100# x 7 feet (Beam)
- 8 pieces $\frac{1}{2}$ " x 5" x 9" Plate (Straps)
- 6 pieces $\frac{1}{2}$ " x 6" x 25" Plate (Stiffeners)
- 2 pieces $\frac{1}{2}$ " x 12" x 12" Plate (Bearing Plate)
- 1 piece $\frac{1}{2}$ " x 13" x 13" Plate (Bearing Plate)
- 2 pieces 3" x 2" x $\frac{1}{4}$ " Angles, 17 feet long
- 24 pieces 2" x 4" x 48" Lumber
- 4 pieces 2" x 4" x 84" Lumber
- Pile Shoe for Steel Tube Test Pile

The Contractor shall supply all equipment necessary to carry out the load test including the following:

1. Portable, diesel driven, Electric Arc Welding equipment.
2. Oxy-Acetylene Welding Equipment.
3. Equipment for Driving Test Piles. Driving Equipment shall be approved by the Bridge Engineer before driving commences.

The Contractor shall supply all labour required to carry out the load test. The Engineer may require the assistance of one or more labourer while load is being applied to, or removed from, a pile. The Contractor shall provide at the site semi-skilled workmen as required by the Engineer including any necessary hand tools. The Contractor shall provide the welding operator at the site.

PILE LOAD TESTS-Cont'd.

All welding shall conform to the provisions of C.S.A. Specifications W59, latest issue, and shall be done by a welder qualified under the provision of C.S.A. Specification W47, latest issue. Electrodes shall conform to C.S.A. Specification W48.1, latest issue.

Procedure for carrying out the pile load tests shall be as follows:

- (a) Drive Steel "H" and Steel Tube Test Piles as shown on the drawings and as directed by the Engineer.
- (b) Place pile shoe on steel tube test pile.
- (c) Cut off tops of test piles to the required elevation if necessary.
- (d) Place 3,000 lb. concrete in tube piles. The pile shall be thoroughly cleaned out and filled with concrete. The concrete shall be placed in one continuous operation and shall be continuously and adequately tamped. The Department will supply the cement. The Contractor shall supply all other material.
- (e) Fabricate and Place cross beam for load test on steel tube pile.
- (f) Fabricate and Erect reference beams and supports.
- (g) Carry out load test on steel tube pile. The Department will take all readings for and interpret the results of the load tests and will supervise the tests. The Contractor must do all applying, maintaining and removing of loads. A Compensator may be used to maintain pressure on the jack.
- (h) Remove crossbeam
- (i) Splice 12" long piece to top of tube pile.
- (j) Cut off top of interior Steel "H" Pile to 12" below level of tops of other test piles as shown on the drawings.
- (k) Place cross beam for load test on Steel "H" Pile.
- (l) Carry out load test on Steel "H" Pile.
- (m) Remove crossbeam and test equipment.
- (n) Pull out test piles and stockpile them at site. Piles shall remain the property of the Department.
- (o) Remove all material from site of test except piles.

The Contractor shall notify the Materials and Research Branch 3 days prior to commencing the driving of test piles.

Test piles shall be driven before driving the piles for the structures.

Mr. A. M. Toye,
Bridge Engineer.

December 1, 1961.

PILE LOADING TEST --

Materials & Research Division,
(Foundation Section).

Attention: Mr. Dave McCune.

Re: Currie Street Interchange,
W.P. 58-59 -- District No. 2.

A number of structures along the new portion of Hwy. 401 (Twps. Delaware, Southwold, Dunwich, Aldborough, Oxford, Harwich, Raleigh), is planned for construction in 1963, 1964, or even later.

The soil conditions at many of these locations are comparable and also similar to the conditions at the site of the Currie Street Interchange, 6.8 Mi. East of Hwy. No. 76. This structure is scheduled for construction in April, 1962.

It is our opinion that a pile loading test should be carried out at this site because the gathered information may prove to be valuable and useful for all the other structures. Piles will be used at this site and the additional cost for a pile loading test will therefore be very small. We would not test the piles used for the structure, but piles driven adjacent to the approach fill. The piles could be pulled out of the ground after the test. It is impossible to foresee the duration of the test, but it is believed that it will be a short-term test. It is therefore suggested that these piles be driven first.

