cc: Gen. Files

DEPARTMENT OF HIGHWAYS ONTARIO

W.P. 125-60-

MEMORANDUM

To: Mr. B. R. Davis
Bridge Engineer
Bridge Division
Admin. Bldg.

From: Foundation Section
Materials & Testing Div.
Room 107, Lab. Bldg.

Date: September 25, 1967

Our File Ref.

In reply to

OCT - 3 1967

Subject:

FOUNDATION INVESTIGATION REPORT
for
Proposed Finch Avenue Extension
Between Existing Hwy. 27 and the
New Hwy. 27, Conc. VII, Lot 33
Borough of Etobicoke
District No. 6 (Toronto)
W.J. 67-F-82 -- W.P. 125-60-1

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

We believe that the factual data and recommendations contained therein, will prove adequate for your design requirements. Should additional information be required, please feel free to contact our office.

A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

AGS:mt
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
F. Allen
W. S. Melinyshyn
T. J. Kovich
B. A. Singh

Foundation Files
General Files

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FOUNDATION INVESTIGATION REPORT
for
Proposed Finch Avenue Extension
Between Existing Hwy. 27 and the
New Hwy. 27, Conc. VII, Lot 33
Borough of Etobicoke
District No. 6 (Toronto)
W.J. 67-F-82 -- W.P. 125-60-1

1. INTRODUCTION:

Following your memo to T. J. Kovich, dated August 21, 1967, we have carried out a foundation investigation at the two proposed crossings of the Humber River and Finch Avenue. Presented in this report are the conclusions of our investigations, together with recommendations as to the foundations of the proposed structures. It should be noted that the contoured plan supplied to us was found to be inaccurate as regards elevations. For your information, we have compiled the following table which gives the correct elevations at various locations:

Metro. Location	Sta. 36+00	(B.H. 4)	G.L. 512.2
	Sta. 42+00	(B.H. 5)	G.L. 509.6
	Sta. 46+00	(B.H. 6)	G.L. 512.2
	River Water Level		506.4
Alternative Location	Sta. 38+00	(B.H. 1)	G.L. 509.9
	Sta. 40+40	(B.H. 2)	G.L. 510.4
	Sta. 45+00	(B.H. 3)	G.L. 533.6
	River Water Level.....		503.9

2. SUBSOIL - Metro Location:

Three borings numbered 4, 5 and 6, were carried out at Stations 36+00, 42+00 and 46+00, respectively. These borings revealed the following subsoil stratigraphy: 1 to 3 ft. of topsoil, followed by 5 to 10 feet of loose to compact sandy silt with some gravel and traces of clay, followed by 8 to 15 feet of glacial till, followed by shale and limestone bedrock.

...../2

2. SUBSOIL - Metro Location: (cont'd)

The glacial till deposit in B.H. #4 consisted entirely of hard clayey silt with sand and gravel, whilst in B.H.'s #5 and #6, it consisted of dense to very dense silty fine sand with traces of gravel and clay, occasional cobbles and boulders. Water level was found to be about the same as the river water level or slightly higher. The locations and elevations of the boreholes together with the stratigraphical profiles are shown on attached drawing #67-F-82A.

3. RECOMMENDATIONS:

Approach Embankments - No stability problems are anticipated for the proposed embankments. If fills are constructed between Sta's. 35+00 and 43+00, up to 3 feet of organic topsoil may have to be subexcavated. Elsewhere, construction may be as per D.H.O. Standards (2:1 slopes).

Abutments and Piers - For all footings, it is recommended that a piled foundation be constructed. End-bearing steel H piles with reinforced tips driven to bedrock would be the most practical. The maximum possible loads for the particular pile section should be assumed for design purposes. For estimating, it may be assumed that the rock surface slopes uniformly from El. 498.0 at Sta. 36+00 to El. 484.0 at Sta. 46+00. Pile caps should have a minimum of 4.0 ft. frost cover.

Dewatering - Since relatively shallow excavations will be carried out, dewatering should present no major problems even though the subsoil is fine-grained granular material and liable to boil under conditions of unbalanced hydrostatic head.

Scour - The embankments and foundations should be protected against scour by appropriate means.

