cc: Foundations Office

2-3-62-109

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

June 17, 1960.
G.E.O. FOUNDATION INVESTIGATION
W.P. 192-60 W.J. 60-F-25.
W.P. 192-60

Attention: Mr. E. McConkie.

Re: King St. Overhead & Church Avenue Overhead for Cherokee Expressway.

Attached to this memo, we are forwarding to you, the Foundation Investigation Report for the above mentioned location. The report has been prepared in our Section.

The conclusions and recommendations contained in this report are self-explanatory and we believe, adequate and sufficient for your future design work.

Should there be any other additional questions in connection with this site that you would like to discuss, please feel free to call on our office.

L. O. Soderman,
PRINCIPAL FOUNDATIONS ENGR.

Per:

(L. Sturman,
FOUNDATIONS OFFICE ENGR.)

LS/bdef
Attach.
cc: Messrs. A. E. Toye (2)
R. A. Fregenbaa
D. G. Manay
I. Campbell
E. M. Richardson
T. J. Kovich
L. Watt.
C. C. Parker & Assoc. (4)

Foundations Office
Gen. Files.

FOUNDATION INVESTIGATION

for

King St. Overhead & Church Access Overhead for Chedoke Expressway.

W.P. 191-60 Dwg. No. BH-4 (C.C. Parker & Assoc.)
W.P. 192-60 Dwg. No. 60-F-25A (Dept. of Hwys.)
W.J. 60-F-25 District No. 4 -- Hamilton, Ontario.

1) INTRODUCTION:

A subsoil investigation was carried out at the above-mentioned site, from March 1/60 to March 15/60, for two overhead structures to be constructed over two C.P.R. tracks in the West-end of the City of Hamilton.

One of the structures, the Southern one, is to be the new overhead for the new Western part of King Street, and the other, the Northern one, the new Church access bridge, both in connection with the Chedoke Expressway.

This report contains the detailed field and laboratory findings and recommendations for the foundations of the structures.

2) DESCRIPTION OF SITE:

King Street in the City of Hamilton, runs from East to West. The two tracks of the C.P.R. run below the existing bridge structure on King Street West in a cut with relatively steep, 28-foot high slopes. The exposed portions of the cut are partly covered with top soil and vegetation. There are numerous outcrops of firmly cemented sand-gravel mixtures. At the time of the investigation, the whole area was partly covered with a thin layer of snow.

The existing bridge over the railroad is a single-span structure with abutments supposedly supported on spread footings.

cont'd. /2 ...

3) DESCRIPTION OF FIELD & LABORATORY WORK:

Field work for these overhead structures consisted of four sampled boreholes. The locations for these boreholes were given on Plan No. BH-4, as prepared by Messrs. C. C. Parker and Associates, and the final locations as given on Dwg. No. 60-F-25A, vary only slightly from these. B.H.'s. #1 & 2 were investigated for the King St. Overhead, and B.H.'s #3 & 4, for the Church Access Overhead.

The investigations were carried out by a standard metal skid-mounted diamond drill, adapted for soil sampling. Conventional wash boring procedures were followed and samples recovered at required depths. Representative undisturbed samples were obtained by means of a 2" I.D. thin-walled Shelby sampler, and disturbed samples, by means of a 2" O.D. split spoon sampler. The dimension of the spoon sampler and the energy used in driving it, conform to the requirements of the Standard Penetration Test.

Upon receipt in the laboratory, samples were visually examined and identified. Routine index tests were performed on selected, representative samples. Field and laboratory test results have been presented in the borehole logs and detailed under Appendix I. The location plan and subsoil profile are presented together in Dwg. No. 60-F-25A.

4) SUBSOIL CONDITIONS:

(4.1) General:

Vegetation and organic silty material exist in the top 0'-6" to 1'-6" layer, along parts of the steep slopes on either side of the existing railroad. The top one-foot depth of soil was frozen at the time of the investigation. At some places along the slopes, outcrops of cemented sand and gravel, can be seen. Below the top soil, the site is underlain by a very dense stratum consisting of well-graded silty sand, gravel, and, in some places, a small percentage of clay as a binding material, was found.

cont'd. /3 ...

4) SUBSOIL CONDITIONS: (cont'd.) ...

(4.1) General: (cont'd.) ...

