

DOCUMENT MICROFILMING IDENTIFICATION

GEOCREs No. 40P9-16

W.P. No. 109-68-11

CONT. No. BUILT BY C.N.R.

W. O. No. 72-1104.3

STR. SITE No. 35-409

HWY. No. H-E DIST. 3

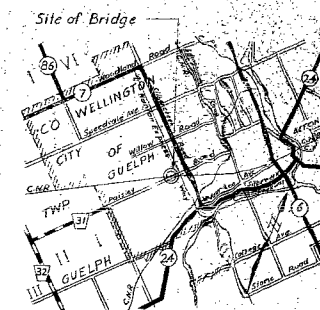
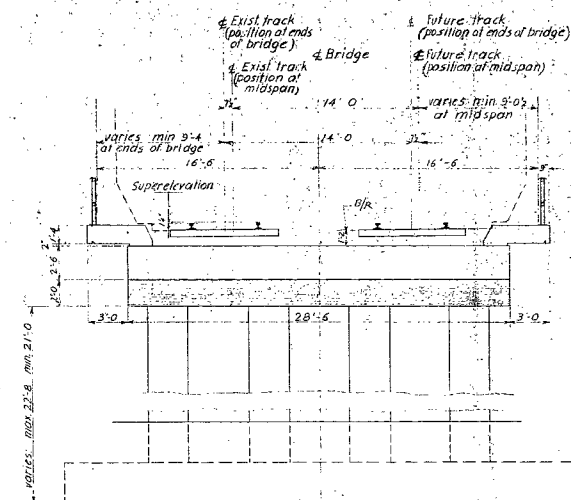
LOCATION GUELPH - C.N.R.

Subway on relocated Paisley Rd.

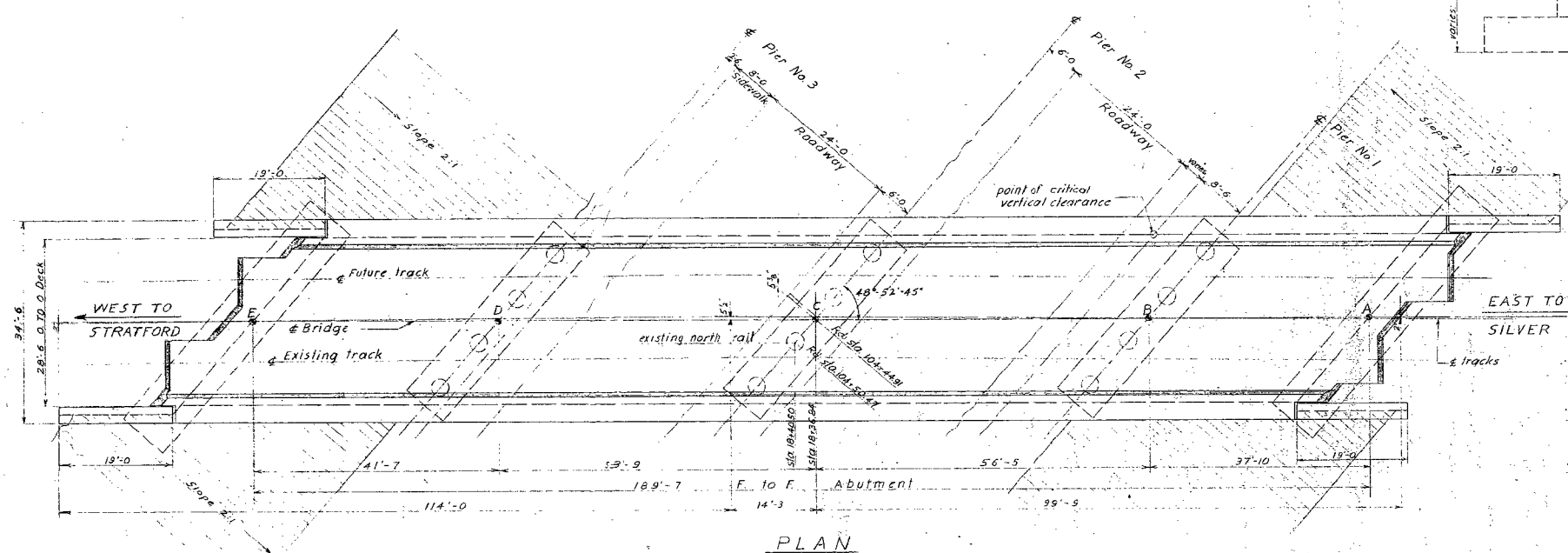
OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 2

REMARKS:

G.I.P.O. SEP. 1978



KEY PLAN
scale: 1" = 1 mi.



SECTION A-A
Scale: 1"=5'

GENERAL NOTES

A new reinforced concrete bridge consisting of 4 continuous spans supported on 3 piers and 2 abutments is to be constructed to carry 2 C.N.R. tracks, of which one is future, at Paisley road. Alignment remains unchanged, B/L elevations to be corrected as per dwg. detail "Prop'd B/L profile of existing M.L. track".

Live Load: Cooper loading E70 + Diesel impact

Live Load: Cooper loading E 70 + Diesel impact

Material specifications

Concrete: C.S.A. A 23.1 or ~~not~~ A 23..

