

# 66-F-40

W.P. #110-66-7

PROPOSED

COMMUTER STN.

PEDESTRIAN

UNDERPASS

MIMICO

MEMORANDUM

CC: GEN. FILES

23-66-279  
W.P. 110-66-1

TO: Mr. W. D. Ratz,  
Superintendent of Land Surveys,  
Right-of-Way Division,  
Admin. Bldg.

FROM: Foundation Section,  
Materials and Testing Division,  
Room 107, Lab. Bldg.

ATTN: Mr. B. Wright,  
Drafting Chief Inspector.

DATE: May 24, 1966

MAY 31 1966

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
Proposed Commuter Station  
Pedestrian Underpass - Mimico  
District #6 (Toronto)

W.J. 66-F-40 -- W.P. 110-66-7

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

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

AGS/MdeF  
Attach.

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

cc: Messrs. W. D. Ratz (4)  
J. C. Thatcher  
T. J. Kovich  
Foundations Office  
Gen. Files ✓

FOUNDATION INVESTIGATION REPORT  
For  
Proposed Commuter Station  
Pedestrian Underpass - Mimico  
District #6 (Toronto)  
W.J. 66-F-40 -- W.P. 110-66-7

A request to investigate the foundation conditions at the location of the above proposed underpass, was received by this Section in a memo dated April 15, 1966, from Mr. B. Wright, Chief Inspector of Surveys. Subsequently an investigation, consisting of two sampled boreholes, was carried out at this site. Presented in this report are the field data and our recommendations pertaining to the structure foundations.

The site is generally flat and well-drained. The surrounding area is heavily residentially developed.

A 3-ft. surface layer of fill, consisting of a heterogeneous mixture of sand, gravel, clayey silt and rubble, overlies the entire site. This fill is underlain by a stratum of clayey silt with sand, extending to bedrock. The thickness of the stratum varies from 3 ft. in borehole 1 to 6.5 ft. in borehole 2. Standard Penetration test (N) values in the stratum varied from 8 blows/ft. to 19 blows/ft., from which a consistency of stiff to hard may be estimated. The shale bedrock which underlies the clayey silt stratum was found to be weathered in its upper portions. The shale was penetrated by the auger and by split-spoon sampler to a depth of 3 ft. (to elev. 290.7) in borehole 1, and 1 ft. (to elev. 294.2) in borehole 2. The sound shale below these elevations was not proved. Water level observations in the boreholes carried out during the time of the investigation, reveal the ground water level to correspond approximately to the bottom of the fill layer.

cont'd. /2 .....

At this time the details of the underpass structure are not available. However, whatever type of structure is adopted, it should not be placed in the fill material. If footings are located within the clayey silt with sand stratum, a safe bearing capacity of 1 t.s.f. may be used. If a larger capacity is required, the footings should be extended to sound shale bedrock, in which case a safe load of 10 t.s.f. may be used for design. In either case, the footing excavations should be kept dry prior to placing of the concrete.

The field investigation, done in May 1966, together with the preparation of this report, was undertaken by Mr. R. Magi, Project Foundation Engineer. The investigation was carried out under the general supervision of Mr. M. Devata, Senior Foundation Engineer, who also reviewed this report.

Equipment was owned and operated by Dominion Soil Investigation Ltd. of Toronto.

May 1966

APPENDIX I

## 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

$\gamma$	UNIT WEIGHT OF SOIL (BULK DENSITY)
$\gamma_s$	UNIT WEIGHT OF SOLID PARTICLES
$\gamma_w$	UNIT WEIGHT OF WATER
$\gamma_d$	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
$\gamma'$	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
$\tau_f$	SHEAR STRENGTH
$c'$	EFFECTIVE COHESION INTERCEPT
$\phi'$	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
$\mu$	COEFFICIENT OF FRICTION
$S_t$	SENSITIVITY

## GENERAL

$\pi$	= 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
$\sigma$	NORMAL STRESS
$\bar{\sigma}$	NORMAL EFFECTIVE STRESS ( $\bar{\sigma}$ IS ALSO USED)
$\tau$	SHEAR STRESS
$\epsilon$	LINEAR STRAIN
$\gamma$	SHEAR STRAIN
$\nu$	POISSON'S RATIO ( $\mu$ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
$\eta$	COEFFICIENT OF VISCOSITY

## EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
$\delta$	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
$K_0$	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
$\beta$	ANGLE OF SLOPE TO HORIZONTAL

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

# RECORD OF BOREHOLE NO.1

FOUNDATION SECTION

JOB 66-F-40 LOCATION See DWG 66-F-40A ORIGINATED BY RM  
W.P. 110-66-7 BORING DATE May 5, 1966 COMPILED BY RM  
DATUM Geodetic BOREHOLE TYPE Penn Auger CHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					Wp — W — WL WATER CONTENT %				
299.3	Ground Level															
0	Fill															
296.3																
3	Clayey Silt with Sand		1	SS	10	295										
293.5	Stiff															
5.8	Weathered Shale		2	SS	119											
	Bedrock															
290.7	Probably Sound Shale		3	SS	50/0*	290										
8.6	End of Borehole															

W.L. Elev  
297.3



DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

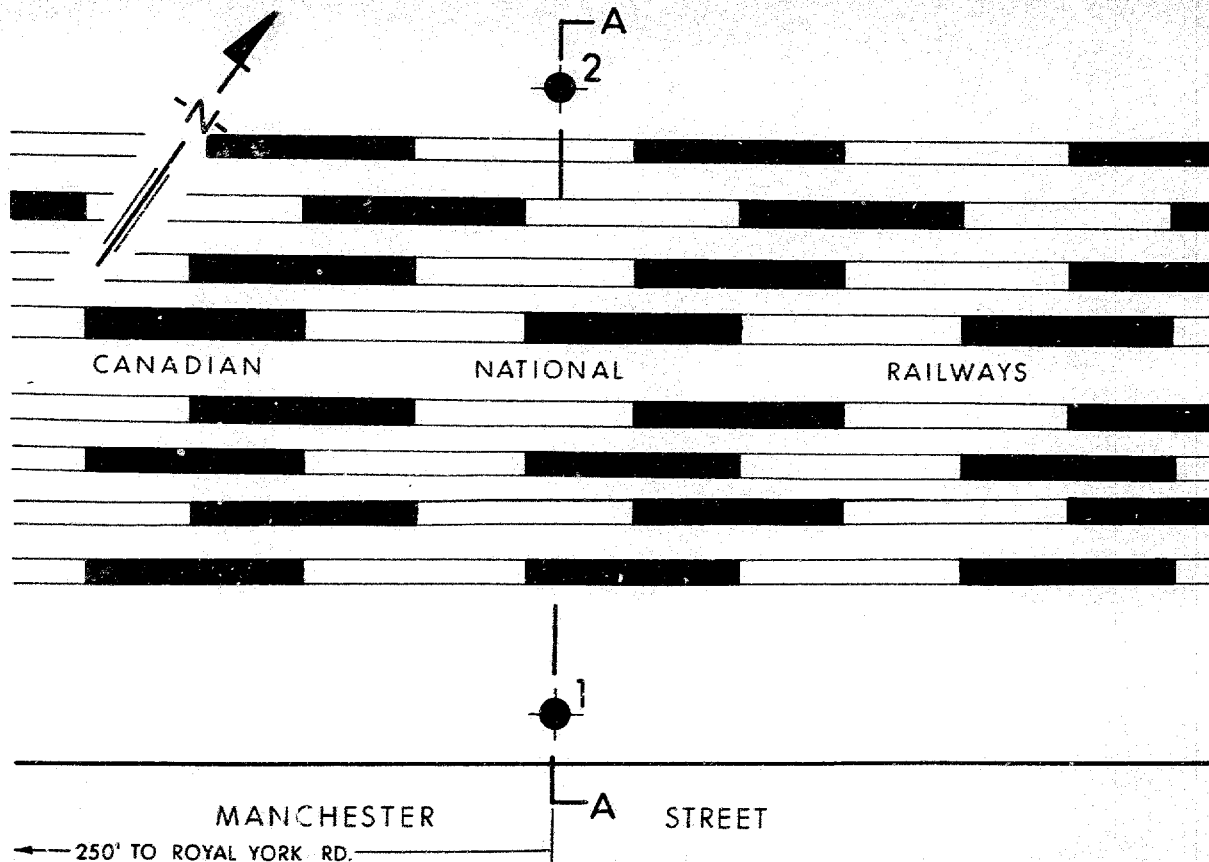
# RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