Testing will be carried out by using two adjacent piles as supports - i.e., anchors for the middle one which is tested. Attached to this memo, we are sending you a sketch showing the necessary arrangement of piles to be tested and the Bill of Materials. (Please ignore title of drawing.) We would appreciate

cont'd. /2 ...

Mr. A. M. Toye

December 4, 1961.

Att'n: Mr. D. McCune

it if this could be included in the Currie St. Interchange contract.

Should there be any additional information that you require, please feel free to contact this Office.

AGS/MdeF

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. B. Davis
J. Keen

Foundations Office ✓
Gen. Files.

BILL OF MATERIALS

I Piles

(a) 12 BP 53 -

3 only 12 BP 53 x 37 ft.

(3 only 12 BP 53 x 25 ft.)

(b) 12" Ø Tubular -

1 only 12" Ø x 37 ft.

1 only 12" Ø x 1.5 ft.

1 only 12" Ø x 40 ft.

II To Make Up Beam -

1 only 24 WF 100 x 7 ft. (Beam)

8 only 1/2" x 5" x 94" PL (Straps)

6 only 1/2" x 6" x 25" PL (Stiffeners)

2 only 1/2" x 12" x 12" PL (Bearing PL)

1 only 1" x 13" x 13" PL (Bearing PL)

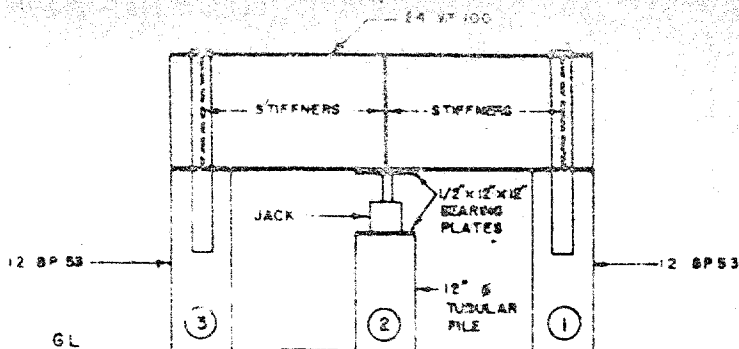
III Reference Bars -

2 only 3" x 2" x 1/4" x 17 ft. (Reference Angles
Approx. Size)

24 only 2" x 4" x 48" Lumber

4 only 2" x 4" x 84" Lumber

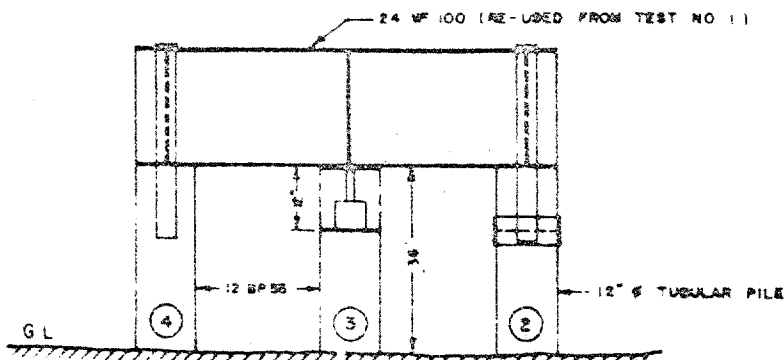
TEST NO. 1



NOTE: Piles may be driven to a greater depth and re-tested.

SCALE: 3/8" = 1' 0

TEST NO. 2



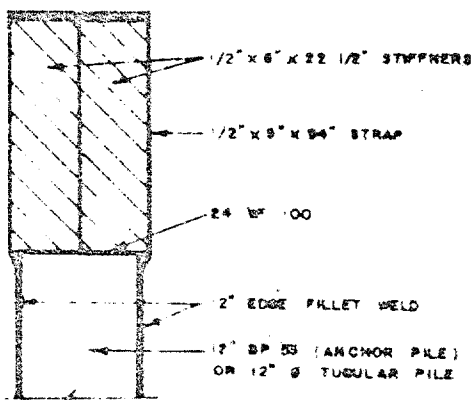
NOTE: For pile 2 an additional length of 1 ft. should be spliced.