Datum: D. H. O. B.M. No 132-69 Elev. 108'±158
Two story stone house, owned by Mr. L. H. Paisey, on S. side of Paisley Rd.
being 36 mi. W. of just E. of intersection of Paisley Rd. and
Hwy. No. 24. Waterloo town, being 258 ft. S. of Corner 51 and 0.2 mi. W.
along Paisley Rd. being 125 ft. S. of Paisley Rd. Tablet is set
horizontally in E. face of stone fdn, being 119 ft. S. of N.E. corner
and 0.3 ft. above ground level.

Authorization:

Nearest station: Guelph Jct, Mi. 49.2

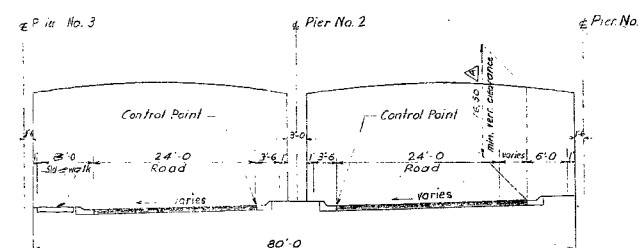
Nearest station: Guelph Jct, Mi. 49.8

Reference drawings:
Department of Highways of Ontario

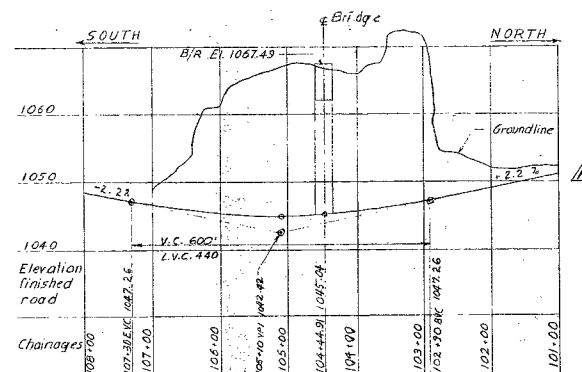
Drq. No G-4022 dated Sept. 1969 revised Feb. 1972
Drq. No F-4868-1 dated Sept. 1969 revised Feb. 1972

Dr. No. 2-4888-1 dated Sept. 1965 Revised Feb. 1972

List of Drawings:
General Layout No. AA-940-50.15-1.1 dated May 72

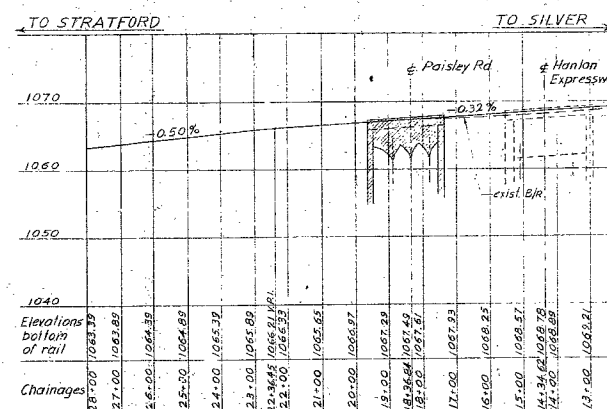


CLEARANCE DIAGRAM
(NORMAL TO PAISLEY ROAD)
scale: 1"=10'



PROFILE PAISLEY ROAD

scale: horiz. $1'' = 100'$
vert. $1'' = 10'$



PROP'D B/R PROFILE OF EXIST. M.L. TRACK


scale: horiz 4" = 200'
vert 1" = 10'

