cc: Mr. A. M. Toye (2nd copy)

DA 990 A

Mr. A. M. Toye,

Bridge Engineer.

Materials & Research Section.

January 12, 1960.

Attention: Mr. S. McCombie.

Re: Hwy. 76 & Thames River Crossing (Simpson's Bridge)
W.P. 142-59 -- W.J. F 59-19.
Settlement Analysis

As requested by Mr. N. Damas of T.O. Lazarides & Associates, we have recently carried out settlement analyses for the piers and abutments at the above noted structure location, based on the folloving design data submitted to us by T.O. Lazarides & Associates:-

[illegible] Abutment at Sta. 530+15.

Pile cap of 9' x 16' supported on timber piles driven to Elev. 595' with each pile carrying 20 tons.
Total dead weight due to superstructure and abutment = 654 Kips.

North Pier at Sta. 529+15.

Footing of 16' x 52' founded at Elev. 605' supporting a total load of 1996 Kips.

South Pier at Sta. 527+85.

Same as per North Pier at Sta. 529+15.

Most Southerly Pier at Sta. 526+85.

Footing of 14' x 52' founded at Elev. 610' supporting a total load of 1300 Kips.

cont'd. /2 ...

Settlements under the footings are as follows:-

	Ultimate Settlement (inches)	90% Consolidation (inches)
North Abutment at Sta. 530+15 (Footing Pressure 2.02 K.s.f.	2.5"	2.3"
North Abutment at Sta. 530+15 (Fill - 2.0 K.s.f.	1.3"	1.2"
North Pier at Sta. 529+15 - Footing Pressure 2.4 K.s.f.	5.1"	4.6"
South Pier at Sta. 527+85 Footing Pressure 2.4 K.s.f.	5.1"	4.6"
Most Southerly Pier - at Sta. 526+85 Footing Pressure 1.78 K.s.f.	2.7"	2.4"

In all calculations, the following consolidation characteristics of the subsoil layers were used:-

Coefficient of Consolidation .... 0.18 ft.^{2}/day.
Compression Index 0.09

In addition, a plot of settlement versus time has been presented and is attached to this memorandum.

It can be seen that most of the settlements will take place in approximately 20 years. Differential settlements for any period of time can be obtained from this plot.

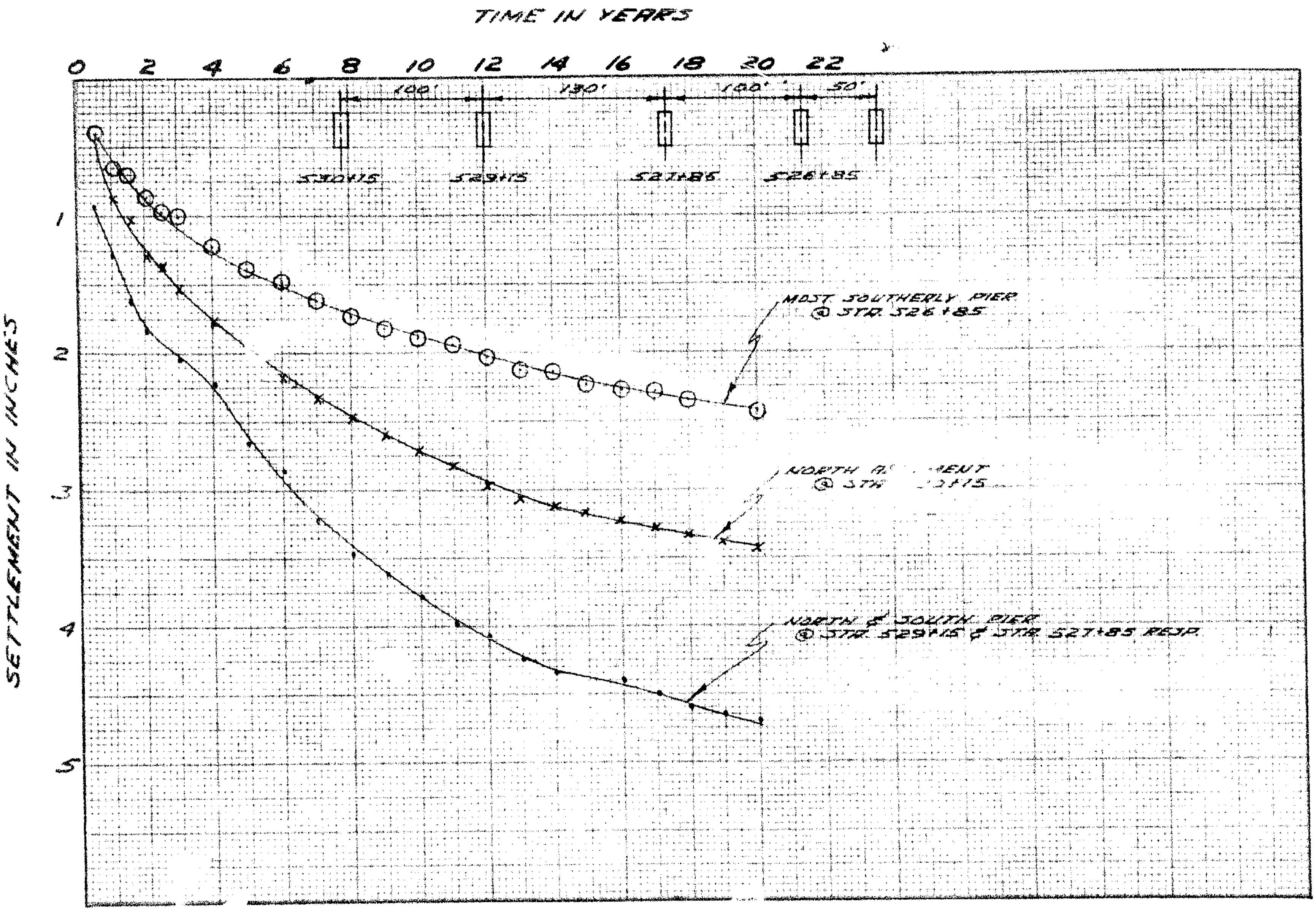
If we can be of further assistance in the foundation design of this structure, please contact our Office.

AKL/MdeF
Attach.
cc: Messrs. A. M. Toye (2) ✓
T. C. Lazarides
J. Roy
Foundation Section
Gen. Files.

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

AKL

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



SETTLEMENT Vs TIME PLOT

W.P. 142-59 JOB F59-1(9) THAMES RIVER

BA 940 -1

ONTARIO
DEPARTMENT OF HIGHWAYS

Memo to Mr. A. M. Toye, *Date* January 12, 1960.

Bridge Engineer. *Subject*

From Materials & Research Section.

Attention: Mr. S. McCombie.