As further depth was reached (approx. Elev. 290'), greyish-brown, dense, silty sand and medium to stiff clayey silt was encountered. At about elevations 274' (B.H. 1 & 3), and 280' (B.H. 2 & 4), respectively and below, grey, stiff clayey silt material predominates along with interlayers of fine silty sand, gravel, and some traces of red shale. The consistency of this cohesive material varies from stiff to very stiff along the entire depth. Below this layer, shale bedrock was encountered, which was slightly weathered at its top layer.

In the order of stratigraphic succession, the following soil types were encountered:-

(4.2) Sand and Gravel:

Below the topsoil, this layer of well graded sand and gravel exists in a compact but loose state in some places, and as a cemented formation in other places. Some silty sand portions were also found having traces of a clay binder as well. This layer was found to end between approximate elevations 283' (B.H. 3) and 293' (B.H. 1). The whole layer is in a very dense state of compaction.

(4.3) Silty Sand with Silty Clay Layers:

This layer is of different depth at the two investigated locations. The average depth at the King Street structure is about 16 feet, while at the Church Access, it is only about 6 feet. The layer is well compacted with an average corrected value of N = 30. The cohesive part of the layer is stiff to very stiff. The respective approximate elevations of the lower boundary of this layer are as follows:-

Borehole No.	Elevation
1	273'
2	280'
3	276'
4	280'

cont'd. /4 ...

4) SUBSOIL CONDITIONS: (cont'd.) ...

(4.4) Clayey Silt with some Shale Fragments:

Below the silty sand layer, there is a layer of clayey silt with some occasional shale fragments. The average Atterberg limits are 30% and 16%, and the average water content is 18%, the material having a stiff consistency. The average unit weight of the material is 134 p.c.f. In B.H. #3, an interlayer of 4 feet depth (Elev. 265' to 269') was encountered, in which dense, coarse sand and gravel predominated.

The layer can also be considered as compact and dense. The same average value of N = 30, applies to this layer.

(4.5) Bedrock:

Below the layer of clayey silt, bedrock was encountered. It consists of grey coloured shale. A shallow surface zone (1 - 2 ft.) of the bedrock shale was found to be in a weathered state.

The respective bedrock elevations are as follows:-

Borehole No.	Elevation
1	253'
2	267'
3	245'
4	247'

(4.6) Water Conditions:

Due to the low permeability of the clayey silt subsoil existing at the site, precise ground water table elevations were not established during the boring and sampling operations. Approximate ground water level in B.H. #1 was observed at an elevation of 280', in B.H. #2, at 283.5', in B.H. #3 at 284', and in B.H. #4 at 286'. No artesian condition was observed during the investigation.

cont'd. /5 ...

5) FOUNDATION CONSIDERATIONS AND RECOMMENDATIONS:

The dense silty sand with silt and clay layers and the underlying clayey silt layer with some shale fragments, are both competent to take the load of the proposed new structures. Considering these layers as cohesive materials, a shear strength of 1.5 T/sq.ft. could be attributed and an allowable bearing load of 3.0 T/sq.ft. can be applied to spread footings at elevation 282' or below.

Approximately the same value could be derived from the average 'N' value of 30, considering this layer as a fine silty, sandy material - i.e., cohesionless layer.

Both calculations take a factor of safety of 3 into account.

The natural water content of the layer being at or around the plastic limit, indicates that no appreciable settlements could be expected. It is our opinion that the settlements will be negligible because the ground is already preloaded by the existing bridge structure, and because of the stiff to very stiff consistency of the soil.

It is assumed that some water problems will be encountered during footing excavations.

Because of the dense state of the layer, as well as because of the substantial amount of silt particles, it is believed that the maintenance of a dry excavation will not present too great a problem.

6) SUMMARY:

a) The investigated site consists mainly of three layers of different materials overlying bedrock. The sequence of these layers from the ground surface down to bedrock, is as follows:-

Sand and gravel, firmly cemented in places.
Silty sand with silty clay layers, well compacted and firm.
Clayey silt with some shale fragments, firm and well compacted.

cont'd. /4 ...