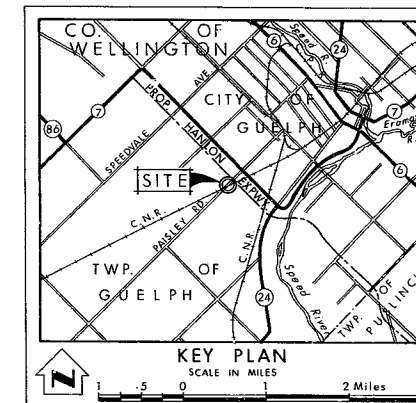
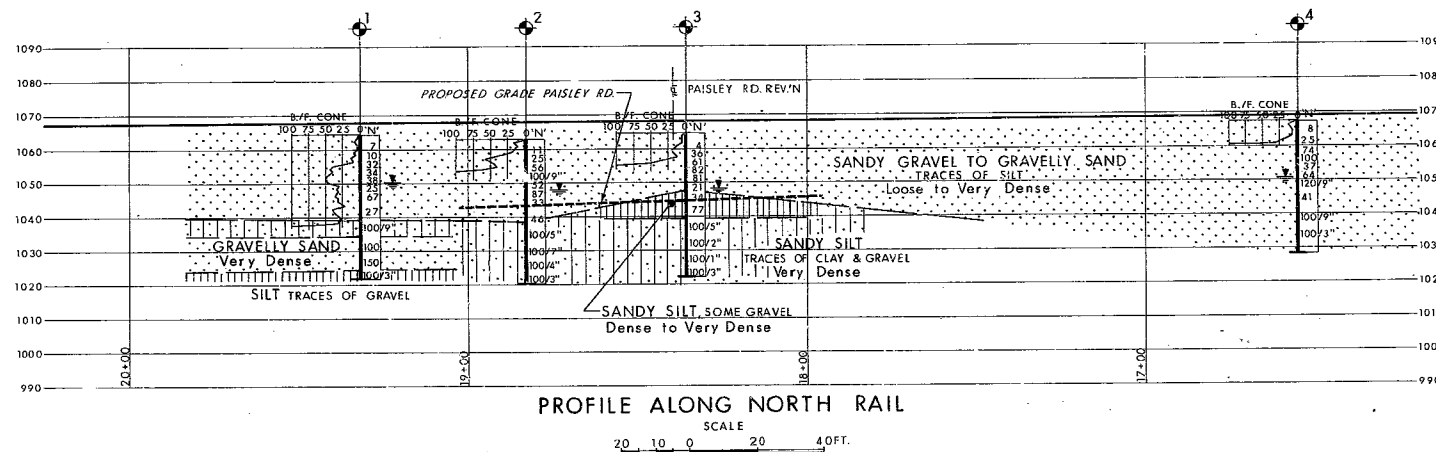
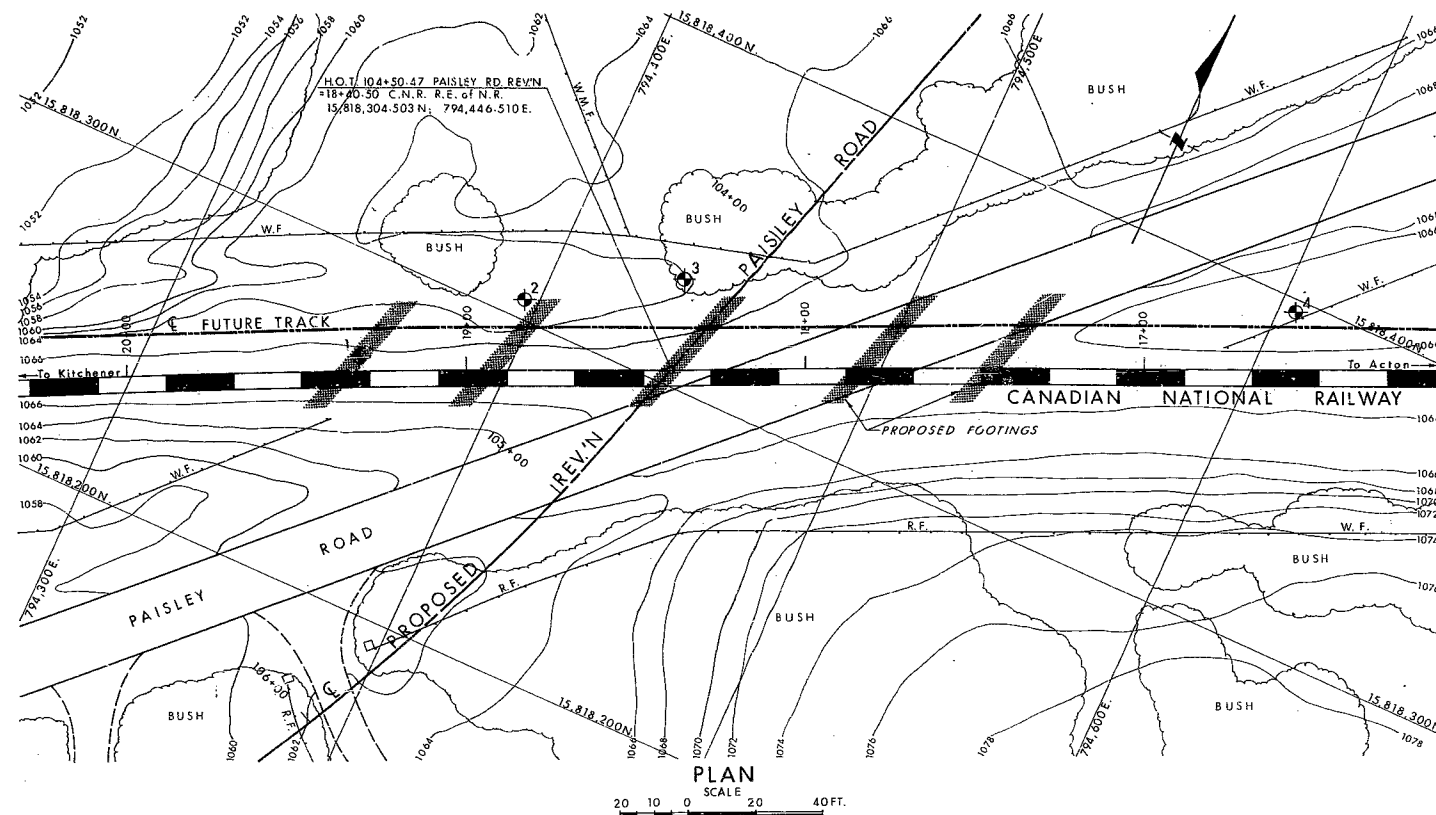
ESTIMATED QUANTITIES

Concrete: cu yds.
Reinforcing steel: lbs.