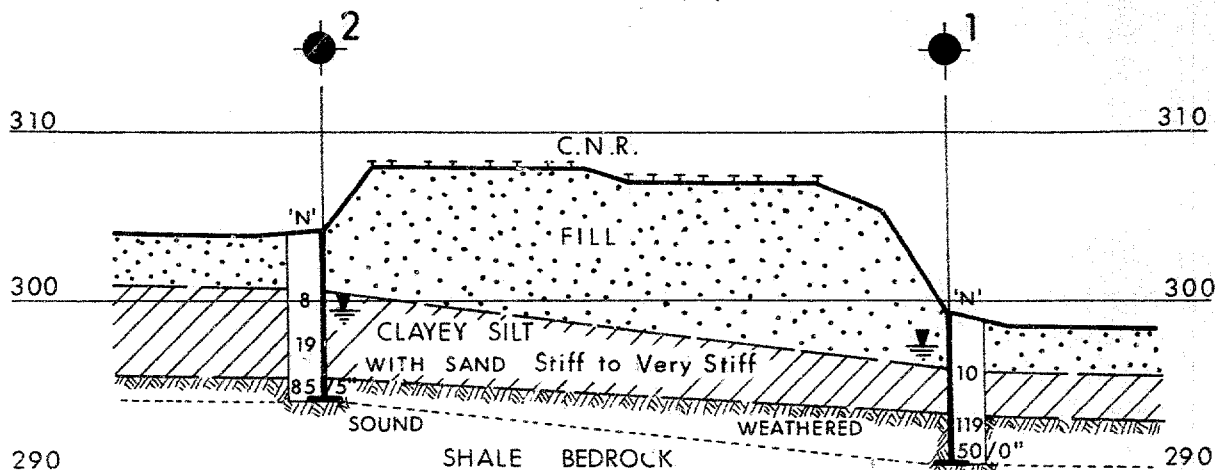
JOB 66-F-40 LOCATION See DWG 66-F-40A ORIGINATED BY RM  
W.P. 110-66-7 BORING DATE May 5, 1966 COMPILED BY RM  
DATUM Geodetic BOREHOLE TYPE Penn Auger CHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W WP — W — WL WATER CONTENT %				BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.										
304.1 0	Groundlevel																
	Fill																
300.6 3.5	Clayey Silt with Sand		1	SS	8	300											
	Stiff to Very Stiff		2	SS	19												
295.4 8.7	Weathered Shale		3	SS	85/5	295											
294.2 9.9	Probably sound shale																
	End of Borehole					290											

W.L. Ele  
299.6



PLAN  
SCALE 1 in. = 40 ft.



SECTION A-A

SCALES HOR. 1 in. = 40 ft.  
VERT. 1 in. = 10 ft.

REF. NO. M-4114



DEPARTMENT OF HIGHWAYS  
MATERIALS and  
TESTING  
DIVISION

ONTARIO

PROPOSED PEDESTRIAN UNDERPASS  
MIMICO COMMUTER STATION  
CANADIAN NATIONAL RAILWAYS

W.P. 110-66-7

DIST. 6

JOB NO. 66-F-40

DATE 27 MAY 1966

APPROVED *M. Levata*

DRAWING NO. 66-F-40A

## MEMORANDUM

To: Mr. A. Rutka  
Materials and Testing Engineer  
Materials and Testing Division

From: B. Wright

Attention: Mr. A. Stermac

DATE: April 15, 1966

OUR FILE REF.

IN REPLY TO

## SUBJECT:

Commuter Rail Project  
Mimico Station

WP 110-66-7

Enclosed herewith are two plans of the above mentioned site.


- (1) shows the soils tests required by DeLeuw Cather for the design and construction of a parking lot.
- (2) shows the soils tests required by the C.N.R. for the design and construction of pedestrian underpasses under the tracks.

The final reports can be compiled in one booklet to serve both organizations. Please forward three copies of the report to the writer for distribution.

The C.N.R. recommend that one of their trackmen be in attendance during the drilling operation on the railway right-of-way to eliminate any liability to this Department. If you want the trackmen, please contact Mr. Harry Keire at 365-3577 twenty-four hours in advance of your drilling time.

As I will be away from my office until May 1st, if you have any enquiries to make please contact Mr. W.T. Howard at local 2007.

BW:ld  
Encl:

  
B. Wright  
Chief Inspector of Surveys

cc Mr. W.T. Howard

Outside 813

Inside 791

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22 mi.