6) SUMMARY: (cont'd.) ...

b) All three layers are competent to support the footings of the proposed structures. Since the footings will have to be below the railway tracks, they will rest in or on the layer of silty, well-compacted sand. The underside of the footing should be below frost penetration depth.

c) Spread footings should be used with a safe load of 3 T/sq.ft. Settlement upon application of this pressure, will be within tolerable limits.

d) Depending on the ground water conditions during construction, ground water control might be necessary during footing excavation. Low-capacity sump pumps should be adequate to handle the seepage quantities expected.

REPORT PREPARED BY: B. Ghadiali,
Project Foundation Engr

REPORT APPROVED BY: A. Stermac,
FOUNDATIONS OFFICE ENGR

APPENDIX I.

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-25
W.P. 192-60

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	S1	4'-4.5'	Partly cemented gravel and sand in places traces of clay binder.	56-6"	-	-	-	-	-	Lost sa.
	S2	6'-6.8'	"	81-10"	7.5	-	-	-	-	
	S3	9.5-10.5'	"	142	9.8	-	-	-	-	
	S4	15'-16.5'	"	60	-	-	-	-	-	
	S5	20'-21.5'	Dense silty sand with silty clay layers.	56	17.4	-	-	-	-	
	S6	25-26.5'	"	29	15.6	-	-	-	-	
	T6	30-30.5'	"	25-6"	-	-	-	-	-	
	T8	35-36'	Stiff grey clayey silt with shale fragments.	34	15.7	15.7	26.3	-	138.0	
	T9	38'-39.5'	"	23	19.8	16.6	31.4	1555	134.0	
	Vane	41'	"	-	-	-	-	2560	-	Sens: 1.6
	T10	42'-43.5'	"	P	22.5	17.4	33.2	2130	129.0	
	Vane	45'	"	-	-	-	-	2320	-	Sens: 1.6
	T11	48-49.5'	"	43	-	-	-	-	-	
	S12	53-53.5'	"	61-6"	-	-	-	-	-	
	RC13	53.5-55.8'	Red and grey shale, partly weathered.	-	-	-	-	-	-	
	RC14	55.8-58.8	Red and grey shale rock.	-	-	-	-	-	-	

FORM OB—MI.—222
FEB 59
1M-58-5569

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-25
W.P. 192-60

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	S1	6-7'	Partly cemented gravel and sand in places, traces of clay binder.	61	6.8	-	-	-	-	
	S2	9-10.5'	"	54	-	-	-	-	-	
	S3	12-13.5'	"	68	6.4	-	-	-	-	
	S4	15-15.3'	"	110-3"	-	-	-	-	-	
	S5	24-25.5'	Dense silty sand withsilty clay layers.	55	15.1	-	-	-	-	
	S6	30-31.5'	"	22	-	-	-	-	-	
	S7	35-36.5'	"	38	19.5	-	-	-	-	
	T8	38-39'	Stiff grey clayey silt with shale fragments.	24	-	-	-	-	-	
	T9	42'-43'	"	35	13.2	15.4	28.1	-	137.0	
	T10	46-47'	"	34	-	-	-	-	-	
	S11	50-50.2'	"	30-2"	-	-	-	-	-	Lost sa.
	RC12	50.2-55.5'	Red and grey shale, partly weathered.	-	-	-	-	-	-	
3	S1	3-4.5'	Partly cemented gravel and sand in places, traces of clay binder.	5	7.1	-	-	-	-	
	S2	6'-7.5'	"	20	21.8	-	-	-	-	

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

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-25
W.P. 192-60

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
3	S3	9-10.5'	Partly cemented gravel and sand in places, traces of clay binder.	92	-	-	-	-	-	
	S4	12-13.5'	Dense silty sand with silty clay layers.	58	19.3	-	-	-	-	
	S5	15-16.5'	"	24	-	-	-	-	-	
	T6	18-19'	Stiff grey clayey silt with shale fragments and scattered sand.	41	18.3	15.9	27.4	-	136.0	
	S7	21.5'-23'	"	62	-	-	-	-	-	
	S8	25-26.5'	"	29	9.9	-	-	-	-	
	T9	30-31.5'	"	P	24.4	16.9	35.2	-	-	
	Vane	33'	Stiff grey clayey silt with shale fragments and scattered shale.	-	-	-	-	3280	-	Sens: 2.0
	S10	35'-36.5'	"	74	-	-	-	-	-	
	S11	40-41.5'	"	41	16.7	-	-	-	-	
	RC12	45.5-47.5'	Red and grey shale partly weathered.	-	-	-	-	-	-	
	RC13	47.5-51.2'	Red and grey shale rock.	-	-	-	-	-	-	
	RC14	51.2-56.2"	"	-	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-25
W.P. 192-60