Re: Hwy. 76 & Thames River Crossing (Simpson's Bridge)
W.P. 142-59 -- W.J. F 59-19.
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AKL/MdeF
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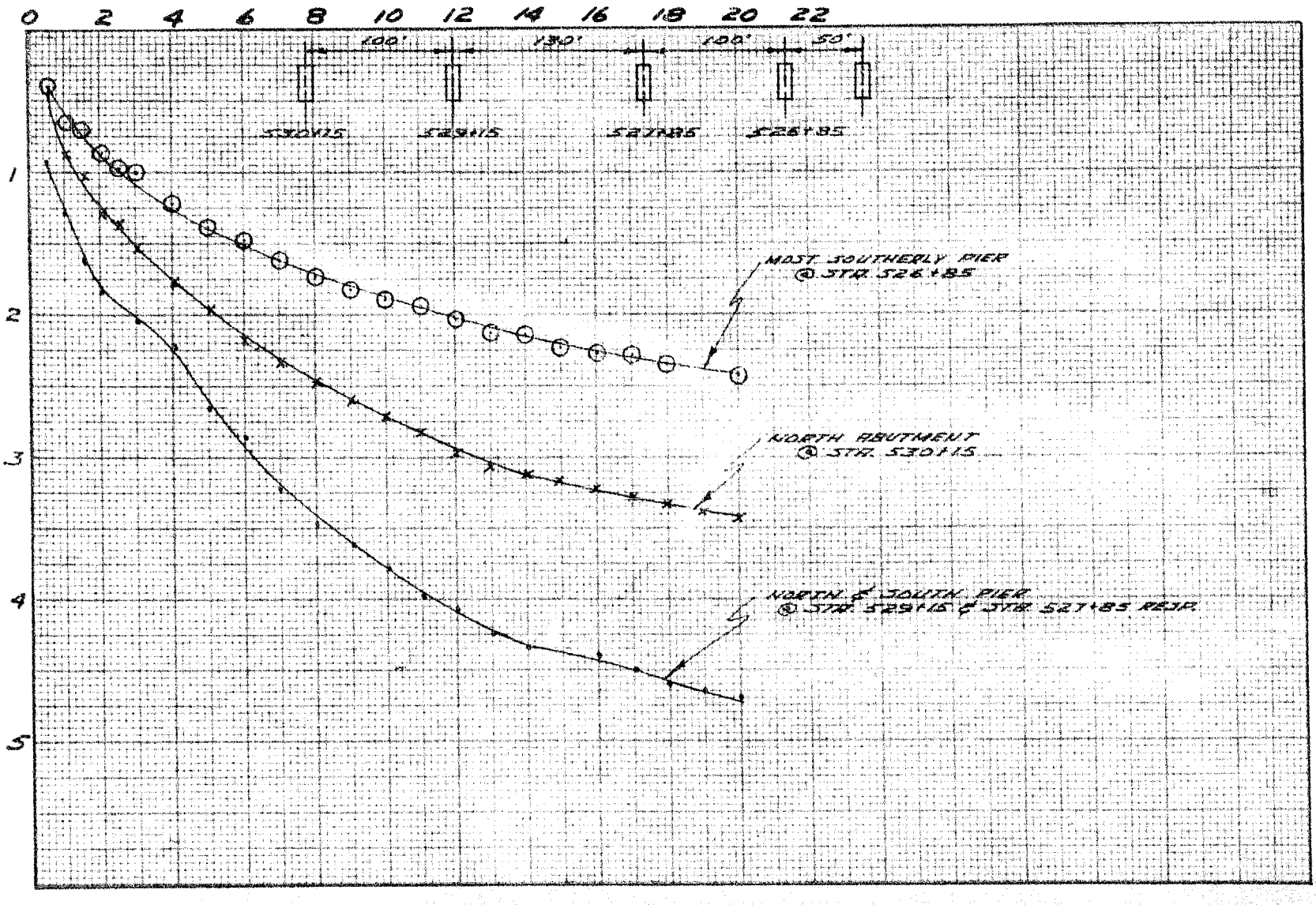
T. O. Lazarides
J. Roy
Foundation Section
Gen. Files.

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

AKLoh

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



SETTLEMENT Vs TIME PLOT

W.P. 142-59 JOB 59-19 THAMES RIVER

Mr. W. L. Fraser,
District Engineer,
London, Ontario.

August 28, 1961.

SITE VISITS --
(Slope Failures)

Materials & Research Section,
(Foundations Office).

Attention: Mr. J. E. Gallagher, Const. Engr.

Re: Glapton Bridge over the Thames River,
Contract No. 61-79 -- District No. 2.

In response to a request by the District, the undersigned has visited the site of the above mentioned bridge on August 22nd, and again on August 24th.

The request by the District was made because some additional failures have occurred during construction and corrective and remedial measures had to be decided upon. This memo is to confirm the main topics that were discussed and to outline the construction sequence and measures considered necessary for the safe continuation of construction.

The first slide - i.e., slope failure, occurred on July 3rd, or 4th (the exact date is not known to the undersigned). The contractor had excavated some material in order to build an access road for the equipment he wanted to bring in. This resulted in a 1:1 or even steeper ground slope which proved to be too steep for the fine saturated silty sand, and a failure occurred. Also, most of the excavated material was piled up on the top of the slope.

cont'd. /2 ...

The material failed in liquefaction and some 2,500 cu. yds. literally flowed down the slope. The undersigned visited the site on July 5th and 7th, and the corrective measure decided upon at that time, called for trimming the slopes back to 4:1. All the disturbed material was to be removed and the sequence and limits of this work were shown on a sketch. Apparently, the boundaries of the failure zone were not correctly shown on this drawing and the excavation was carried out farther back. This excavation has shown that the nature of the slide and the moved masses were greater than originally estimated and assumed. During the excavation of some soft material, additional small failures have occurred. At that time, the undersigned was called out again and it was decided to build a drainage blanket between the abutment and the pier. Besides the drainage, the blanket will also provide a good base for the granular fill on top of it, and higher friction will be mobilized, under the part of the embankment which is resisting movements. The blanket should be built for the full width of the pier and have sides parallel to the Centre Line, the N.E. side being 75 ft. and the S.W., 55.5 ft. long. The difference in length results from the fact that the North back half is parallel to the pier and the South back half is perpendicular to the Centre Line. The width of the blanket (perpendicular to Centre Line) is 60.0 ft. The thickness of the blanket should be 4 ft.

It is estimated that approx. 300 cu. yds. will be needed and pit-run clean gravel size granular material should be used. In order to place this blanket, additional excavation will have to be carried out. The side slope should be always 2-1/2:1

cont'd. /3 ...

or flatter. It is recommended that the excavation and blanket placing be carried out in stages - i.e., the area closest to the pier where only very little material will have to be excavated, be finished first and then proceeded towards the abutment. In this way, if smaller slides occur, the whole area would not have to be cleaned again. The excavation for the blanket placement should be carried down to the firm till material. It is estimated that the average excavation elevation will be 612.0, but the exact depth will have to be determined in the field.

At the top of the failure area, there is some very soft material. It is recommended to place granular material, preferably coarse, on top of it. The soft material is basically granular and it is believed that it will drain and thus stabilize. Besides, this area will be at the toe of the embankment slope and movements perpendicular to the Centre Line cannot take place due to the ground topography. Movements parallel to the Centre Line will be prevented by the above described blanket arrangement.

It is believed that the outlined measures and procedures will produce the desired result. Should there be some unexpected or unforeseen developments, please feel free to call on our Office and we will give you all possible assistance.

GS/mef

cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMiller
A. Oster
J. Roy
W. O'Dell
L. R. Eadie
Foundations Office
Gen. Files.

A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Gen. Files

Mr. W. L. Fraser,
District Engineer,
London, Ontario.

August 10, 1961.

Materials & Research Section,

(Foundations Office).

Attention: Mr. J. E. Callaghan, Const. Engr.

Re: Simpson Bridge over the Thames River,
Contract No. 61-79 -- District No. 2.

This is to confirm the contents of the telephone conversation on August 10, 1961, between Mr. W. Zonnenberg, Simpson's Bridge Project Supervisor and the undersigned.

Mr. Zonnenberg has informed the undersigned that the encountered old borehole at the pier foundation location was estimated to be 33 ft. deep and of an approximate 24 inches diameter. The hole was filled with alternate compacted layers of crushed stone and clay. The compaction was carried out by means of a steel breaking ball. Fourteen cu. yds. of this material were placed in the described manner up to four feet from the excavation level. A 6-ft. long piece of a 36-inch C.I.P. was inserted into the compacted clay for 2 feet leaving 4 feet empty. A 5-inch pipe was then inserted to provide for the escape of any gas that could accumulate in time and possibly build up a certain pressure. The space around the 5" pipe within the 36" C.I.P. was then filled with concrete.

It is considered that the described and carried out measures are sufficient and adequate and that the construction of the footings can be continued. The hole is situated close to the centre point of the pier footing. The subsoil is a dense till material and it is believed that the gas did not disturb the ground more than it was visible. The disturbed area, which is now corrected, is very small in comparison to the footing dimensions and it is believed that no detrimental consequences would result.

A. G. Sternac,
SUPERVISING FOUNDATION ENGINEER

AGS/MdeF

cc: Foundations Office
Gen. Files.

ONTARIO
DEPARTMENT OF HIGHWAYS

Memo to Mr. A. G. Stermac,
Principal Foundation Engineer.

Date September 14, 1961.

Subject SITE VISIT - SEPT. 7th, 1961.

From Mr. M. Devata,
Sr. Project Foundation Engineer.

Re: Simpsons Bridge over the Thames River,
Contract No. 61-79 - Dist. #2. WP 59-F-19

In response to a request by the District, the undersigned visited the above-mentioned site on Sept. 7th, 1961. This trip was made to see whether the construction sequence and remedial measures discussed in the memorandum of Aug. 28th, 1961, by Mr. A. Stermac, Principal Foundation Engineer, were carried out as per our recommendations.