40P9-16

11-11-04

B		29 - AUG. 1972		ELEV N. OF W.ABUT. FOOTING 1051.38	
A		19 - JUNE 1972		PROFILE OF PAISLEY ROAD REVISED	
No.	Date	Revision			
Region	GREAT LAKES	Area	SOUTHWESTERN	Sub-division	GUELPH
		Section	ONTARIO		
				Mile	50.45
<u>PAISLEY ROAD SUBWAY</u> <u>GUELPH, ONTARIO</u> <u>GENERAL LAYOUT</u>					
Drawn	G.E.K.	Checked	AB	Approved	ZLS
Design		Verification		Approval	
				Scale	1" = 10' OR
				Shown	AS NOTED 1 MAY 1972
Office of Chief Engineer Bureau de l'Ingénieur en chef					
File	50.45 GUELPH SD		Drawing Number	AA-940-50.45-1.1	
					B



LEGEND			
	Bore Hole		
	Cone Penetration Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation, March 1972		
NO.	ELEVATION	CO-ORDINATES	
		NORTH	EAST
1	1064.7	15,818,271	794,359
2	1063.1	15,818,316	794,396
3	1064.9	15,818,331	794,436
4	1067.3	15,818,397	794,605

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



MINISTRY OF TRANSPORTATION & COMMUNICATIONS
DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

CANADIAN NATIONAL RAILWAY & PAISLEY ROAD REVISION

HIGHWAY NO. Prop. HANLON EXPWY. DIST. NO. 3
CO. WELLINGTON City of GUELPH
TWP. LOT 3 & 4 CON. I DIV'N'E'

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. A. B. CHECKED W.P. NO. 109-68-11 DRAWING NO. 72-11042A
DRAWN CHECKED JOB NO. 72-11042
DATE April 28, 1972 SITE NO. BRIDGE DRAWING NO.
APPROVED CONT. NO.

40P9-16
EGG/APS 116

REF. NO. E-4868-1

Geol. 40P9-16

72-110422
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. A. G. Stermac,
Principal Foundation Engineer,
Foundation Office,
Design Services Branch,
ATTENTION: West Bldg., DOWNSVIEW, Ont.

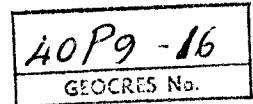
FROM: Bridge Planning,
Southwestern Region,
London, Ontario

DATE: February 24, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 109-68-11, Bridge Site 35-409
C. N. R. Subway #2
Over relocated Paisley Road
City of Guelph
Hanlon Expressway
District 3, Stratford



Would you kindly arrange to have a foundation investigation conducted at the above location. I have enclosed two copies of the Bridge Site Plan E-4868-1 with the probable footing locations marked in red. I have also attached the Field Reconnaissance Report, a list of the utilities to be contacted, utilities plan # 2 and a copy of C.N.R. Instructions for Foundation Consultants.

Please contact the C.N. Area Engineer, Mr. M.F.K. Leighton, in London, telephone 433-4511, local 235, for his assistance in locating the boreholes and the provision of flagmen, if required. One week advance notice would be appreciated.

We will require 3 additional copies of the Foundation Investigation Report for the C.N.R.

SJ/fs
Encls.

S. Jants

S. Jants,
Bridge Planning Technician,
Southwestern Region.

cc: Mr. E. Grebski
Mr. A. Crowley
Mr. J. Anderson
C. N. R.

COMPLETION DATE
APR 30/72.

MICROFILM.

FIELD RECONNAISSANCE REPORT
REQUIRED BY FOUNDATION SECTION
FOR

FF-69
SEPT. 1968

35-409
W.P. NO. 109-68-11 HIGHWAY NO. H.E. DISTRICT 3 SITE PLAN NO. _____ PROFILE NO. _____
RIVER CROSSING ☐ GRADE SEPERATION ☐ R.R.X. ☒ OTHER (SPECIFY) C.N.R. Subway on
ALTERNATE SCHEME (IF ANY) relocated Paisley Road

EXISTING SITE CONDITIONS

DESCRIPTION:

TOPOGRAPHY: HILLY ☐ ROLLING ☐ VALLEY ☐ GULLIED ☐ FLAT ☐
VEGETATION: TREES ☐ BRUSH ☐ GRASS ☐ SWAMP ☐ FARM CROPS ☐ CLEARED ☐
SNOW COVER: 0"-6" ☐ 6"-12" ☐ >12" ☐
ROCK OUTCROP (SPECIFY LOCATIONS) _____

UNDERGROUND UTILITIES:

UTILITY COMPANY

TELEPHONE NO. FOR DEFINITE LOCATION

1 Telegraph line runs parallel with tracks (S.W.)

2 _____

3 Hydro Line runs parallel with existing Paisley Road

4 _____

5 _____

EXISTING STRUCTURE(S):

FOUNDATIONS: SPREAD FOUNDATIONS ☐ SIZE _____ ELEVATION(S) _____
PILES ☐ TYPE _____ LENGTH(S) _____
DESIGN LOAD _____ T.S.F. _____ TONS/PILE
CONDITION OF STRUCTURE _____

APPROACHES: CUT ☐ FILL ☐ SIDE SLOPES _____
BERMS YES ☐ NO ☐

OTHER OBSERVATIONS (USE BACK OF SHEET TO DESCRIBE ANY FAILURES IN AREA, PAST PERFORMANCE OF EXISTING APPROACHES & STRUCTURE, ETC.)