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
4	S1	3'-4.5'	Well graded gravelly sand.	5	-	-	-	-	-	
	S2	4.5'-6'	"	19	-	-	-	-	-	
	S3	7.5'-9'	Dense silty sand with silty clay layers.	68	16.4	-	-	-	-	
	S4	12-13.5'	"	32	-	-	-	-	-	
	T5	15'-16.5'	Stiff, grey, clayey silt with shale fragments and scattered sand.	18	21.4	-	-	-	130.0	
	T6	20-21.5'	"	43	-	-	-	-	-	
	T7	25-26.5'	"	19	16.7	16.2	31.0	-	-	
	T8	30-31.5'	"	19	-	-	-	-	-	
	T9	35'-36'	"	38	-	-	-	-	-	Lost sa.
	S9A	35-36.5'	"	19	-	-	-	-	-	Lost
	S10	40-41.5'	"	49	14.2	-	-	-	-	
	RC11	45.5-46.7'	Red and green shale bedrock	-	-	-	-	-	-	
	RC12	46.7-51.9'	"	-	-	-	-	-	-	

S denotes split spoon sample
T denotes shelby tube sample
RC denotes rock core sample

FORM OB-ML-126 (REV. 1959) – 59-5008

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 192-60 BORE HOLE NO. 1

JOB 60-F-25 STATION See Drawing

DATUM 307.2' COMPILED BY B.K.

BORING DATE Mar. 1/60 CHECKED BY T.S.

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)
NATURAL MOISTURE AND LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	↓ Ground level	307.2	0
	Topsoil	306.7	
	Partly cemented gravel and sand. Traces of clay binder in places.		10
		290.8	20
	Dense silty sand with silty clay layers.		
	W.L. ▽	279.7	30
		273.0	
	Stiff grey clayey silt with shale fragments.		40
			50
	Red and grey shale, partly weathered.	253.0	
		252.0	60
	Red and grey shale rock		70
			80

STRENGTH AND PENETRATION RESISTANCE — B.S.F.

1000 2000 3000 4000

BLOWS/FT.

25 50 75 100 125

50 for 6"
51 for 10"
25 for 6"
61 for 6"

CONSISTENCY

MOIST. CONTENT - % DRY WT.

10 20 30 40

SAMPLE	NATURAL UNIT WT. P.C.F.
S1	-
S2	-
S3	-
S4	-
S5	-
S6	-
T7	-
T8	138.0
T9	134.0
T10	129.0
T11	-
S12	-
RC13	-
RC14	-

FORM OB-ML-126 (REV 1959) - 59-5008

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 192-60 BORE HOLE NO. 2

JOB 60-F-25 STATION See Drawing

DATUM 317.0' COMPILED BY B.K.

BORING DATE Mar. 9/60 CHECKED BY T.S.

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)
NATURAL MOISTURE AND LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	↓ Groundlevel	317.0	0
	Topsoil	316.25	
	Partly cemented gravel and sand in places traces of clay binder.		10
			20
	Dense silty sand with silty clay layers.	293.0	
	W.L. ▽	283.5	30
	Stiff grey clayey silt with shale fragments	279.0	40
	Red and grey shale, partly weathered.	266.8	50
		265.8	60
	Red & grey shale rock.		70
			80

STRENGTH AND PENETRATION RESISTANCE P.S.F.

BLOWS/FT. 25 50 75 100 125

110 for 3"

30 for 2"

CONSISTENCY

MOIST. CONTENT - % DRY WT. 10 20 30 40

SAMPLES	NATURAL UNIT WT. P.C.F.
S1	-
S2	-
S3	-
S4	-
S5	-
S6	-
S7	-
T8	-
T9	137.0
T10	-
S11	-
RC12	-

FORM OB-ML-126 (REV. 1959.) – 59-5008

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 192-60 BORE HOLE NO. 3

JOB 60-F-25 STATION See Drawing

DATUM 291.9 COMPILED BY B.K.

BORING DATE Mar. 19/60 CHECKED BY T.S.