It was noticed that the excavation and blanket placing was not carried out in stages as outlined in our memorandum. This was brought to the attention of Mr. Frank Clark, Construction Supervisor at the site. The excavation for placing the granular blanket was carried down to the firm till material with side slopes of cut 2-1/2:1.

The following recommendations were made at the site to Mr. Frank Clark in conjunction with the above-mentioned project:

1) Within the failure zone for the cut slopes, a granular blanket 2 ft. thick should be placed.

2) The granular blanket should be constructed as outlined in our memo of Aug. 28th/61. Using the granular blanket as the base, this should be brought up to the original ground elevation in the form of a frustrum of a pyramid. Locally available granular material may be used.

3) Any type of acceptable earth borrow material may be used in between the granular fill and abutment.

MD/MdeF

M. Devata
M. Devata,
SR. PROJECT FOUNDATION ENGR.

cc: Foundations Office

Mr. W. L. Fraser,
District Engineer,
London, Ontario.

August 10, 1961.

Materials & Research Section,

(Foundations Office).

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AGS/MdeF

A. G. Stermac,
SUPERVISING FOUNDATION ENGINEER

cc: Foundations Office
Gen. Files.

Mr. A. G. Stermac,
Principal Foundation Engineer.

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London, Ontario.

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AGS/MdeF

A. G. Stermac,
SUPERVISING FOUNDATION ENGINEER

cc: Foundations Office
Gen. Files.

W. G. A. Fraser,
District Engineer,
London, Ontario.

August 28, 1961.

Materials & Research Section,
(Foundations Office).

(Slope Failures)

Attention: Mr. J. E. Gallagher, Consl. Engr.

Re: Glapson Bridge over the Thames River,
Contract No. 61-79 -- District No. 2.

In response to a request by the District, the undersigned has visited the site of the above mentioned bridge on August 22nd, and again on August 24th.

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cont'd. /2 ...

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AGS/MdeF

A. G. Steinman,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. A. M. Taye (2)
H. A. Tregaskes
H. D. McMillan
A. Gater
J. Key
W. O'Dell
L. B. Kadic
Foundations Office
Gen. Files.

Mr. A. M. Toye, January 12, 1960.

Bridge Engineer.

Materials & Research Section.

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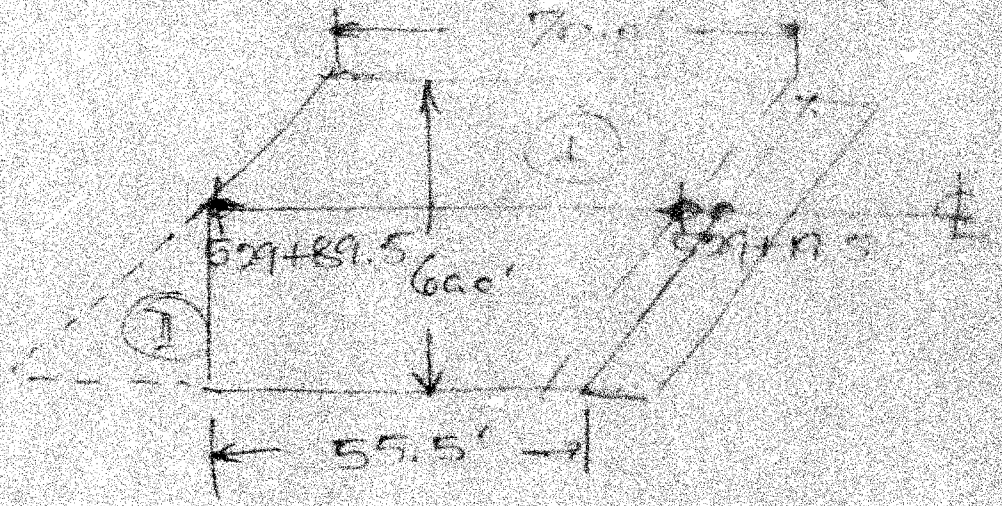
L. G. Soderman,
PRINCIPAL SOILS & FOUNDATIONS ENGR.
Dept.

AKLoh

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

LINES TANGENT TO ℄ ⅋C
SHEET PILE STATION 529+89.5
⅋C
~~529+89.5~~
529+89.5
⅋C
℄ 529+89.5



QUANTITY OF BLANKET

	SHAPE	
3' BLANKET	I	1,282 cu yds
7' BLANKET	I	1,800 cu yds

ONTARIO
DEPARTMENT OF HIGHWAYS

Memo to Mr. A. M. Toye, *Date* December 3, 1959.

Bridge Engineer. *Subject* D.H.O. FOUNDATION INVESTIGATION

From Materials & Research Section. W.P. 142-59 -- W.J. F-59-19.

Attention: Mr. S. McCombie.

Re: Hwy. #76 Rev'n. Line 'A' & Thames River Crossing,
(Simpson's Bridge)
Approx. 8 Miles North of Wallacetown.
London -- Dist. #2.

As requested, we have carried out 4 borings at the above noted structure location where revised Hwy. #76 crosses the Thames River. Attached hereto, are the detailed results of our field and laboratory findings as presented in the borehole logs and summarized in Table No. 1. The locations of the boreholes and their subsoil profiles are shown in the accompanying Drawing F-59-19B.

Subsoil consists of fluvial and alluvial deposits of loose silty sand, sandy silt and gravel overlying a deep glacial deposit of stiff silty clay. This stratum of glacial till was explored to a depth of approximately 100 ft. below the ground surface - (i.e., at approx. Elev. 545') during the exploration programme. A layer of medium sand and gravel, varying in thicknesses of 7 ft. in Boring 3-A to 11 ft. in Boring 1-A, was encountered in the stiff silty clay at approximately Elev. 600'.

The upper layer of fluvial and alluvial deposits of silty sand, sandy silt and gravel contains a considerable amount of organic matter and decayed vegetation and is in a loose state of packing with an average 'N' value (standard penetration resistance expressed in number of blows per foot) of 6 registered during the

cont'd. /2 ...

sampling operations. Its thickness varies from 4 ft. in Boring 2-A to 27 ft. in Boring 4-A.

The stratum of stiff silty clay was encountered immediately below the upper loose granular stratum in each of the sampled boreholes. The silty clay contains a small amount of fine to medium gravel and exists in a stiff condition. It grades into a dense sandy silt below approx. Elev. 567'. Laboratory triaxial and field vane test results show that the silty clay has a shear strength of approx. 2000 p.s.f. throughout. A plot of shear strength and consistency versus depth has been presented and is included under Appendix I.

Foundation Considerations:

The upper stratum of loose fine-grained granular material, varying from silt to gravel sizes, cannot be relied upon to support simple spread footings. The strength and compressibility characteristics of the stiff silty clay stratum underlying the upper granular layer, can be used for direct support of spread footings provided that net footing pressures do not exceed 2 1/2 tons/sq. ft. (i.e., a pressure of 2 1/2 tons in excess of existing total overburden pressure).

Pier Footings (Chainage 527+70 to 529+25)

It is understood that a multi-span structure is being considered with piers located at approximate chainages of 527+70 and 529+25. At or between these two chainage points the upper sand layer is 10 feet thick or less. Recommended placement footing elevations at these locations is 605.0'. A layer of water-bearing sand was encountered below elevation 603.0' in Boring 2-A, and below elevation 600.0' in Boring 1-A. Footings should be founded at least 2 feet above this water-bearing layer. In order to found footings at the recommended placement depth, it will be necessary to excavate through the upper layer of granular material. A sheeted excavation appears necessary, and we suggest that steel sheet piling be used. Piling should be driven to at least five feet below footing elevation.

cont'd. /3 ...

Abutment Footings

For footings located North of Station 529+60 and South of Station 527+20, the use of spread footings does not appear economically feasible. Use of spread footings in these areas would necessitate sheeted excavations to a depth of the order of 20 feet. An alternative means of footing support which we recommend is that of using displacement piles driven into the stiff clay stratum. Timber piles driven into the stratum of stiff silty clay should develop 20 tons/pile capacity with tip elevation at 595' or above. The capacity of 'H' piles, if used, as friction piles, cannot be predicted without the use of static load tests.