For pile 3, the pile should be cut off approximately 2 ft. above ground.

Piles may be driven to a greater depth and re-tested

SCALE: 3/8" = 1' 0

DETAILED LAYOUT OF THE HORIZONTAL BEAM TO THE REACTION PILES.



SCALE: 3/4" = 1' 0

ORIGINATED W. DEVATA

DRAWN D. MURFORD

CHECKED *HR* 11/13

APPROVED *ays*

DATE 12 OCT 1961

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH SECTION

PILE LOADING TEST DETAILS

PROPOSED IONA, MELBOURNE COUNTY RD.

AND

HIGHWAY NO. 401

SCALE AS SHOWN

W.P. NO. 61-59

JOB NO.

DWG. NO. X-30

MATERIAL FOR SPLICING

For 12 BP 53 Beams -

9 only 1/2" x 6" x 6" PL

For 12" Ø Tubular Pile -

2 only Rings 6" long, 12" I.D., 13" O.D.

2 only Steel Clamps - 8" opening.

EQUIPMENT REQUIRED

Pile driving equipment

Electric Arc Welder - Portable - Diesel Driven.

Oxy-Acetylene Welding equipment.

#59-F-93

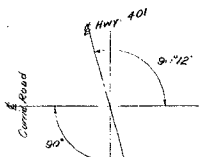
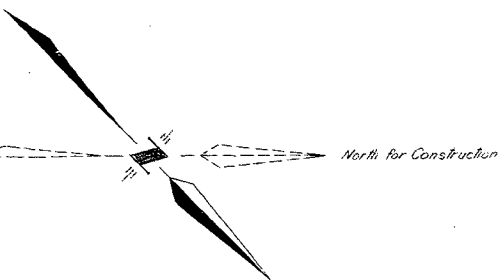
W.P. #58-59

Hwy. #401 E

COUNTY RD.

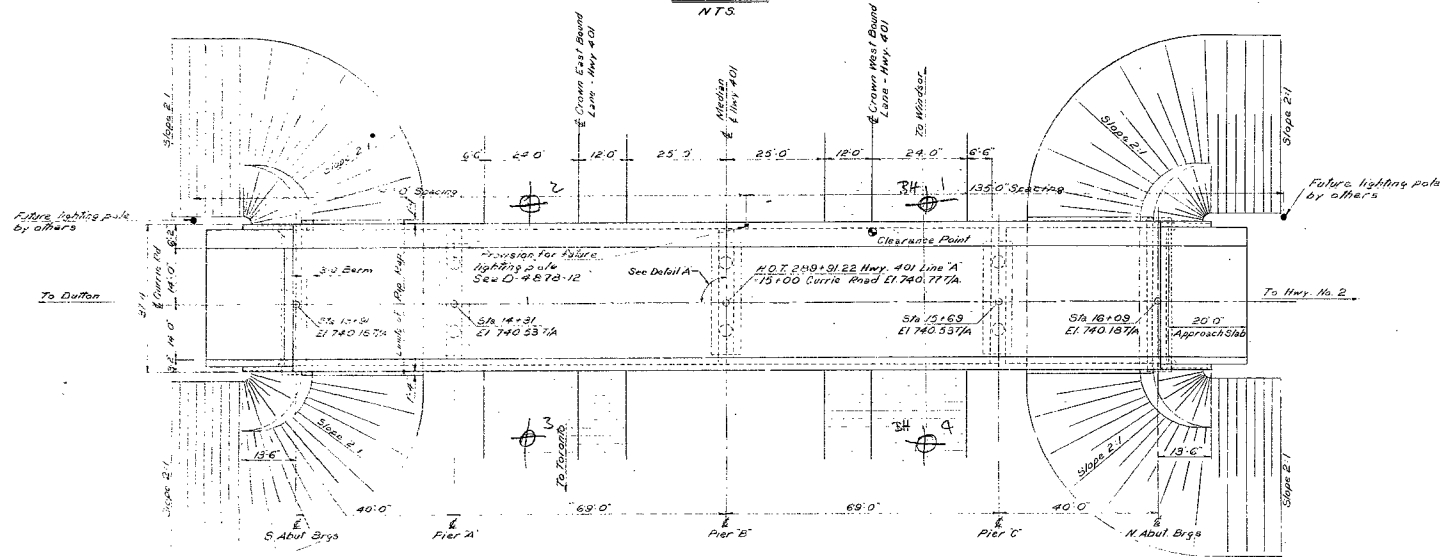
BRIDGE #9

DUNWICH TWP.