...../3

4. SUBSOIL - Alternative Location:

Three boreholes numbered 1, 2 and 3 were carried out at the Stations 38+00, 40+40 and 45+00, respectively. B.H. #3 was drilled in the high ground on the west bank of the river, and B.H.'s #1 and #2 were drilled in the valley bottom on the east side. These borings revealed the following stratigraphy:

In the valley: 1 to 3 feet of topsoil followed by 5 to 6 feet of loose to compact sandy silt or silty sand with gravel (glacial till), followed by shale and limestone bedrock. In the high ground on the west side of the river: 1.5 ft. of topsoil followed by 3.5 ft. of very stiff clayey silt, followed by 3.5 ft. of very dense sandy silt to silty sand, followed by at least 27 ft. of hard clayey silt with sand and gravel (glacial till).

Groundwater level was found to be at approximately the same level as the river in the valley bottom, and in the high ground (B.H.#3), about 12 ft. below ground level.

5. RECOMMENDATIONS:

Approach Cuts and Fills - No stability problems are anticipated for the proposed approach cuts and fills. If fills are constructed between Stations 36+40 and 41+80, up to 3 feet of organic topsoil may have to be subexcavated. Elsewhere, construction may be as per D.H.O. Standards (2:1 slopes).

West Abutment - The west abutment, if located at Sta. 44+80 or beyond, may be founded on spread footings at El. 523 ft. or lower, using a design pressure of 4 t.s.f. and a frost cover of 4 feet.

East Abutment and Piers - For the east abutment and all piers, it is recommended that piled foundations be constructed. End-bearing steel H piles with reinforced tips driven to bedrock would be the most practical. The maximum possible loads for the particular pile section should be assumed for design purposes. For estimating purposes, it may be assumed that the bedrock surface slopes uniformly from El. 496 feet at Sta. 38+00 to El. 494 feet at Sta. 40+40, and beyond. Pile caps should have a minimum of 4 feet frost cover.

...../4

5. RECOMMENDATIONS: (cont'd)

Dewatering - Since relatively shallow excavations will be carried out. dewatering should present no major problems even though the subsoil is fine-grained granular material and liable to boil under conditions of unbalanced hydrostatic head.

Scour - The embankments and foundations should be protected against scour by appropriate means.

6. MISCELLANEOUS:

The supervision of the field work, together with the preparation of this report has been undertaken by Mr. K. Liljefors, Project Foundation Engineer. Equipment used was owned and operated by Canadian Longyear Ltd.

Mr. K. G. Selby, Supervising Foundation Engineer, reviewed this report.

September 1967

APPENDIX I

FORM OB-MT-126
66-4546

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

JOB 67-F-82 LOCATION Co-ords. 889,945 N, 969,785 E. ORIGINATED BY KAL
W.P. 125-60-1 BORING DATE Sept. 5, 1967 COMPILED BY KAL
DATUM Geodetic BOREHOLE TYPE Core Drill CHECKED BY AR

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100 / SHEAR STRENGTH P.S.F.	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w — WATER CONTENT % 10 20 30	BULK DENSITY P.C.F.	REMARKS
509.9	Ground Level									
0.0	Organic clay Silt									
507.4	Soft									
2.5	Sandy Silt to silty sand with gravel Brown Grey		1	SS	6	505		N.P.		Gr.24, Sa.53 Si.19, Cl. 4
	Loose to compact.		2	SS	19					
501.9										
8.0	Clayey silt, sand and gravel occasional boulder		3	SS	133	500				
	Hard		~~4~~	~~SS~~	~~100/1"~~					
496.4			5	RC	25%					
13.5	Bedrock Banded shale and limestone		6	RC	65%	495				
491.1			7	RC	90%					
18.8	End of Borehole					490				

66-4546

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

JOB 67-F-82 LOCATION Co-ords. 889,715 N; 969,715 E ORIGINATED BY AMB
W.P. 125-60-1 BORING DATE Sept. 12, 1967 COMPILED BY AMS
DATUM Geodetic BOREHOLE TYPE Core Drill CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS / FOOT	ELEV. SCALE
510.4	Ground Level					
0.0	Silty sand, trace of gravel					
	Very loose to compact		1	SS	3	
						505
503.4			2	SS	25	
7.0	Clayey silt traces of sand & gravel.					
			3	SS	139/8½"	
499.4	Very stiff to hard					500
11.0	Silty sand to sandy silt, traces of gravel		4	SS	88	
	Very dense.					
494.4			5	SS	128	495
						bouncing
16.0	Bedrock		6	AXT	Rec	
492.4	Banded shale and limestone			RC	20%	
18.0	End of Borehole					

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT
20 40 60 80 100
SHEAR STRENGTH P.S.F.