Approach Embankment Stability

The subsoil underlying approach embankment fills is essentially granular and standard 2:1 side slopes will be adequate. Rip-rap protectinn of the side slopes should be provided up to High Water Elevation.

Summary of Recommendations:

1. Simple spread footing support is recommended for piers placed between Chainages 527+70 and 529+25. The safe net bearing pressure has been determined at 2 1/2 tons/sq. ft. for footings founded at Elev. 605.0'. In order to place footings at this depth, it appears necessary to use a sheet excavation with sheet pile tips driven to at least Elev. 600.0'. It is our recommendation that the sheet piling be left in place to serve as scour protection for the footings. Bed el. 610

2. For piers or abutment position North of Station 524+60 and South of 527+20, pile-supported footings are recommended. Large displacement timber piles loaded to a capacity of 20 Tons/pile will obtain this capacity at or slightly above Elevation 595.0'. Steel 'H' piles are not recommended unless design capacities for specific length can be determined prior to construction by dynamic and static load testing.

cont'd. /4 ...

Summary of Recommendations: (cont'd.) ...

3. Standard 2:1 approach fill slopes will be stable. Slope protection by means of rock rip-rap should be used up to the High Water Level.

If we can be of assistance in the interpretation of data contained herein, or in substantiating recommendations made, please contact our office.

L. G. Sodeman
for A. K. Loh,
PROJECT FOUNDATION ENGR.

AKL/MdeF
Encls.

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

APPENDIX I.

FORM CB--ML--222
FEB 59
1M-58-5569

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-19

W.P. 142-59

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
1 A	S1	3'-4.5'	Loose silty sand & gravel with organic matter	6	9.2	-	-	-	-	
	S2	6'-7.5'	"	9	-	-	-	-	-	No recovery
	S3	6'-7.5'	"	7	19.7	-	-	-	-	
	T4	9'-10.5'	Stiff grey silty clay (glacial till)	P	19.2	-	-	1800	131.0	
	Vane	11.3'	"	-	-	-	-	>2000	-	Approximately 10% fine to medium gravel throughout.
	T5	15'-16.5'	"	P	19.6	-	-	-	133.0	
	T6	20'-21.5'	"	P	18.9	-	-	2060	134.0	
	T7	25'-26.5'	"	P	13.2	-	-	-	142.0	
	T8	30'-31.5'	Med. to dense sand & gravel	30	-	-	-	-	-	No Recovery'
	S9	30'-32'	Medium sand and gravel	18	-	-	-	-	-	No recovery
	S10	30'-32'	"	19	11.7	-	-	-	-	
	S11	35'-37'	Dense sand & gravel	50	22.4	-	-	-	-	
	S12	40'-41.5'	Stiff grey silty clay (glacial till)	26	23.4	-	-	-	-	Approximately 10% fine to medium gravel throughout.
	T13	45'-56.5'	"	P	21.0	-	-	2230	132.0	
	T14	50'-51.5'	"	P	-	-	-	-	-	No recovery
	S15	50'-51.5'	"	27	16.9	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB F59-19
W.P. 142-59

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 A	S1	3'-4.5'	Gre sandy clay and gravel	9	18.4	-	-	-	-	
	T2	6'-7.5'	Stiff grey silty clay (glacial till)	14	19.9	18.1	26.0	-	136.0	
	T3	9'-10.5'	"	25	-	-	-	-	-	No recovery
	S4	9'-10.5'	"	-	23.4	-	-	-	-	
	T5	12'-13.5'	"	P	21.1	19.4	29.3	1710	126.0	-
	Vane	14.8'	"	-	-	-	-	>2000	-	
	T6	15'-16.5'	Medium sand and gravel	16	--	-	-	-	-	No recovery
	T7	15'-16.8'	"	-	-	-	-	-	-	No recovery
	S8	15'-16.8'	Stiff grey silty clay (glacial till)	14	-	-	-	-	-	No recovery
	S9	20'-22'	"	67	17.6	-	-	-	-	Approximately 2% to 3% fine to medium gravel throughout.
	S10	25'-27'	"	28	-	-	-	-	-	
	T11	30'-31.5'	"	P	21.6	-	-	1945	129.0	
	T12	35'-36.5'	"	P	21.2	-	-	-	132.0	
	T13	40'-41.5'	"	P	15.5	15.8	2[illegible].3	2430	136.5	-
	T14	45'-46.5'	"	29	17.3	-	-	-	-	
3 A	S1	3'-4.5'	Loose grey sandy silt and	7	17.8	-	-	-	-	
	S2	6'-7.5'	clay with organic matter	4	21.3	-	-	-	-	
	T3	9'-10.5'	"	P	24.0	-	-	983	126.0	

SUMMARY OF FIELD & LABORATORY TESTS

JOB F59-19
W.P. 142-59

HOLE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENETN RESIST. BLOWS FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
3A	T4	12'-13.5'	Loose grey sand silt and	P	25.4	-	-	948	123.0	
	T5	15'-16.5'	clay with organic matter	P	21.1	18.0	23.0	-	126.3	
	T6	20'-21.5'	Stiff grey silty clay (glacial till)	P	19.4	-	-	2610	132.0	
	T7	25'-26.5'	"	P	19.7	18.5	27.1	2010	132.2	
	S8	30'-31.5'	"	21	-	-	-	-	-	No recovery
	S9	35'-36.5'	"	20	21.1	-	-	-	-	
	T10	41-42.5'	Medium silty sand with clay	P	9.7	-	-	1793	148.0	Approximately 2% to3% fine to medium gravel.
	S11	45'-46.5'	"	24	8.9	-	-	-	-	
	S12	50'-51.5'	Stiff grey silty clay (glacial till)	35	18.1	-	-	-	-	
	T13	60'-62'	"	P	-	-	-	-	-	
4A	S1	3'-4.5'	Loose grey-brown sandy silt and silty sand.	4	13.6	-	-	-	-	
	S2	6'-7.5'	"	6	16.1	-	-	-	-	
	S3	9'-10.5'	"	5	16.9	-	-	-	-	
	T4	12.5'-14'	"	P	21.6	-	-	-	128.3	-
	T5	15'-17'	"	P	-	-	-	-	-	No recovery
	S6	15'-17'	"	P	20.9	-	-	-	-	
	T7	20'-22'	"	P	21.0	-	-	-	132.0	
	T8	25'-27'	"	P	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB F59-19
W.P. 142-59

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
4A	T9	30'-32'	Stiff grey silty clay (glacial till)	P	20.9	17.6	31.0	2160	131.0	-
	T10	35'-37'	"	P	-	-	-	-	-	No recovery
	S11	35'-37'	"	P	-	-	-	-	-	
	T12	40'-42'	Medium silty sand	P	-	-	-	-	-	
	T13	45'-47'	"	P	-	-	-	-	-	No recovery
	S14	45'-47.3'	Stiff grey silty clay (glacial till)	P	-	-	-	-	-	
	T15	50'-52.5'	"	P	-	-	-	-	-	Approximately 3% fine to red gravel throuthout.
	T16	55'-57.5'	"	P	21.8	18.6	27.3	2050	-	
	T17	61'-63.5'	"	P	16.0	-	-	1860	135.0	
	T18	66'-68'	"	13-3"	-	-	-	-	-	
	S19	70'-72'	Dense grey sandy silt (till)	39-6"	-	-	-	-	-	
	S20	75'-77'	"	41 for 5½"	11.9	-	-	-	-	
	S21	80'-82'	"	39 for 4"	14.5	-	-	-	-	
	S22	85'-87'	"	30 for 6"	17.7	-	-	-	-	
	S23	90'-92'	"	16	16.6	-	-	-	-	
			S denotes Split Spoon Sample T denotes Shelby Tube Sample							

SUMMARY OF FIELD & LABORATORY TESTS

JOB F-59-19
W.P. 142-59

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
			Consolidation Characteristics:							
1A	4	9-10.5	Compression index 0.09							
			Coeff. of consolidation 0.0192 in ^{2}/min.							
			Coeff. of volume compressibiltiy 0.0141 Ft ^{2}/Ton							
			Probable Preconsolidation pressure 0.8 T.S.F.							
1A	13	45-46.5	Compression index 0.093							
			Coeff. of consolidation 0.022 in ^{2}/min.							
3A	7	25-27.5	Compression index 0.095							
			Coeff. of Consolidation 0.014 in ^{2}/min.							
4A	16	55'-57-5'	Compression index 0.124							
			Coeff. of consolidation 0.016 in ^{2}/min.							