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)
NATURAL MOISTURE AND LIQUIDITY INDEX
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	↓ Groundlevel	291.9	0
	Topsoil	290.4	
	Partly cemented gravel and sand in placed, traces of clay binder. W.L. ▽	283.9	
		281.9	10
	Dense silty sand with silty clay layers.	273.9	20
	Stiff grey clayey silt with shale fragments and scattered sand.		30
			40
	Red & Grey shale, partly weathered.	246.4	
		244.4	50
	Red & grey shale rock.		60
			70
			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 40

SAMPLE	NATURAL UNIT WT. P.C.F.
S1	–
S2	–
S3	–
S4	–
S5	–
T6	136.0
S7	–
S8	–
T9	–
S10	–
S11	–
RC12	–
RC13	–
RC14	–

FORM OB-MIL-126 (REV. 1959) - 59-5008

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. 192-60 BORE HOLE NO. 4

JOB 60-F-25 STATION See drawing

DATUM 293.2' COMPILED BY B.K.

BORING DATE Mar. 14/60 CHECKED BY T.S.

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
LIQUID LIMIT
PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	↓ Ground level	293.2	0
	Topsoil	292.0	
	Well graded gravelly sand.	285.2	10
	Dense silty sand with silty clay layers.	279.2	
	Stiff grey clayey silt with shale. Fragments and scattered sand.		20
			30
			40
		250.0	
	Red and green shale bedrock.		50
			60
			70
			80

STRENGTH AND PENETRATION RESISTANCE P.S.F.

BLOWS/FT. 25 50 75 100 125

CONSISTENCY

MOIST. CONTENT - % DRY WT. 0 10 20 30 40

SAMPLE	NATURAL UNIT WT. P.C.F.
S1	-
S2	-
S3	-
S4	-
T5	130.0
T6	-
T7	-
T8	-
T9A	Lost
S9A	Lost
S10	-
RC11	-
RC12	-

Materials and Research Division

June 15, 1962.

Ontario Research Foundation,
43 Queen's Park,
Toronto 5, Ontario.

Attn: Mr. Leslie G. Kende.

Re: Influence of pile driving at the New King Street Bridge on the adjacent cathedral.

WP 191-60

Dear Sir:-

This will confirm our verbal arrangement and agreement by which we are hiring your services to establish by means of vibration seismographs, the influence the pile driving at the location of the new King Street Bridge in the City of Hamilton has on the adjacent cathedral.

Two main experiments should be carried out, namely, the establishing of possible vibrations from the present location of pile driving which is some 1,100 ft. away and from the location closest to the cathedral which is some 70 - 90 ft. away.

We understand that your rates per man are $75.00/day and $12.00/hour, and also that it is your estimate that the job could be completed for approximately 9 man days.

AGS/MdeF

Yours very truly,

A. G. Stermac,
PRINCIPAL FOUNDATION ENGI

For:

A. Rutka,
MATERIALS & RESEARCH ENGI

cc: Messrs. J. C. Thatcher
E. J. Kovich
N. D. Smith (2)
Mrs. T. Tate
Foundations Office
Gen. Files (2)

Department of Highways
COPY
For the information of

A. RUTKA

File
ag

July
TORONTO, May 24, 1962.

W.P 191-60

MEMORANDUM FOR -
Mr. A.T.C. McNab,
Deputy Minister.

Re: Highway #403 - Vibration Measurements -
Basilica - King/Main Interchange

The attached report by the Ontario Research Foundation and a memo from Mr. A. Rutka is forwarded for your information. The following is a very brief summary of this report:-

1. The current pile driving operations at Main Street have not caused vibrations which would result in any structural damage to the Basilica.

2. A test pile was driven near the King Street structure. The results of this test were similar to those in Item 1.

3. Vibrations of the floor of the tower with the organ fan in operation were observed but were not of sufficient mangitude to cause any damage to the structure.

Racey-McCallum, Consulting Engineers, have been retained by the Church to study this vibration problem. I have authorized C.C. Parker to co-operate fully with Racey-McCallum to provide whatever design data is requested. Since this authorization, I have been advised that Racey-McCallum and the Church have not been co-operative in permitting the Department to investigate the exterior condition of the Church or to take photos of same.