ACCESSIBILITY

IS STRUCTURE LOCATED ON D.H.O. RIGHT OF WAY? YES ☐ NO ☐ IF NO,
HAS PERMISSION BEEN OBTAINED TO ENTER PROPERTY? YES ☐ NO ☐ IF NO,
PROPERTY OWNER(S):

NAME

ADDRESS

TELEPHONE NO.

1 _____

2 _____

3 _____

4 _____

WHO WILL OBTAIN NECESSARY PERMISSION? _____

HAS SITE BEEN SURVEYED & STAKED? YES ☒ NO ☐ IF YES, DATE OF MOST RECENT SURVEY (Partly)

WILL CLEARING BE NECESSARY TO ENTER SITE AREA? YES ☐ NO ☐

IS SITE ACCESSIBLE TO WHEELED VEHICLES? YES ☒ NO ☐

IF RIVER CROSSING:

WILL A RAFT BE NECESSARY? YES ☐ NO ☐ IF YES, GIVE MAX. DEPTH OF WATER _____ FT.

CURRENT: SWIFT ☐ MODERATE ☐ SLOW ☐

DRILLING OPERATIONS

NEAREST SOURCE OF WATER (GIVE HAULING DISTANCE, IF KNOWN) _____

ADDITIONAL INVESTIGATION REQUIRED FOR THE FOLLOWING PURPOSES:

ALTERNATE SCHEME: YES ☐ NO ☐ IF YES, SPECIFY _____

HYDROLOGIC REASONS: YES ☐ NO ☐ IF YES, SPECIFY (SCOUR, ETC.) _____

REMARKS

NEAREST AVAILABLE ACCOMODATION: Guelph

OTHER COMMENTS: _____

DATE July 17/69

REGIONAL BRIDGE LOCATION ENGINEER A.P. Watt

Monday, Mar. 20/72 12⁰⁰ PM

HANLON EXPRESSWAY UTILITY CONTACTS

Bell Telephone

✓ (519) 742-3501
(815)

Mr. Angus Watt,
800 King Street West,
KITCHENER, Ontario.

Guelph Hydro

✓ (519) 822-3010
(816) ~~822-6720~~

Mr. Don Perry,
104 Dawson Road,
GUELPH, Ontario.

✓ Union Gas

(519) 621-0470
(815)

Mr. J. E. Pollock,
221 Avenue Road,
GALT, Ontario.

✓ Ontario Hydro (H. E. P. C.)

(416) 529-7111
(811) (519) 822-5071
GUELPH

Mr. Tom Atherton,
1053 Main Street,
HAMILTON, Ontario.

✓ Guelph P. U. C. (Water, Sanitary etc.)
(519) 822-6820

Mr. Ray Funnell,
City Hall,
GUELPH, Ontario.

{ WATER at 12⁰⁰ PM
SEWER - " - " - "
HYDRO (GUELPH) 12⁰⁰ PM.

TEL: 12⁰⁰ PM

GAS (UNION): 1³⁰ PM

ONT. HYDRO: 816-822-5071 No charges

geoph hydro
UNDERGROUND CABLE LOCATION REQUEST FORM

104 DAWSON ROAD

TELEPHONE 822-3010

EXT. 31

DATE RECEIVED: March 17

TIME RECEIVED: 1100

UNDERGROUND CABLE LOCATION RECORD

LOCATION AREA: Parkway St. @ C.N.R. tracks W. of Parkway
STREET

FROM: _____ TO: _____

DATE OF APPOINTMENT: March 20/72 TIME 1315 A.M.
P.M.

LOCATION REQUEST FOR: FIRM Department of Highways

NAME OF CALLER Mr. Payer

TELEPHONE NO. _____

SKETCH OF AREA SHOWING APPROXIMATE CABLE LOCATION & EXCAVATION

REMARKS: Underground service for C.N.R. control Box
Unable to locate this service at all
Dig with caution in vicinity of
service pole.

METHOD OF MARKING: STAKES ☐ PAINT ☐ TAPE ☐ VERBAL ☒

LOCATION ACCEPTED BY: John T. Berger FIRM: Dept. of Highways

LOCATION GIVEN BY: J. Miller DATE March 20 TIME 1330 A.M.
P.M.