DETAIL A
N.T.S.

NOTE: Structure to be built without skew and square to Currie Road.



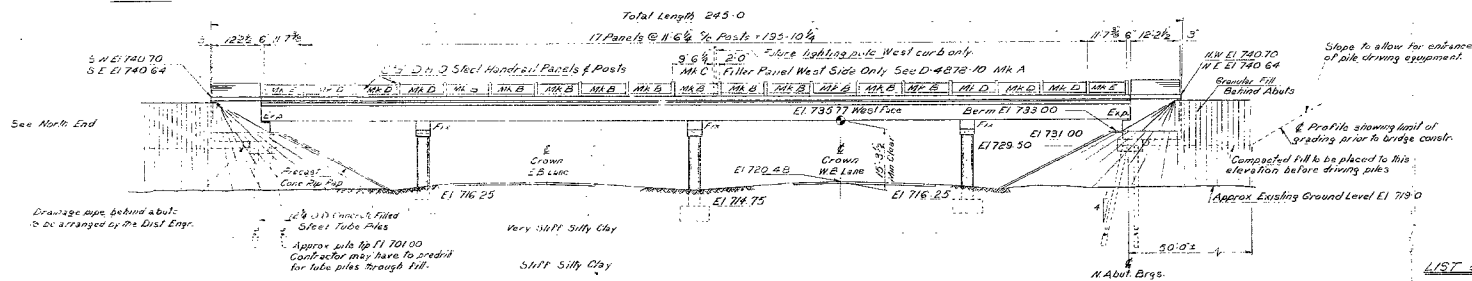
PLAN

Scale: 1"=20'-0"

NOTE: T/A Denotes elevations are to top of asphalt

SOUTH

NORTH



ELEVATION

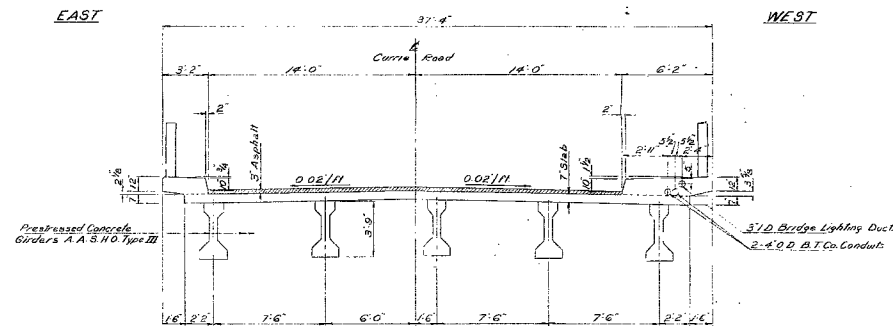
Scale: 1"=20'-0"

LIST OF DRAWINGS

- D-4878-1 Plan & Elevation
- 2 Foundation Layout & Borehole Data
- 3 Abutment & Wing Walls
- 4 Pier & End Post Details
- 5 Prestressed Concrete Girders
- 6 Bearings
- 7 Deck, Diaphragms & Curbs
- 8 Approach Slab Details
- 9 Handrail & Steel Post Details
- 10 Handrail Filler Panel
- 11 Concrete Slope Paving
- 12 Bridge Lighting Details
- 13 Reinforcing Steel Schedule
- 14 " " " (Approach Slab)