LIQUID LIMIT ——— w_L
PLASTIC LIMIT ——— w_P
WATER CONTENT ——— w
w_P w w_L
WATER CONTENT %
10 20 30

BULK DENSITY γ P.C.F.

REMARKS

FORM 08-MT-126
66-4546

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

JOB 67-F-82 LOCATION Co-ords. 889,270 N;; 969,585 E. ORIGINATED BY KAL
W.P. 125-60-1 BORING DATE Sept. 8, 1967 COMPILED BY KAL
DATUM Geodetic BOREHOLE TYPE Core Drill CHECKED BY

ELEV. / DEPTH	SOIL PROFILE DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (20 40 60 80 100) SHEAR STRENGTH P.S.F.	LIQUID LIMIT w_L PLASTIC LIMIT w_P WATER CONTENT w (w_P w w_L) WATER CONTENT % (10 20 30)	BULK DENSITY γ P.C.F.	REMARKS
533.6	Ground Level									Gr.Sa.Si.Cl
0.0	Clayey silt, some organic material.									
532.1	Firm									
1.5	Clayey silt, some sand and gravel. Very stiff		1	SS	26	530				
528.6										
5.0	Sandy silt to silty sand with some gravel. Very dense Brown Grey		2	SS	147	525				2 32 62 4 10 71 (19)
522.6			3	SS	86					
11.0	Clayey silt, some sand, trace of gravel Glacial Till Hard		4	SS	112	520				
			5	SS	107					
			~~6~~	~~SS~~	~~100/½"~~					
			RC	Boulder		515				
			7	SS	66					
						510				
			8	SS	60					
						505				
			9	SS	45					2 88 10
						500				
497.1			10	SS	88					
36.5	End of Borehole									

66-4546

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 67-F-82 LOCATION Co-ords. 890,160 N; 969,680 E. ORIGINATED BY KAL
W.P. 125-60-1 BORING DATE August 31, 1967 COMPILED BY KAL
DATUM Geodetic BOREHOLE TYPE Core Drill CHECKED BY AR

SOIL PROFILE ELEV./DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE
512.2	Ground Level					
0.0	Organic silt to silt. Loose					510
509.1						
3.1	Sandy silt with gravel Loose		1	SS	11	
506.7						
5.5	Clayey silt with sand and gravel. Occasional boulder. Hard		2	SS	37	505
			3	SS	100/1"	
			4	SS	100/2"	500
498.2						
14.0	Bedrock Banded shale and limestone		5	RC	50%	
			6	RC	70%	495
			7	RC	90%	
492.2						
20.0	End of Borehole					

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT 20 40 60 80 100
SHEAR STRENGTH P.S.F.

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
w_P w w_L
WATER CONTENT % 10 20 30

BULK DENSITY γ P.C.F.

REMARKS

▽ 506.5
11/9/67

66-4546

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 5

FOUNDATION SECTION

JOB 67-F-82 LOCATION Co-ord. 889,700 N; 969,300 E. ORIGINATED BY AMS
W.P. 125-60-1 BORING DATE Sept. 11 & 12, 1967 COMPILED BY AMS
DATUM Geodetic BOREHOLE TYPE Core Drill CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS / FOOT	ELEV. SCALE
509.6	Ground Level					
0.0	Sandy silt, trace of gravel.					
	Loose to Dense		1	SS	8	505
503.1						
6.5	Clayey silt, traces of sand and gravel. Hard.		2	SS	35	
8.3	Silty sand, trace of gravel.		3	SS	108	500
	Very dense.		4	SS	111	
495.1						495
14.5	Shale fragments in clayey silt. Hard.		5	SS	100/2"	
493.9						
493.0	Bedrock		6	RC		
15.8	End of Borehole					

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT 20 40 60 80 100
SHEAR STRENGTH P.S.F.