RECORD OF LOCATING TELEPHONE PLANT

SWITCHING CENTRE Bushy SERIAL NO. _____

APPOINTMENT FOR DATE 30.3.72 TIME 4.30 AM
PM

REQUESTED BY W/O TEL # _____
(NAME OF FIRM OR OTHER)

ADDRESS 100-100 (STREET) (CITY)

CONTACT PERSON _____

LOCATION OF WORK 100-100

NATURE OF WORK 100-100

TYPE OF PLANT BUR ☒ U.G. ☐ OTHER ☒
METHOD OF MARKING STAKES ☐ PAINT ☐ OTHER ☐

REMARKS _____

SKETCH OF PROPOSED EXCAVATION AND PLANT LOCATION

"CAUTION" HAND DIG WITHIN 3 FEET OF THE MARKINGS

ACCEPTED BY W/O SIGNATURE TITLE COMPANY

GIVEN BY W/O SIGNATURE DATE TIME AM
PM

ACCOUNT CODE 63 R HOURS 3/4 FOLLOW-UP DATE

BT FORM 1349 (2-70)

UNION **GAS** COMPANY OF CAN. LIMITED

LINE LOCATION REQUEST

DIVISION / BRANCH <i>Sturph</i>		DATE REC'D <i>17/1/72</i>	TIME REC'D <i>11.09</i>
LOCATE FOR <i>Dept. of Transport</i>		MUNICIPALITY <i>Sturph</i>	
REQUESTED BY <i>Mr. Payer</i>		PHONE	
DATE REQUIRED <i>17/1/72</i>	TIME REQUIRED <i>13:30</i>	SITE CONTACT <i>Mr. Payer</i>	
LINE TO BE LOCATED <i>at Car Paving & C.N.R. Tracks</i>			

DISPATCHER <i>CH</i>		DISPATCHED TO <i>192</i>		LINE TYPE <input type="checkbox"/> Dist. <input type="checkbox"/> Trans.	
DISPATCH DATE <i>20-3-72</i>		DISPATCH TIME <i>1300</i>		<input type="checkbox"/> RADIO	
ARRIVAL DATE <i>20-3-72</i>		TIME <i>1:30 P.M.</i>		COMPLETION DATE <i>20-3-72</i>	
TIME <i>2:30 P.M.</i>		COMPLETION DATE <i>20-3-72</i>		TIME <i>2:30 P.M.</i>	
LOCATION IDENTIFICATION <input type="checkbox"/> PAINT <input type="checkbox"/> STAKE <input type="checkbox"/> SKETCH <input checked="" type="checkbox"/> OTHER (SPECIFY)		CONTRACTOR STARTED WORK <input type="checkbox"/> YES <input type="checkbox"/> NO SKETCH ATTACHED <input type="checkbox"/> YES <input type="checkbox"/> NO			

REMARKS
*Mr. Payer on line 192
C.N.R. tracks on Paddy Rd. west of Sidway*

SKETCH (IF REQUIRED)

IF FURTHER INFORMATION REQUIRED	
PHONE	EXT.

LOCATED <i>W.T. & P.A.</i>	CLASS	TIME <i>2:30 P.M.</i>
RECEIVED <i>W.T. & P.A.</i>	TITLE	DATE <i>20-3-72</i>

FORM 391

WHITE — DIV / BRANCH COPY BUFF — CONTROL COPY PINK — CONTRACTOR'S COPY ▲

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

To: Mr. A. P. Watt, (4)
Regional Bridge Planning Eng.,
Southwestern Region,
London, Ontario.

FROM: Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

ATTENTION:

DATE: April 25, 1972.

OUR FILE REF.

IN REPLY TO

MAY 5 1972

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For

The Proposed C.N.R. Subway #2 Over
Related Paisley Rd., Hanlon Expressway
City of Guelph, District #3, Stratford
W.O. 72-11042 -- W.P. 109-68-11

40P9-16
GEOCREs No.

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

We believe that the factual data and recommendations contained therein, will prove adequate for your design requirements. Should additional information be required, please do not hesitate to contact our Office.



A. G. Stermac,
PRINCIPAL FOUNDATIONS ENGINEER.

AGS/ao
Attach.

cc: D. W. Farren
B. R. Davis
A. Rutka
W. A. Zonnenberg
W. D. Neillipovitz
B. J. Giroux
J. R. Roy
G. A. Wrong
B. A. Singh

Foundations Files
Documents

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FOUNDATION INVESTIGATION REPORT
For
The Proposed C.N.R. Subway #2 Over
Related Paisley Rd., Hanlon Expressway
City of Guelph, District #3, Stratford
W.O. 72-11042 -- W.P. 109-68-11

1. INTRODUCTION:

A foundation investigation was requested at the site of the proposed C.N.R. Subway #2 over relocated Paisley Rd. in the City of Guelph, by Mr. S. Jants, Regional Bridge Planning Technician, Southwestern Region, on February 24, 1972. This proposed crossing is in conjunction with the future Hanlon Expressway.

According to the request a field and subsequent laboratory investigation was carried out by this Office in order to determine soil conditions existing at the site.

Presented in this report are the results of the investigation together with recommendations concerning foundations.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The proposed bridge site is situated at the western limit of the City of Guelph, adjacent to the existing level crossing of Paisley Rd. and the C.N.R. tracks. The area has a gentle gradient, sloping westerly, the immediate vicinity being partially tree covered, partially open. North-west of the site there is a sand and gravel pit.

Geologically the site belongs to what is called the "Guelph Drumlin Field" physiographic region. The general land form pattern of this region consists of drumlins or groups of drumlins, fringed by gravel terraces and separated by swampy valleys, in which flow sluggish tributaries of the Grand River.

The City of Guelph is located upon a gravel terrace at the confluence of the Speed and Eramoso Rivers.