FORM OB-ML-126 (REV. 1959.)—58-5691

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 142-59 BORE HOLE NO. 1 "A"

JOB F59-19 STATION 527+50 (5' S. of ℄)

DATUM 626.0' COMPILED BY B.K.

BORING DATE Sept. 15/59 CHECKED BY I.J.J. & A.L.

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

LEGEND

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

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	↓ Ground level	626.0	0
	Loose silty sand & gravel with organic matter. W.L. ▼	619.0	10
	Stiff grey silty clay with some gravel (glacial till)		20
		600.0	30
	Medium sand & gravel	589.0	40
	Stiff grey silty clay with some gravel (glacial till)		50
	End of borehole	574.5	60
	Penetration resistance profile shown; obtained by driving a 2" dia. cone from ground level to depth noted with an energy of 350 ft. lb. per blow.		70
			80

STRENGTH AND PENETRATION RESISTANCE

1000 2000 3000 4000 P.S.F.

25 50 75 100 BLOWS/FT.

Penetration ends at Elev. 609.2'

CONSISTENCY

MOIST. CONTENT - % DRY WT.

10 20 30

SAMPLE	NATURAL UNIT WT. P.C.F.
S1	-
S3	-
T4	131.0
T5	133.0
T6	134.0
T7	142.0
S10	-
S11	-
S12	-
T13	132.0
S15	-

FORM OB-ML-126 (REV. 1959.)—58-5691

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 142-59 BORE HOLE NO. 2 "A"

JOB F 59-19 STATION 529+15 (10'S ℄)

DATUM 618.0' COMPILED BY B.K.

BORING DATE Sept.17/59. CHECKED BY I.J.J. & A.L.

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 W LI
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	↓ Groundlevel W.L.	618.0	0
	Grey sandy clay & gravel	614.0	
	Stiff grey silty clay with some gravel (glacial till)		10
	Medium Sand & Gravel	603.0'	20
	Stiff grey silty clay (glacial till)	590.0"	30
			40
	End of borehole	569.0	50
	Penetration resistance profile shown; obtained by driving a 2" dia. cone from ground surface to depth noted with an energy equal to 350' lb. per blow.		60
			70
			80

STRENGTH AND PENETRATION RESISTANCE P.S.F.
1000 2000 3000 4000
BLOWS/FT.
25 50 75 100

Penetration Ends at Elev. 598.0'

CONSISTENCY
MOIST. CONTENT - % DRY WT.
10 20 30

SAMPLE	NATURAL UNIT WT. P.C.F.
S1	-
T2	136.0
T3	Lost
S4	-
T5	126.0
S8	-
S9	-
S10	-
T11	129.0
T12	132.0
T13	136.5
T14	-

FORM OB-ML-126 (REV. 1959.) -- 58-5691

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 142-59 BORE HOLE NO. 3 "A"

JOB F 59-19 STATION 527+00 (℄)

DATUM 640.7' COMPILED BY B.K.

BORING DATE Sept.21/59. CHECKED BY I.J.J. & A.L.

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 X
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	↓ Groundlevel	640.7	0
	Sandy Topsoil Clayey	637.7	
	Loose grey Sandy Silt & Clay Silt with organic matter.		10
		623.2	20
	Stiff grey silty clay with some gravel, (glacial till).		30
		600.0	40
	Med. Silty Sand with Clay	593.0	50
	Stiff grey silty clay with some gravel, (glacial till).		60
			70
			80

STRENGTH AND PENETRATION RESISTANCE
P.S.F. 1000 2000 3000 4000
BLOWS/FT. 25 50 75 100

CONSISTENCY
MOIST. CONTENT - % DRY WT. 10 20 30

SAMPLE	NATURAL UNIT WT. P.C.F.
S1	-
S2	-
T3	126.0
T4	123.0
T5	126.3
T6	132.0
T7	132.2
S8	-
S9	-
T10	148.0
S11	-
S12	-
T13	-

FORM SB-HL-128 (REV. 1939.) —56-3697

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 142-59 BORE HOLE NO. 3 "A" (Cont'd

JOB F 59-19 STATION 527+00 (℄)

DATUM 640.7' COMPILED BY B.K.

BORING DATE Sept.21/59. CHECKED BY I.J.J.

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 X
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	Borehole Continued		
	Stiff grey Silty Clay (glacial till).	550.7	90
			100
	End of borehole	537.7	110
			120
			130
			140
			150
			160
			170

STRENGTH AND PENETRATION RESISTANCE
P.S.F.
BLOWS/FT.

CONSISTENCY
MOIST. CONTENT - % DRY WT.

SAMPLE

NATURAL UNIT WT. P.C.F.

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 142-59 BORE HOLE NO. 4 "A"

JOB F59-19 STATION 530+05 (℄)

DATUM 637.5 COMPILED BY B.K.

BORING DATE Sept. 23/59 CHECKED BY I.J.J. & A.L.

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 X
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	↓Ground level	637.5	0
	Brown sandy topsoil	634.5	
	Loose grey brown sandy silt and silty sand.		10
			20
		610.0	
	Stiff grey silty clay with some gravel (glacial till)		30
	Layer of silty sand between Elev. 600 & 590'.		40
			50
			60
			70
		567.5	
	Grading into dense sandy silt (till) below Elev. 567.5		80

STRENGTH AND PENETRATION RESISTANCE
1000 2000 3000 4000 P.S.F.
25 50 75 100 BLOWS/FT.

CONSISTENCY
MOIST. CONTENT - % DRY WT.
10 20 30

SAMPLE	NATURAL UNIT WT. P.C.F.
S1	-
S2	-
S3	-
T4	128.3
S6	-
T7	132.0
T8	[illegible]
T9	131.0
S11	-
T12	-
S14	-
T15	-
T16	-
T17	135.0
T18	-
S19	-
S20	-
S21	-
S22	-

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 142-59 BORE HOLE NO. 4 "A" (Cont'd).

JOB F 59-19 STATION 530+5 (℄)

DATUM 637.5 COMPILED BY B.K.

BORING DATE Sept.23/59. CHECKED BY A.L.