100/6"

LIQUID LIMIT ——— w_L
PLASTIC LIMIT ——— w_P
WATER CONTENT ——— w
w_P w w_L
WATER CONTENT % 10 20 30

N.P.

BULK DENSITY γ P.C.F.

REMARKS

Gr.Sa.Si.C

2 48 42

6 48 40 6

66-4546

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 6

FOUNDATION SECTION

JOB 67-F-82 LOCATION Co-ords. 889,380 N; 969,045 E. ORIGINATED BY KAL
W.P. 125-60-1 BORING DATE Sept. 6, 1967 COMPILED BY KAL
DATUM Geodetic BOREHOLE TYPE Core Drill CHECKED BY

ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE
512.2	Ground Level					
0.0	Organic clay-silt.					
510.7	Very soft to firm.					
1.5	Sandy silt to silty sand with some gravel		1	SS	56	510
			2	SS	33	505
	Dense to very dense		3	SS	22	
			4	SS	43	500
			5	SS	33	
			6	SS	32	495
			7	SS	62	
			8	SS	100/3"	490
			9	SS	100/3"	
484.7						485
28.5	Clayey silt, some sand & gravel. Hard.		10	SS	120/4"	
482.9						
29.3	Bedrock					
	Banded shale and Limestone		11	RC	80% Rec	480
477.7						
34.5	End of Borehole					

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT 20 40 60 80 100
SHEAR STRENGTH P.S.F.

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
w_P w w_L
WATER CONTENT % 10 20 30

N.P
N.P

BULK DENSITY γ P.C.F.

REMARKS
Gr.Sa.Si.C

30 26 36
9 50 36

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

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

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

DESCRIPTION OF SOIL

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

CONSISTENCY	'N' BLOWS / FT.	c LB. / SQ. FT.	DENSENESS	'N' BLOWS / FT.
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

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

GENERAL

π	= 3·1416
e	BASE OF NATURAL LOGARITHMS 2·7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

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

EARTH PRESSURE

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

FOUNDATIONS

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

SLOPES

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

cc: Foundations Files (Rm. 110)

Mr. W. C. Friedmann,
Sr. Project Planning Engineer,
Functional Planning Division,
Admin. Bldg.

Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

September 13, 1967

Proposed Finch Avenue Extension
Between Existing Hwy. 27 and the
New Hwy. 27, Conc. VII, Lot 33
-- Borough of Etobicoke --
District No. 6 (Toronto)

67-F-82
125-60-1

Following your memo to Mr. T. J. Kovich, dated August 21, 1967, we have carried out a foundation investigation at the two proposed crossings of the Humber River and Finch Avenue. Since the project is extremely urgent, we are advising you, prior to the completion of the foundation report, of our findings to date, and tentative recommendations for the new structure foundations. It should be noted that the contoured plan supplied to us was found to be inaccurate as regards elevations. For your information, we have compiled the following table which gives the correct elevations at various locations:

Metro. Location	Sta. 36+00	(B.H. 4)	G.L. 512.2
	Sta. 42+00	(B.H. 5)	G.L. 509.6
	Sta. 46+00	(B.H. 6)	G.L. 512.2
	River Water Level	.....	506.4
Alternative Location	Sta. 38+00	(B.H. 1)	G.L. 509.9
	Sta. 40+40	(B.H. 2)	G.L. 510.4
	Sta. 45+00	(B.H. 3)	G.L. 533.6
	River Water Level	.....	503.9

SUBSOIL - Metro. Location:

Three borings numbered 4, 5, and 6, were carried out at Stations 36+00, 42+00, and 46+00, respectively. These borings revealed the following subsoil stratigraphy: 1 to 3 ft. of topsoil, followed by 5 to 10 feet of loose to compact silt to silty sand with some gravel and traces of clay, followed by 8 to 15 feet of glacial till, followed by shale and limestone bedrock. The glacial till deposit in B.H. #4 consisted entirely of hard clayey silt or silty clay with sand and gravel, whilst in B.H.'s #5 and #6, it consisted of dense to very dense silty fine sand

cont'd. /2 ...

SUBSOIL - Metro. Location: (cont'd.) ...

with traces of gravel and clay, occasional cobbles and boulders. Water level was found to be about the same as the river water level or slightly higher.