3. FIELD AND LABORATORY INVESTIGATION PROCEDURE:

Some four samples boreholes and adjacent to the borings four dynamic cone penetration tests were carried out during the course of the field work. A Bombardier mounted continuous hollow stem auger was used to advance the holes, taking samples at frequent intervals. The cones and split-spoon samples were driven by a 140 lbs. hammer, falling freely a distance of 30 inches. The number of hammer blows required to advance the sampler 1 ft. into the soil is marked as penetration "N" value. Soil samples were visually examined and identified upon recovery and again in the laboratory. A few laboratory tests of natural moisture contents and grain-size analyses were performed on representative samples, to substantiate the physical properties of the soil specimens.

Field and laboratory test results are plotted on the accompanying borelogs, while the locations and elevations of the borings as well as a stratigraphical profile are marked on Drawing #72-11042A in the Appendix.

4. SUBSOIL CONDITIONS:

Granular type subsoil was encountered in every borehole, extending to the bottom of holes at some 42.8 ft. below ground level (approximate elevation 1020 ft). In Boreholes #1 - #3, the uppermost 17-25 ft. layer was identified to be gravelly sand to sandy gravel with traces of silt. In Borehole #4, this layer was noted to extend to the bottom of the hole (elevation 1028 ft.). The natural moisture contents of the gravelly sands range from 3% to 10%. A typical sample within this stratum would contain 5-8% silt size particles, the remainder being gravel and sand. Penetration resistances generally increase with depth, corresponding to loose relative density within the surficial 3-4 ft. and dense to very dense relative density further down.

Underlying the gravelly sands and sandy gravels in Boreholes #1 - #3, a deposit of fine sandy silts with traces of clay and gravel were observed, extending to the bottom of borings. Very high penetration resistances were obtained within these layers, "N" values usually exceeding 100 blows per ft. The natural moisture contents of the silts averaged just above 10%, the grain-size analyses yielded some 9% gravel size, and 6-7% clay size particles, the rest being fine sand and silt.

The equilibrium groundwater levels in the borings were established to be between elevation 1048 ft. and elevation 1051 ft., some 14-16 ft. below ground surface.

5. DISCUSSION AND RECOMMENDATIONS:

5.1) General:

It is proposed to build a five span subway structure at the future crossing of the C.N.R. tracks over the relocated Paisley Road in the City of Guelph. The railway grades at the crossing will remain practically unchanged, while the grades of Paisley Rd. are designed to be between elevation 1043 ft. and elevation 1046 ft., necessitating a cut of some 22-25 ft. depth. It is assumed that perched abutments will be built.

Subsoil at the site was found to consist of deposits of gravelly sands, sandy gravels and fine sandy silts. Beneath a 3-4 ft. thick loose surficial layer, the relative density of the strata is dense to very dense.

5.2) Foundations:

The dense to very dense granular soils are competent load bearing materials and as such they are suitable to support the piers as well as the abutments on spread footings.

Spread footings under the perched abutments may be placed at or below elevation 1058 ft., using a safe design load of 3 t.s.f. on the footing bases. Spread footings under the

piers may be placed 4 ft. below finished ground. It is estimated that the base of such footings will be between elevation 1038 ft. and elevation 1041 ft. Safe design loads of 4 t.s.f. may be employed on the footings, constructed at or below elevation 1041 ft. The granular soils, particularly the fine sandy silts are susceptible to conditions of unbalanced hydrostatic head. Since the footing excavations will extend some 10-12 ft. below the groundwater level, quick conditions at the base of the excavations will occur. In order to eliminate "boiling" of the base, a dewatering scheme will be necessary for the excavations.

5.3) Approach Cuts:

No stability problems are foreseen for the approach cuts above the prevailing groundwater levels, provided that they are built with 2 horizontal to 1 vertical slopes.

Because of the permeable nature of the subsoil, seepage is likely to occur along the portion of the slopes below the groundwater level. The seepage forces will naturally cause unstable conditions, consequently remedial measures will be necessary. It is recommended that subdrains be built, consisting of suitable sized perforated pipes at the toes of the slopes, with the pipe inverts at a sufficient depth for frost protection (4 ft.). The pipes should be backfilled with granular material.

6. MISCELLANEOUS:

The field investigation carried out between March 20 and 24, 1972, was supervised by Mr. J. Bangs, Project Foundation Engineer.

The equipment used was owned and operated by P.V.K. Drilling Company, Burford, Ontario.

This report was prepared by Mr. A. K. Barsvary,
Senior Foundation Engineer, and reviewed by Mr. K. G. Selby,
Supervising Foundation Engineer.