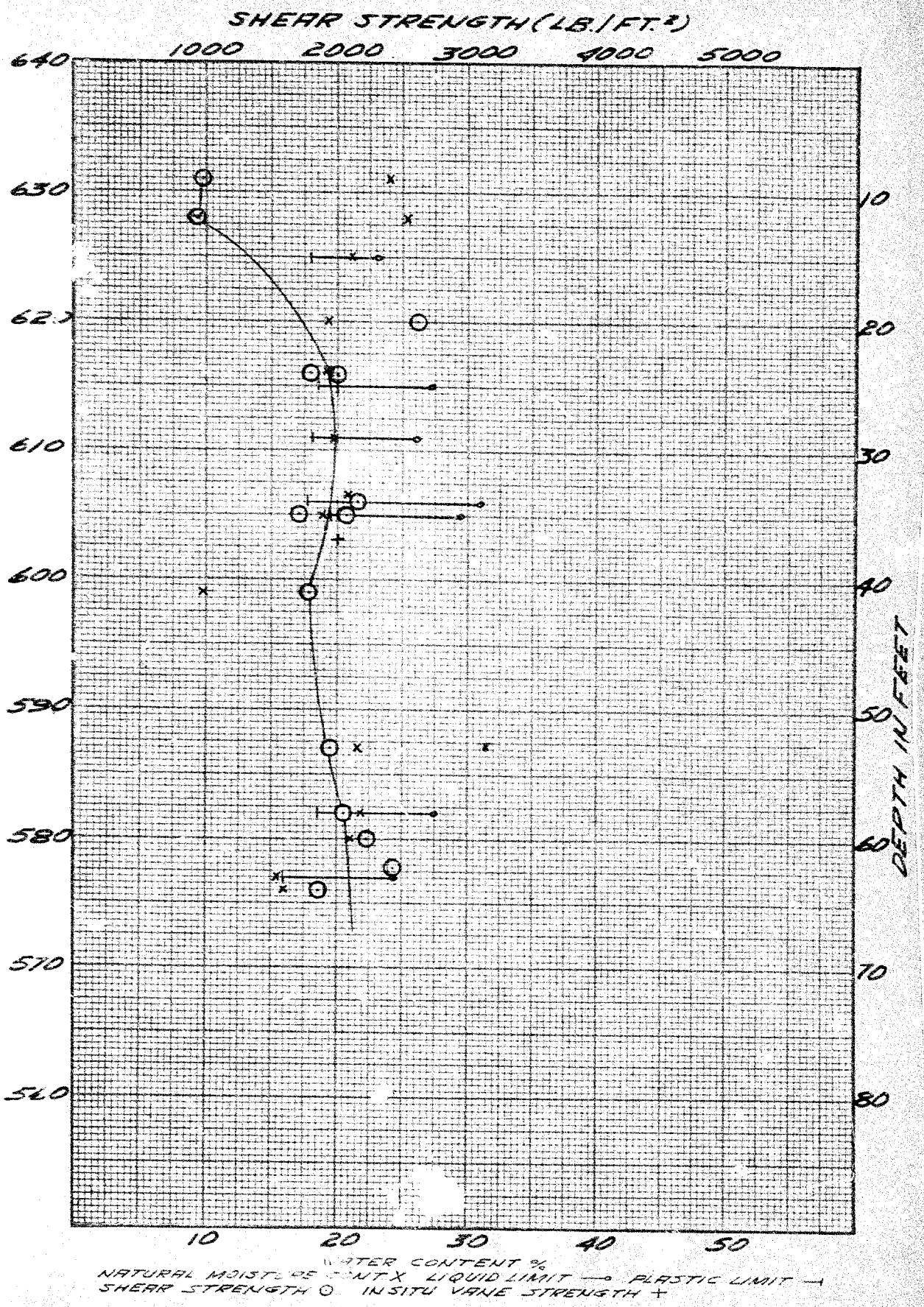
2" DIA. SPLIT TUBE
2" SHELBY TUBE
2" SPLIT TUBE
2" DIA. CONE
2" SHELBY
CASING

LEGEND

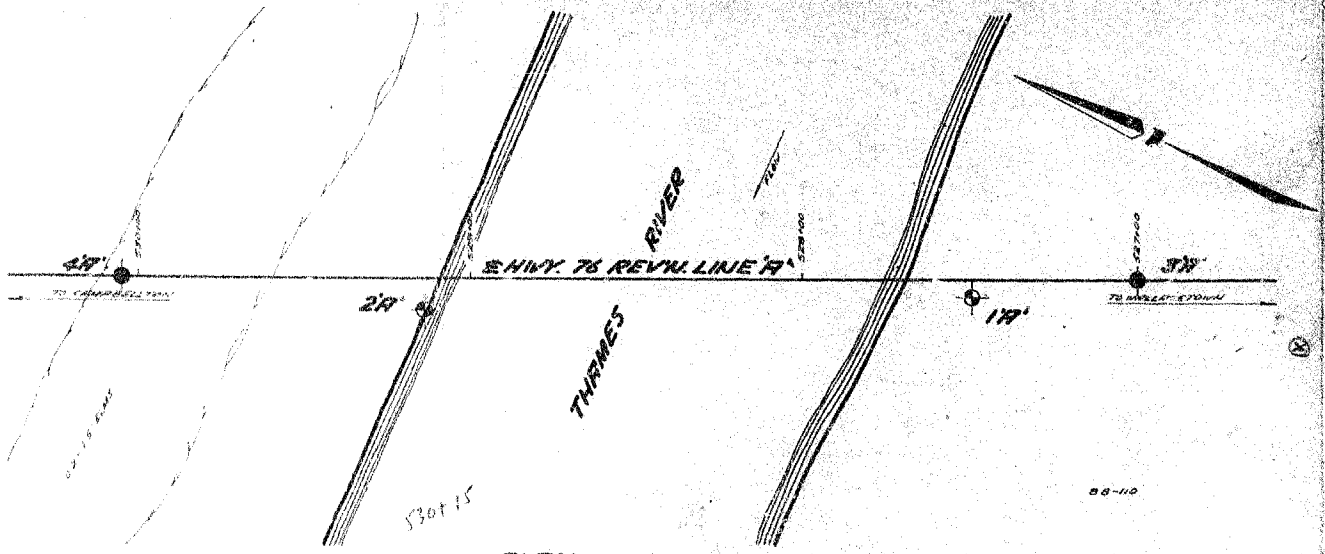
1/2 UNCONFINED COMPRESSION (Qu) O
VANE TEST (C) AND SENSITIVITY (S) +S
NATURAL MOISTURE AND LIQUIDITY INDEX W LI X
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE P.S.F. BLOWS/FT.	CONSISTENCY MOIST. CONTENT - % DRY WT. 10 20 30	SAMPLE	NATURAL UNIT WT. P.C.F.
	Borehole Continued		90				
	Dense Sandy Silt (till)	545				S23	-
		545.5					
	End of borehole		100				
			110				
			120				
			130				
			140				
			150				
			160				
			170				

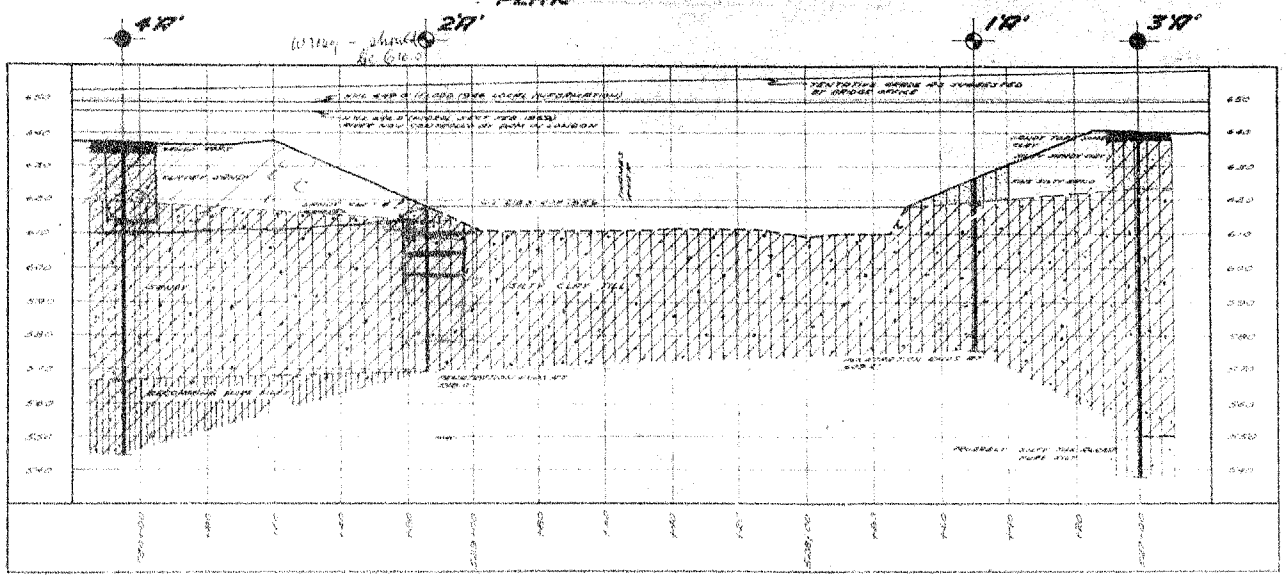
W.P. 142-59 JOB F59-19



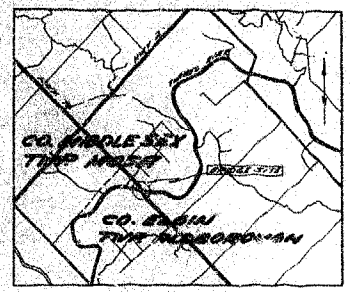
7-62-17-SE



PLAN



PROFILE



KEY PLAN
SCALE:
1 in. = 1 mi.