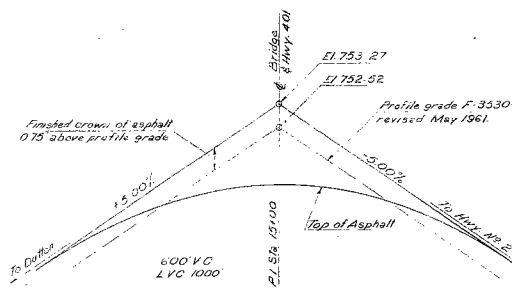
EAST

WEST



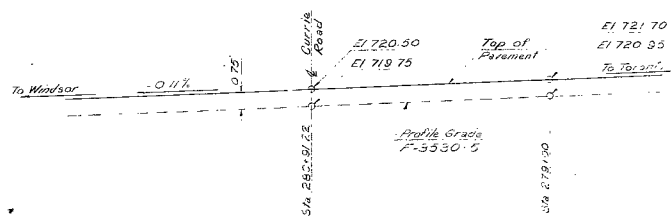
TYPICAL DECK SECTION

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



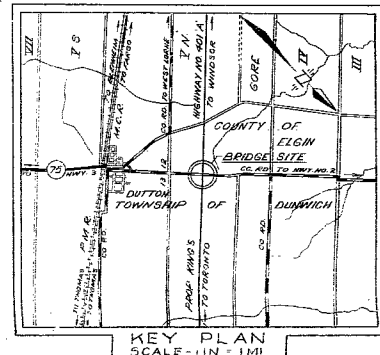
PROFILE OF CURRIE ROAD

N.T.S.



PROFILE OF HWY 401

N.T.S.



NOTES

TO: DISTRICT ENGINEER

CONCRETE WORK ON THIS STRUCTURE MUST NOT BE COMMENCED UNTIL MONUMENTS TO FIX CONTROL POINTS HAVE BEEN ERECTED AND CHECKED BY THE DISTRICT ENGINEER.

TO: CONTRACTOR

STRUCTURE TO BE BUILT IN ACCORDANCE WITH FORM NO. 9 AND THE SPECIAL PROVISIONS, EXTRA COPIES OF WHICH MAY BE OBTAINED FROM THE DISTRICT ENGINEER.

CONCRETE MIX

	MINIMUM STRENGTH AT 28 DAYS	MAXIMUM SIZE OF AGGREGATE
PRESTRESSED BEAMS	5000 p.s.i.	3/4"
REMAINDER	3000 p.s.i.	3/4"

APPROVED ADMIXTURES SUPPLIED BY THE CONTRACTOR WILL BE ADDED TO ALL CONCRETE AS SPECIFIED BY THE ENGINEER.

BORING DATA

THE COMPLETE SOIL INVESTIGATION REPORT BA/GIO MAY BE EXAMINED AT THE BRIDGE OFFICE. DOWNVIEW. THE DEPARTMENT DOES NOT GUARANTEE THE ACCURACY OF THIS REPORT OR THE ABRIDGED VERSION SHOWN ON THESE PLANS.

CLEAR COVER ON REINFORCING STEEL

FOOTINGS	3"
ABUTMENT & PIER COLUMNS	3"
DECK	1" TOP & BOTTOM OR AS NOTED
END POSTS & CURBS	2"
PIER CAPS	2"

CONSTRUCTION NOTES

ALL EXPOSED EDGES TO BE CHAMFERED 1"x1" EXCEPT AS NOTED. ALL CONSTRUCTION JOINTS MUST BE APPROVED BY THE BRIDGE ENGINEER. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BRIDGE SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF PLUS OR MINUS 1/8" INCH.

THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT THE FINAL DECK ELEVATIONS CONFORM WITH THE ELEVATIONS SHOWN. NO CONCRETE SHALL BE PLACED ABOVE BRIDGE SEAT UNTIL CONCRETE IN DECK HAS BEEN PLACED.

THE CONTRACTOR'S ATTENTION IS DRAWN TO THE CONSTRUCTION SEQUENCE AND CONDITIONS OUTLINED IN THE SPECIAL PROVISIONS.