A. K. Barsvary

A. K. Barsvary, P. Eng.



K. G. Selby

K. G. Selby, P. Eng.

AKB/ao
April 13/72

APPENDIX I

FOUNDATION SECTION

CHECKED BY 

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT ———— w_L PLASTIC LIMIT ———— w_P WATER CONTENT ———— w				BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.				WATER CONTENT %					
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE				w_P ———— w ———— w_L 10 20 30					
1061.7	Ground Level														P.C.F.	GR. SA. SI. CL.
0.0																
	Gravelly sand, traces of silt		1	SS	7	1060										
			2	SS	10											
			3	SS	32											
			4	SS	34											
	Loose to Very Dense		5	SS	38	1050										27 65 (8)
			6	SS	25											
	Brown		7	SS	67											
			8	SS	27	1040										
1039.7	Sandy silt, traces of clay & gravel.															
25.0	Very Dense		9	SS	100	9"										9 33 52 6
1034.7																
30.0	Gravelly sand, traces of silt.		10	SS	100	1030										
	Very Dense		11	SS	150											
1024.7																
1021.9	Silt, traces of gravel		12	SS	100	3"										
42.8	End of Borehole															

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 2


FOUNDATION SECTION

JOB 72-11042 LOCATION Co-ords. 15,818,306 N: 794,396 E. ORIGINATED BY JB
W.P. 109-68-11 BORING DATE March 21, 1972 COMPILED BY AKB
DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT										
							20	40	60	80	100						
							SHEAR STRENGTH P.S.F.					WATER CONTENT %					
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					w_p — w — w_L 10 20 30					
1063.1	Ground Level																
0.0																	
	Gravelly sand to sandy gravel, traces of silt		1	SS	11	1060							○				
			2	SS	25								○				
			3	SS	56								○				
	Compact to Very Dense		4	SS	100/9"	100/9"							○				
			5	SS	52	1059							○				
			6	SS	87								○				
			7	SS	33												
	Brown																
1038.1			8	SS	46	1040							○				
25.0	Fine sandy silt, traces of clay & gravel.		9	SS	100/5"								○				
	Very Dense		10	SS	100/7"	1030							○				
	Grey		11	SS	100/4"								○				
1020.3			12	SS	100/3"								○				
42.8	End of Borehole																

9 21 63 7

FOUNDATION SECTION

JOB	72-11042	LOCATION	Co-ords. 15,818,331 N; 794,436 E.	ORIGINATED BY	JB
W.P.	109-68-11	BORING DATE	March 22, 1972	COMPILED BY	AKB
DATUM	Geodetic	BOREHOLE TYPE	Hollow Stem Auger	CHECKED BY	

[illegible]

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 :-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
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
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
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 (YOUNG'S 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

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. A. G. Stermac
Principal Foundation Engineer
Foundation Office
West Bldg., Downsview
ATTENTION: Mr. K. G. Selby
Assistant Foundation Engineer
OUR FILE REF.

FROM: Structural Planning
Southwestern Region

DATE: February 26, 1973

IN REPLY TO

SUBJECT: W.P. 109-68-11, Bridge Site 35-409
C.N.R. Subway #2
Paisley Road Revision Sta. 104 + 50.47
District 3, Stratford

72-11-042

Enclosed please find one print of a General Layout Drawing
AA-940-50.45-1.1, Revision B, prepared by the C.N.R. for
the above noted structure.

May we please have your comments as soon as possible.

S. Jants

S. Jants
Structural Planning Technician

SJ:sz
Enc.

cc F. K. Leighton

No comments

TRC Mar 2/73



FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P. ...109-68-11...
W.O.72-11042...

Foundations Report by:G. ALLEN.....
Review of Design Drawings by:A. PRAKASH.....
Design Drawing No.'s:AA-940-50.45-1, 1 B
.....

1. Does footing design comply with our report or subsequent memos? Yes
2. If answer to 1. is 'No'; is present design acceptable? -
3. Has sufficient field work been done? Yes
4. Are estimated pile lengths shown on Drawings correct? If not, make a new list. -
5. If excavation of unstuitable soil is recommended, is this shown on drawings? -
6. Are approaches designed in accordance with our report? Check slopes and berm lengths. Yes
7. Do you anticipate any construction problems? i.e. dewatering, stability of temporary slopes or excavations. NO
8. Summarize your comments; on separate sheet is necessary.

Drawings Received ...Feb 28.....1973..
ReviewedMar...2.....1973..

SignedAPRAKASH.....

Mr. B. J. McKenna,
Structural Location Engineer,
Structural Planning Office,
Southwestern Region,
London, Ontario.

Foundations Office,
Design Services Branch,
West Bldg., Downsview.

March 23, 1973.

W.P. 109-68-11 W.O. 72-11042
C.N.R. Subway #2, Paisley Road Revision,
City of Guelph, District #3, Stratford

We have reviewed the general layout drawing for the above project and find it to be in accordance with the recommendations contained in our foundation investigation report.

We have no comments to make.

K.G. Selby

KGS/ao

K. G. Selby,
SUPERVISING FOUNDATIONS ENGINEER.

CS

72-11042

DOWN LOND 20 MAY 15 1974 4:40 PM

MR K G SELBY GEOTECHNICAL OFFICE

RE: W P 109-68-11, BRIDGE SITE 35-409

MAY 16 8 40 AM '74

00332

C N R SUBWAY NO 2

HANLON EXPRESSWAY

WOULD YOU KINDLY SEND US A COPY OF THE FOUNDATION INVESTIGATION
REPORT W O 72-11042 FOR THE ABOVE NOTED STRUCTURE.

MR A P WAIT STRUCTURAL PLANNING OFFICE

CS

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