LEGEND

BORE HOLE
PENETRATION HOLE
BORE & PENETRATION HOLE

HOLE NO.	ELEVATION	STATION	OFFSET & DIRECTION
1R	626.0	527+50	5'LT
2R	618.0	528+18	10'LT
3R	640.2	527+00	5'
4R	637.5	530+15	10'

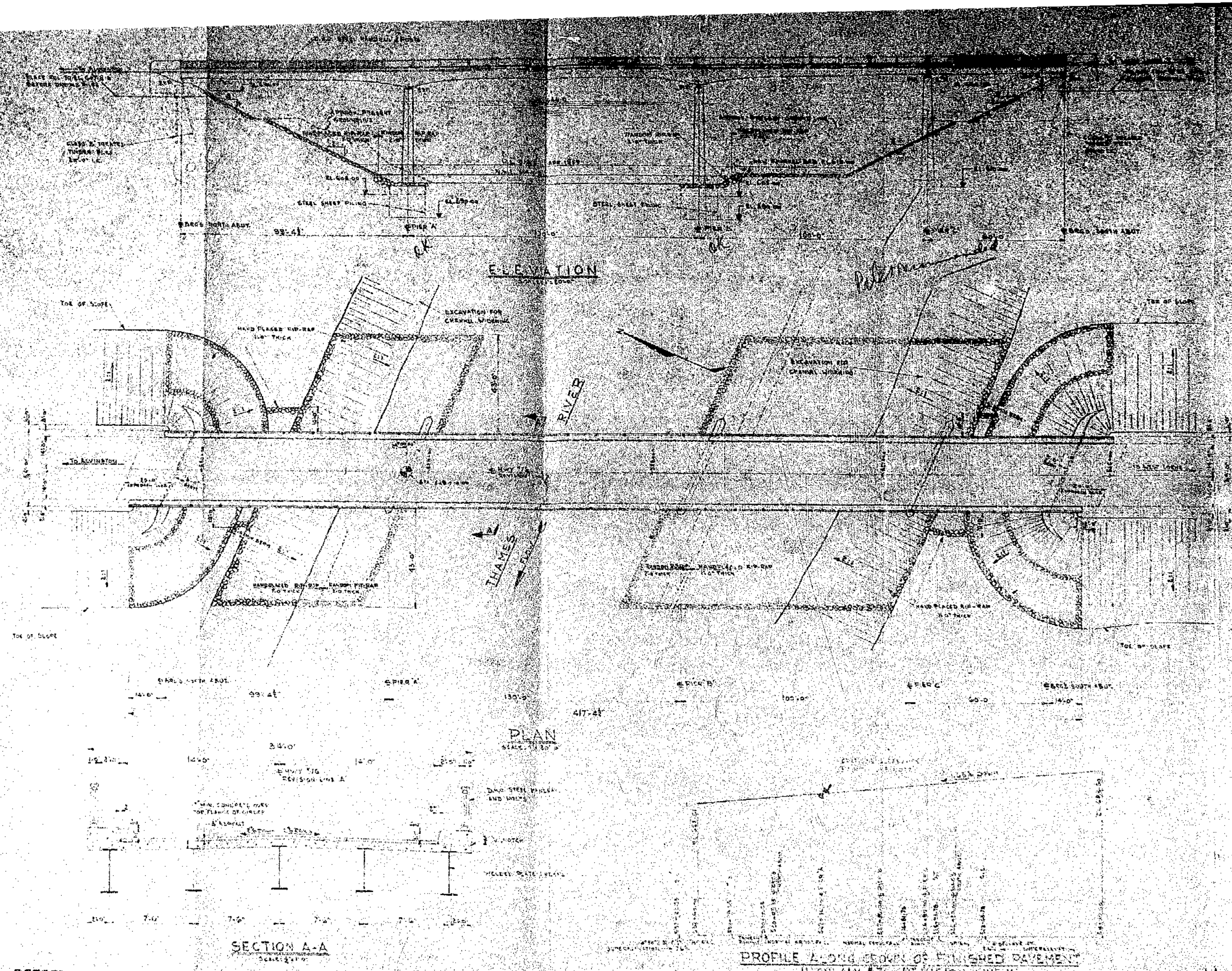
NOTE:

DEPARTMENT OF HIGHWAYS, ONTARIO

THAMES RIVER
PROPOSED CROSSING

FSS-158

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT



23-61-19-7

NOTE: CRITICAL CLEARANCE POINT IS AT STA. 559+00.00. IN ORDER TO PROVIDE SUFFICIENT CLEARANCE, THE ELEVATION OF TOP OF ASPHALT ON CROWN OF ROADWAY AT THIS POINT REQUIRES TO BE NOT LOWER THAN EL. 656.25

W.P. 142-59

T.O. LAZARIDES AND ASSOCIATES LIMITED
CONSULTING ENGINEERS
209 DAVENPORT ROAD — TORONTO

DEPARTMENT OF HIGHWAYS: ONTARIO
BRIDGE OFFICE: TORONTO

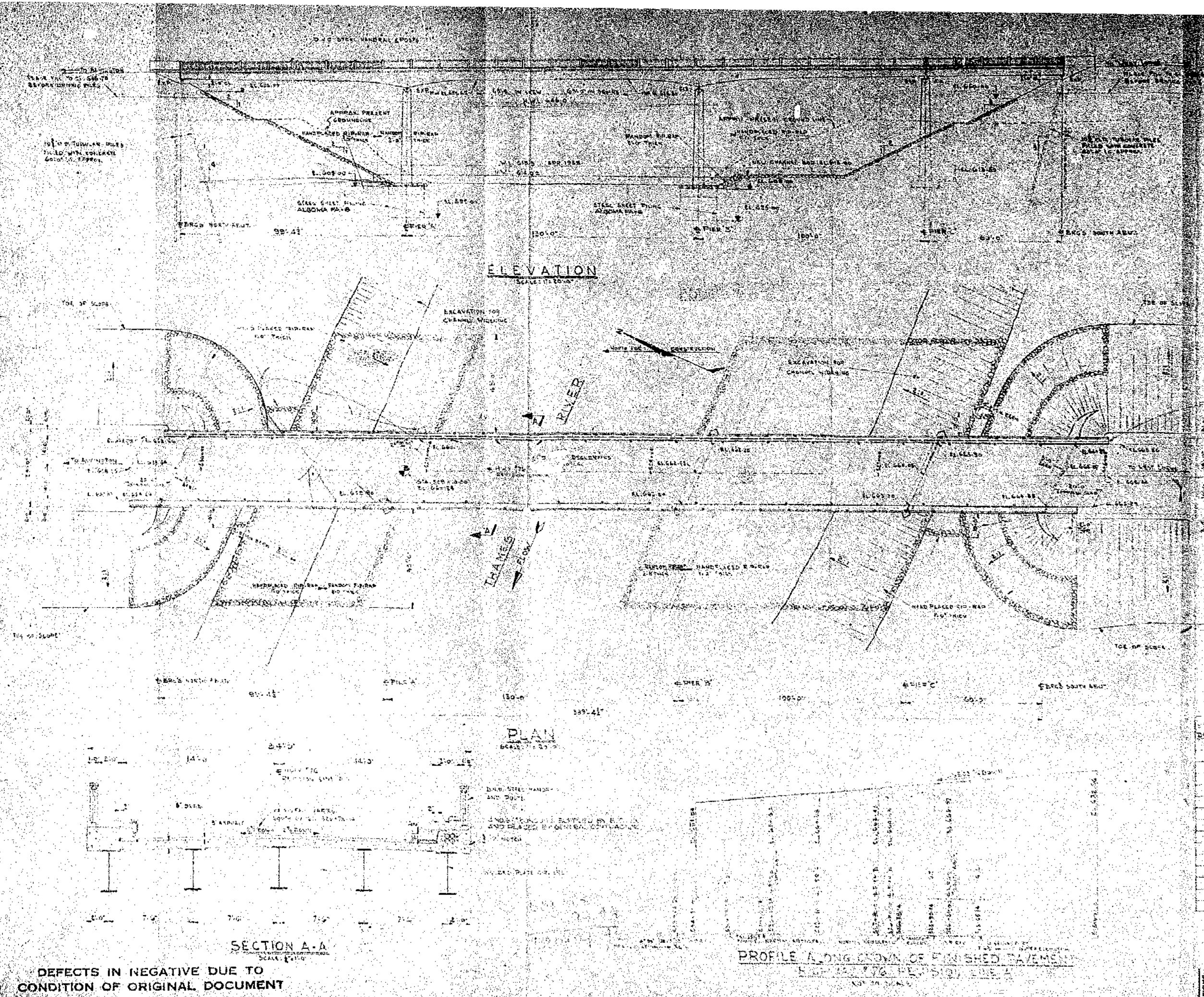
THAMES RIVER – SIMPSON'S BRIDGE

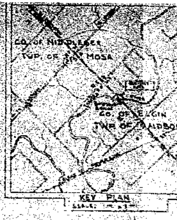
THE KING'S HIGHWAY No. 76 — DIST. No. 2
CO. ELGIN & MIDDLESEX
TWP. ALDBOROUGH & MOSA — LOT 21 & 9 R. SLR — CON. 'B'