RECOMMENDATIONS:

Approach Embankments - No stability problems are anticipated for the proposed embankments. If fills are constructed between Sta's. 35+00 and 43+00, up to 3 feet of organic topsoil may have to be subexcavated. Elsewhere, construction may be as per D.H.O. Standards (2:1 slopes).

Abutments and Piers - For all footings, it is recommended that a piled foundation be constructed. End-bearing steel H-piles with reinforced tips driven to bedrock would be the most practical. The maximum possible loads for the particular pile section should be assumed for design purposes. For estimating, it may be assumed that the rock surface slopes uniformly from El. 498.0 at Sta. 36+00 to El. 484.0 at Sta. 46+00. Pile caps should have a minimum of 4.0 ft. frost cover.

Dewatering - Since relatively shallow excavations will be carried out, dewatering should present no major problems even though the subsoil is fine-grained granular material and liable to boil under conditions of unbalanced hydrostatic head.

Scour - The embankments and foundations should be protected against scour by appropriate means.

SUBSOIL - Alternative Location:

Three boreholes numbered 1, 2, and 3, were carried out at Stations 38+00, 40+40, and 45+00, respectively. B.H. #3 was drilled in the high ground on the west bank of the river, and B.H.'s #1 and #2 were drilled in the valley bottom on the east side. These borings revealed the following stratigraphy:

In the valley: 1 to 3 feet of topsoil followed by 5 to 6 feet of loose to compact sandy silt or silty sand with gravel, followed by 6 to 9 feet of hard clayey silt with sand and gravel (glacial till), followed by shale and limestone bedrock. In the high ground on the west side of the river: 1.5 ft. of topsoil

cont'd. /3 ...

SUBSOIL - Alternative Location: (cont'd.) ...

followed by 3.5 ft. of very stiff clayey silt, followed by 3.5 ft. of very dense sandy silt to silty sand, followed by at least 27 ft. of hard clayey silt with sand and gravel (glacial till).

Groundwater level was found to be at approximately the same level as the river in the valley bottom, and in the high ground (B.H. #3), about 12 ft. below ground level.

RECOMMENDATIONS:

Approach Cuts and Fills - No stability problems are anticipated for the proposed approach cuts and fills. If fills are constructed between Stations 36+40 and 41+80, up to 3 feet of organic topsoil may have to be subexcavated. Elsewhere, construction may be as per D.H.O. Standards (2:1 slopes).

West Abutment - The west abutment, if located at Sta. 44+80 or beyond, may be founded on spread footings at El. 523 ft. or lower, using a design pressure of 4 tsf and a frost cover of 4 feet.

East Abutment and Piers - For the east abutment and all piers, it is recommended that piled foundations be constructed. End-bearing steel H-piles with reinforced tips driven to bedrock would be the most practical. The maximum possible loads for the particular pile section should be assumed for design purposes. For estimating purposes, it may be assumed that the bedrock surface slopes uniformly from El. 496 feet at Sta. 38+00 to El. 494 feet at Sta. 40+40, and beyond. Pile caps should have a minimum of 4 feet frost cover.

Dewatering - Since relatively shallow excavations will be carried out, dewatering should present no major problems even though the subsoil is fine-grained granular material and liable to boil under conditions of unbalanced hydrostatic head.

Scour - The embankments and foundations should be protected against scour by appropriate means.

The supervision of the field work, together with the preparation of the foundation report has been undertaken by Mr. Elm Liljefors, Project Foundation Engineer. We expect to complete the final report within about two weeks.

cont'd. /4 ...

Mr. W. C. Friedmann,
Sr. Project Planning Engr.,
Functional Planning Div.,
Admin. Bldg.

September 13, 1967

If you have any queries concerning this matter, please contact this Office.

K. G. Selby

KGS/RdeF

K. G. Selby,
SUPERVISING FOUNDATION ENGINEER
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. T. J. Kovich
A. W. Robinson
B. R. Davis
W. S. Melinyshyn

Foundations Files
Gen. Files

401 & Keele Street
Downsview, Ontario

September 21, 1967

Canadian Longyear Ltd.
35 Brydon Drive
Rexdale, Ontario

Dear Sirs:

This is to confirm our request of August 28, 1967 for the supply of a Diamond Drill together with all necessary equipment, as specified under the terms of our Contract Agreement, at Hwy. #27 and Albion Rd., Toronto, on August 31, 1967.