W.P. 58-59

DEPARTMENT OF HIGHWAYS-ONTARIO

BRIDGE OFFICE - TORONTO

CURRIE ROAD INTERCHANGE

APPROX 6.2 MILES EAST OF HWY 16

THE KING'S HIGHWAY NO. 401 DIST. NO. 2
CD. Elgin Dunwich Twp. Br. #9
TWP. Dunwich LOT 12 & 13 CON. 2N

PLAN & ELEVATION

APPROVED

BRIDGE ENGINEER DESIGN ENGINEER

DESIGN P.S. CHECK J.S.A. CONTRACT NUMBER

DRAWING F.W.H. E.C.K. C.S.B. DRAWING NUMBER

TRACING E.C.K. DRAWING NUMBER

DATE JUL 1 1961 DATE JUL 1 1961

DATE JUL 1 1961 DATE JUL 1 1961

DATE JUL 1 1961 DATE JUL 1 1961

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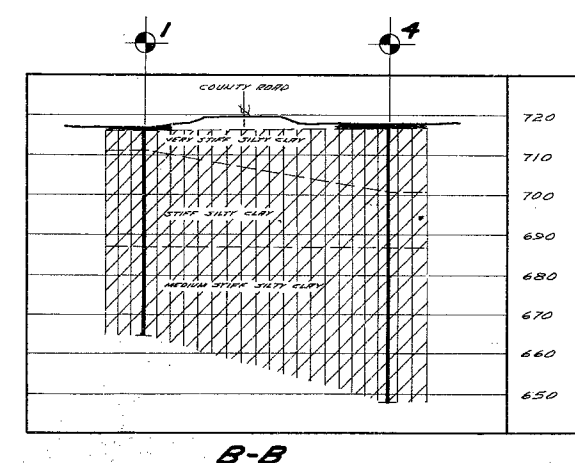
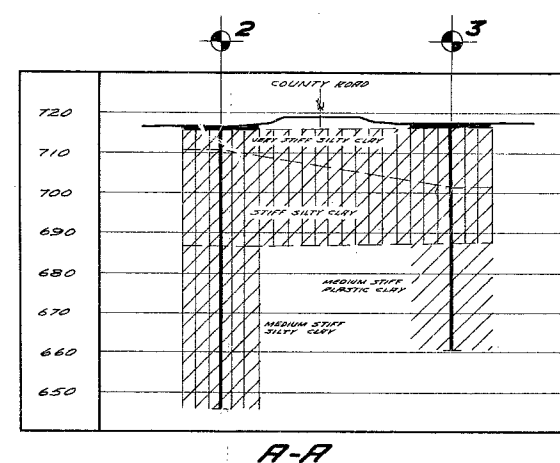
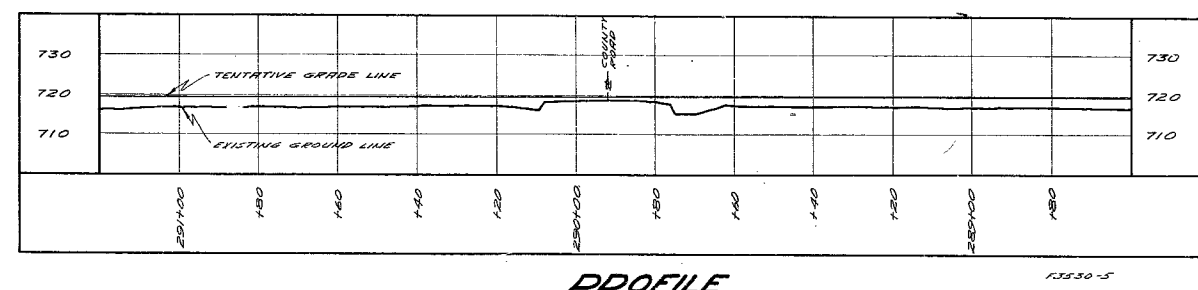
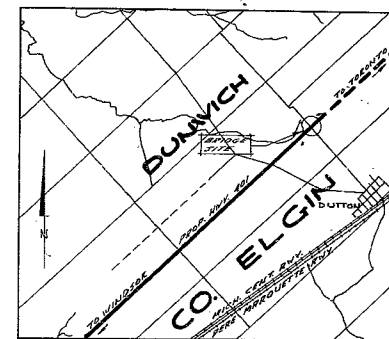
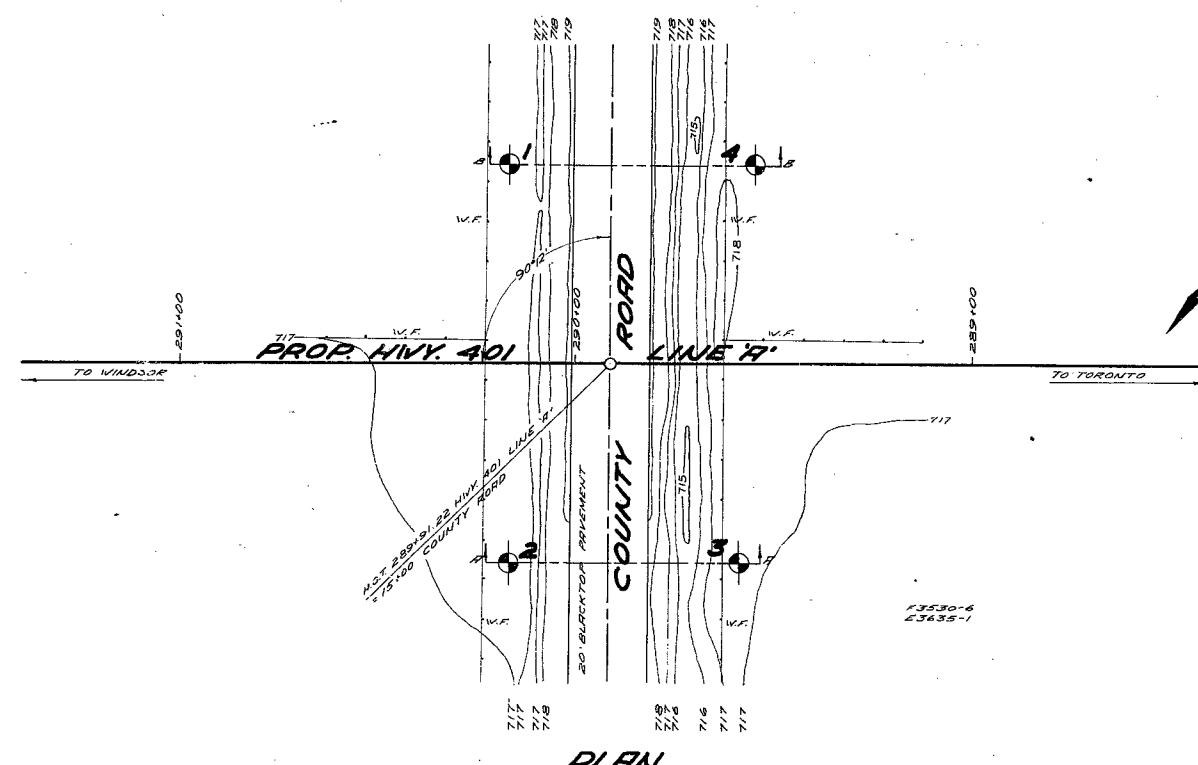
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LEGEND

BORE HOLE

PENETRATION HOLE

BORE & PENETRATION HOLE

HOLE NO.	ELEVATION	STATION	DISTANCE FROM E
1	717.0	289+12	50' RT.
2	716.9	289+12	50' LT.
3	717.3	289+59	50' LT.
4	718.0	289+55	50' RT.

- NOTE -

THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BORE HOLE LOCATIONS. BETWEEN BORE HOLES THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE AND MAY BE SUBJECT TO CONSIDERABLE ERROR.

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH SECTION

COUNTY ROAD PROPOSED CROSSING

SHOWING POSITIONS & ELEVATIONS OF HOLES

HWY. 401 DISTRICT 2 COUNTY ELGIN

TOWNSHIP DUNWICH LOT 12 & 13 CON. 3 N

LOCATION R.R. 100 N.W. 1/4 OF SECTION 10

DRAWN BY: T. MELLORES CHECKED BY: J. F. W.P. 58-59

DATE 12 NOV. 59 APPROVED BY: J. F. W.P. 58-59

SCALE 1/4" = 20 FT. DRAWING NO. F59-93A