It is my recommendation that the Ontario Research Foundation be retained to periodically continue the vibration studies as

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Mr. A.T.C. McNab Toronto, July 24, 1962.

construction continues, especially when the pile driving operations are performed at the three structures adjacent to the Church.

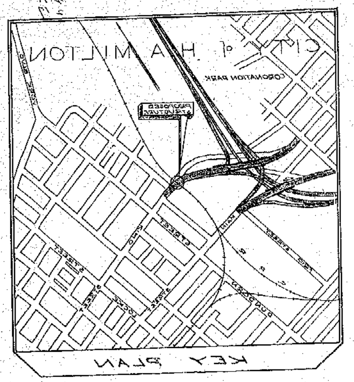
I would like to discuss with you the possibility of making this report available to the Church.

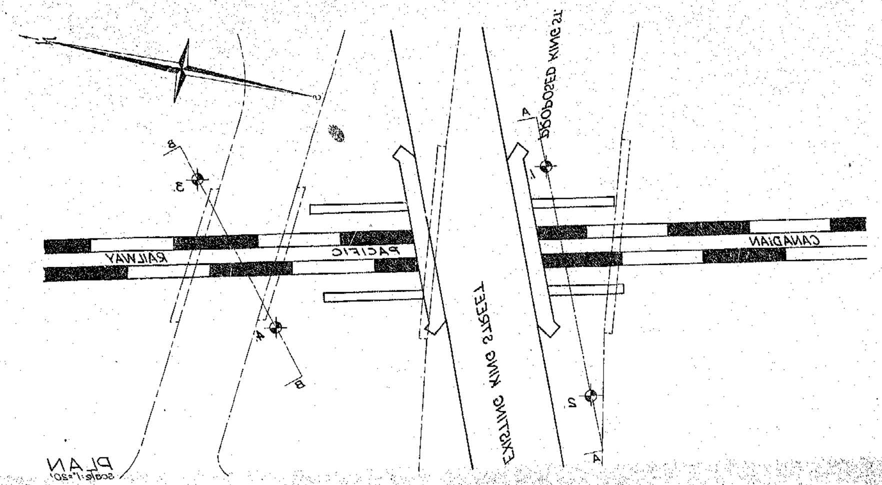
sgd: J. Walter

JW*YFM
ATTACH*

J. WALKER,
Director of Planning & Design.

c.c Messrs. H.W. Adcock
W.A. Clarke
C.C. Parker & Parsons,
Brimacombe Ltd.
J.C. Thatcher
J.B. Wilkes
A. Futko

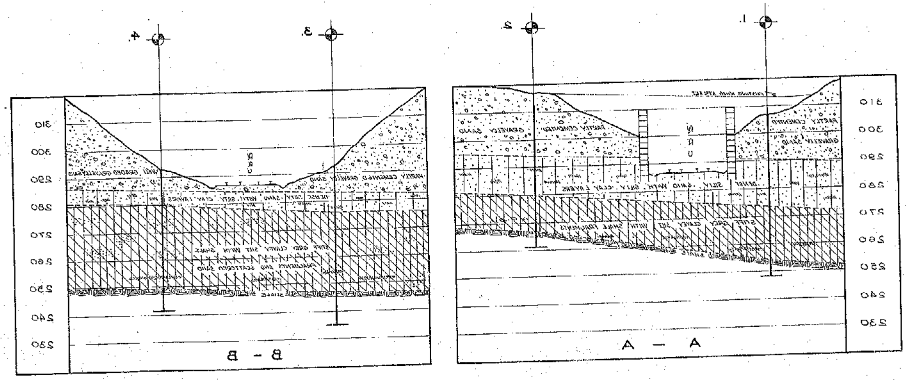




LEGEND

⊕ BORE & PENETRATION HOLE

HOLE NO	ELEVATION
1	307.20
2	317.00
3	291.80
4	293.20



- 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

KING STREET & C.P.R. PROP CROSSING

SHOWING POSITIONS & ELEVATIONS OF HOLES

HWY. ____ DISTRICT 4 COUNTY WENTWORTH
TOWNSHIP ____ LOT ____ CON ____
LOCATION AT HAMILTON

DRAWN BY:	CHECKED BY:	W.P. 192-60
DATE 26 APR. 1960	APPROVED BY:	DRAWING NO.
SCALE AS SHOWN		60-F-254