This project bears job number 67-F-82.

Yours truly,

K. G. Selby

KGS:mt

K. G. Selby
Supervising Foundation Engineer
for: A. G. Stermac
Principal Foundation Engineer

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: K. G. Selby
Foundation Section

From: K. Ingraham

Date: September 12, 1967

Our File Ref.

In reply to

Subject: Proposed Finch Avenue Bridge
Crossing Humber River
Job 65-F-82 ? 67-F-82.

Shale of the Meaford-Dundas formation has been intersected in the foundation investigation for this bridge. An examination of Boreholes 1, 4 and 6 indicates the existence of bedrock beneath a layer of dense stoney clay till. The elevation of the top of the bedrock in each case is essentially as noted in the field log of each hole. The shale characteristically contains interbedded layers of limestone and silty limestone from 0.1 to 0.4 ft. in thickness. In each hole approximately the upper 2.0 ft. is weathered, the weathering however is not severe - the limestone and hard shale bands are relatively fresh - and the strata recovered by drilling are in more or less horizontal attitudes. The core loss probably represents layers of soft shale weathered to the consistency of clay. Below this level the bedrock is unweathered and as previously described.

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

67-F-82

To: T. J. Kowich,
Regional Materials Eng. (Toronto),
Materials & Testing Division,
Lab. Bldg.

From: W. C. Friedmann,
Sr. Project Planning Engineer.

Date: August 21st, 1967.

Our File Ref.

In reply to

Subject: SP 125-60-1

**Proposed Finch Avenue Extension,
between the existing Highway 27 and
the new Highway 27, Con. III, Lot 33,
Borough of Etobicoke, Dist. 6, Toronto.**

Attached please find one photo-mosaic illustrating the proposed location of Finch Avenue as indicated in the "Proposed Official Plan of the Metropolitan Toronto Planning Area" and one alternate location together with two profiles and a contour map. Both lines cross the land owned by the D.H.O. west of the existing Highway 27 and we are trying to establish the minimum property requirements through this land so that we can release the remainder of the property.

The crossing of the West Branch of the Humber River and adjacent valley, will be carried out by a structure over the river with end spans wide enough to provide for pedestrian crossings and any services required by the Conservation Authorities along the valley and flood-plain area.

The cross-section of Finch Avenue will consist ultimately of 6 lanes with 7' median, 10' shoulders and 5' sidewalks over the structure.

Will you please inform us of any foundation prob'ms that can be anticipated in these two locations.

Your early attention to this request will be very much appreciated since the D.H.O. property must be released as soon as possible.

W. C. Friedmann,
Sr. Project Planning Engineer.

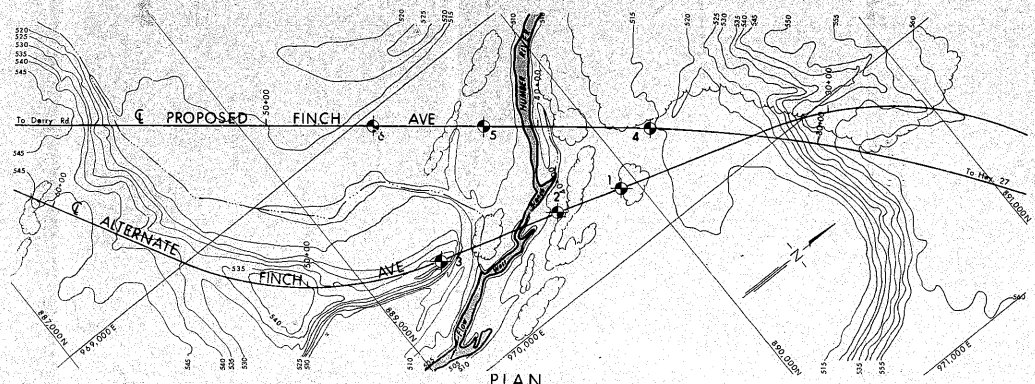
WCF/IA/mw
Attach.

P.S. Will you please return the enclosed 1" = 200' contour plan since this is our only copy.

c.c. M. W. Robinson,
W. Melinyshyn.