PRELIMINARY GENERAL ARRANGEMENT

APPROVED
BRIDGE ENGINEER — FEB 11 1960 — DESIGN ENGINEER

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT





23-61-79-2

DEFECTS IN NEGATIVE DUE TO CONDITION OF ORIGINAL DOCUMENT

DRAWING INDEX

DRAWING No.	TITLE OF DRAWING
D4468-1	GENERAL ARRANGEMENT
2	LAYOUT OF FOOTINGS PILING & SCHEDULES
3	LAYOUT OF ABUTMENTS
4	REINF. OF ABUTMENTS
5	LAYOUT & REINF. OF PIERS 'A' 'B'
6	LAYOUT & REINF. OF PIER 'C'
7	LAYOUT OF SUPERSTRUCTURE
8	STRUCTURAL STEEL I
9	STRUCTURAL STEEL II
10	STRUCTURAL STEEL III
11	DECK REINFORCEMENT I
12	DECK REINFORCEMENT II
[illegible]	HANDRAILING [illegible]
14	REINFORCING STEEL SCHEDULE
15	REINFORCING STEEL SCHEDULE
[illegible]	REINFORCING STEEL SCHEDULE

WP 142-59

T.O. LAZARIDES AND ASSOCIATES LIMITED
CONSULTING ENGINEERS
209 DAVENPORT ROAD TORONTO

DEPARTMENT OF HIGHWAYS - ONTARIO -
BRIDGE OFFICE - TORONTO

THAMES RIVER – SIMPSON'S BRIDGE

THE KING'S HIGHWAY No. 76 DIST. No. 2
CO. ELGIN & MIDDLESEX
TWP. ALDBOROUGH & MOSA LOT 21 & S.R.T. S.L.R. CON. 'B'

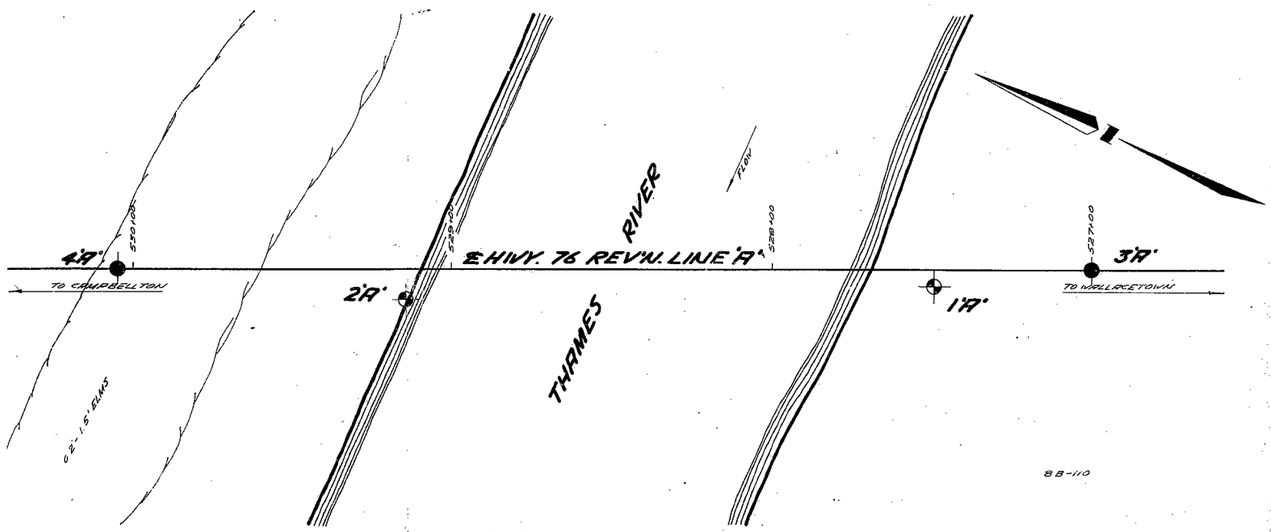
GENERAL ARRANGEMENT

APPROVED

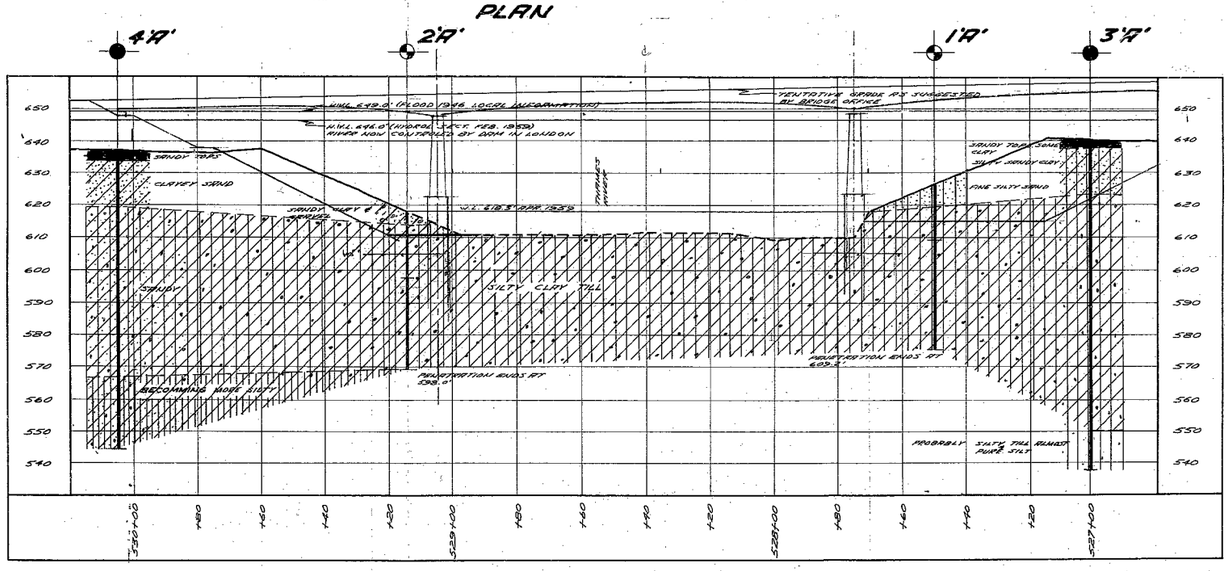
BRIDGE ENGINEER DESIGN ENGINEER

D4468-1

#59-F-19
W.P. #142-59
Hwy. #76
CROSSING
THAMES R.
(SIMPSON'S BR.)

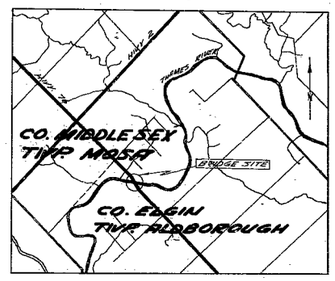


PLAN



PROFILE

F 4019-1



KEY PLAN
SCALE :
1 in. = 1 mi.

LEGEND

BORE HOLE

PENETRATION HOLE

BORE & PENETRATION HOLE

HOLE NO.	ELEVATION	STATION	DISTANCE FROM ℄
1'A'	626.0'	527+50	5' LT.
2'A'	618.0'	529+15	10' LT.
3'A'	640.7'	527+00	℄
4'A'	637.5'	530+05	℄

- 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

THAMES RIVER PROPOSED CROSSING

SHOWING POSITIONS & ELEVATIONS OF HOLES

HWY., 76 DISTRICT 2 COUNTY ELGIN/MIDDLESEX
TOWNSHIP ALDBOROUGH/E. MOSA LOT 21 & 9 CON. "A" R.H.S.R.
LOCATION APP. 0.4 mi. N. OF WALLACETOWN

DRAWN BY: T. MELLOR	CHECKED BY:	W.P. 142-59
DATE OCT. 30/59	APPROVED BY:	DRAWING NO.
SCALE 1 in. = 20 ft.		FS-198