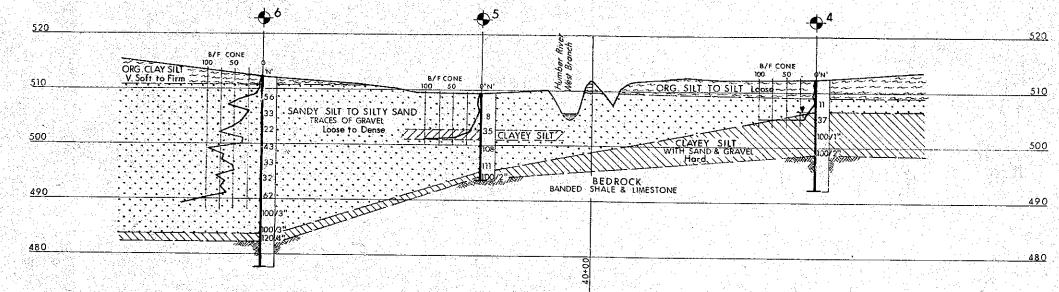
IGNACIO ARDIZONE Loc-3581

67-F-82
W.P. #125-60-1
PROPOSED FINCH AVE. EXTENSION BETWEEN EXISTING HWY. # 27 AND THE NEW HWY. #27

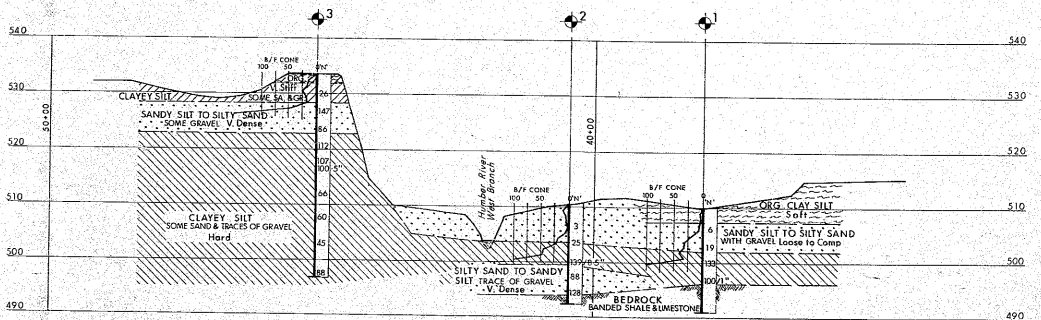


PLAN

SCALE 200 100 0 200 400 FT.



PROFILE PROPOSED LINE

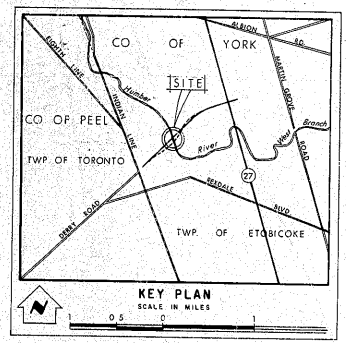


PROFILE ALTERNATE LINE

SCALE

VERT. 10 5 0 10 20 FT.

HORIZ. 100 50 0 100 200



KEY PLAN

SCALE IN MILES

1 0.5 0 1

LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation. AUG. 1967

NO.	ELEVATION	CO-ORDINATES NORTH	CO-ORDINATES EAST
1	509·9	889,945	969,785
2	510·4	889,715	969,715
3	533·6	889,270	969,585
4	512·2	890,160	969,680
5	509·6	889,700	969,200
6	512·2	889,380	969,045

– 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.

REVISIONS		
DATE	BY	DESCRIPTION

PRINT RECORD		
NO.	FOR	DATE

DEPARTMENT OF HIGHWAYS – ONTARIO

MATERIALS & TESTING DIVISION – FOUNDATION SECTION

HUMBER RIVER - WEST BRANCH

KING'S HIGHWAY NO. PROPOSED FINCH AVE DIST. NO. 6

CO. YORK Metro To Conto

TWP. ETOBICOKE LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D A.B.	CHECKED G.P.	W.P. NO. 125-60-1	M.&T. DRAWING NO. 67-F-82A
DRAWN S.O.	CHECKED	JOB NO. 67-F-82	
DATE 21 SEPT. 1967		SITE NO.	BRIDGE DRAWING NO.
APPROVED		CONT. NO.	