

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 30MS-106

DIST. 4 REGION Central

W.P. No. 125-66-16

CONT. No. 78-104

W. O. No. \_\_\_\_\_

STR. SITE No. 10-287

HWY. No. \_\_\_\_\_

LOCATION W-N Ramp Hwy. 403

Structure over Ford Drive, QEW/  
Ford Drive /403 Interchange

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 3

REMARKS: documents to be unfolded  
before microfilming

ENGINEERING MATERIALS OFFICE  
SOIL MECHANICS SECTION

WP 125-66-16

DIST 4

HWY 403

STR SITE 10-287

W-N Ramp Hwy. 403 Structure over Ford Drive  
QEW/Ford Drive/ 403 Interchange

DISTRIBUTION

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SAMPLE DISPOSITION NOTICE		
TYPE	DISCARD AFTER	RECOMM. BY
JARS	7705 17	MD
TUBES		
ROCK CORES	to be removed of contract	MD

FOUNDATION INVESTIGATION REPORT  
For

W-N Ramp Hwy. 403 Structure over Ford Drive  
QEW/Ford Drive/ 403 Interchange  
W.P. 125-66-16 Site 10-287  
District 4, Hamilton

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INTRODUCTION

This report contains the results of a foundation investigation carried out at the site of the above mentioned project during the period of March 21, 1977 to March 23, 1977. The fieldwork consisted of 4 sampled boreholes advanced by employing solid stem augers and BXL coring techniques. The boreholes ranged in depth from 29 to 31 feet below the ground level.

SITE DESCRIPTION AND GEOLOGY

The site is located just east of the QEW approximately 900 feet south of the existing QEW Underpass at Ford Drive in the Regional Municipality of Halton, Town of Oakville. The land immediately adjacent to the site slopes gently south to Joshuas Creek located some 500 feet to the south.

The land is used for farming and light industry with some unproductive, tree covered land along Joshuas Creek.

Physiographically the site lies on the southern fringe of the region referred to as the South Slope. This region is a strip of land bounded by the Iroquois Plain on the south and the Peel Plain on the north and extends from the Niagara escarpment to the Trent River. The region is characterized by a shallow till overlying shale of the Queenston and Dundas Formation of the Upper Ordovician age.

SUBSURFACE CONDITIONS

Generally, a 7 to 8 foot layer of clayey silt was found to overly 2 to 3 feet of moderately weathered grey shale underlain by sound shale of the Dundas Formation. Detailed descriptions of the various soil and rock types encountered in each borehole are given in the Record of Borehole Sheets. The estimated stratigraphical profile and section shown on Drawing #1256616-A are based upon this information. From ground level downwards, the various soil types encountered are as follows:

### Clayey Silt, Some Sand, Trace of Gravel

Immediately below a thin cover of topsoil, a 7 to 8 foot thick stratum of cohesive soil consisting of clayey silt with some sand and traces of gravel was encountered. In boreholes 2, 3 and 4, the upper 4 to 6 feet of this cohesive stratum is in a reworked condition due to previous highway construction activities.

The results of the Atterberg Limit tests as determined by laboratory testing are shown on the Plasticity Chart, Figure 1 and are listed below:

	<u>Range</u>	<u>Average</u>
Natural Moisture Content (W) %	14 - 18	16
Liquid Limit (W <sub>L</sub> ) %	27 - 34	30
Plastic Limit (W <sub>p</sub> ) %	17 - 20	18
Plasticity Index (I <sub>p</sub> ) %	9 - 15	11

The Atterberg Limits indicate that the cohesive stratum is generally inorganic and of low plasticity.

Two typical grain size distribution curves from this stratum are shown on Figure 2.

The Standard Penetration Test results ranged from 7 to 30 blows/ft. in the reworked zone, elsewhere, they varied from 32 to 44 blows/ft. indicating that the consistency of the reworked zone varies from firm to very stiff, whereas the consistency of the cohesive deposit elsewhere is hard.

### Bedrock

Underlying the cohesive stratum is shale bedrock which was proven to a maximum depth of 23 feet. The bedrock is a grey shale with intermittent layers of limestone and shaly limestone. The upper 2 to 3 feet of the bedrock is moderately weathered.

The rock quality designation (RQD) classification gives an indication of the quality of the bedrock with respect to the number of fractures and amount of softening or alteration of the rock mass. The RQD is the total length of rock core pieces of 4 or more inches in length expressed as a percentage of the total length of core drilled. The RQD for the rock core varies from 0 to 75%, generally increasing with depth. These values indicate a rock quality of very poor to fair due to the presence of thin horizontal bedding planes.

A detailed description of the bedrock is given on the individual Report of Borehole Sheets.

#### GROUNDWATER

The groundwater level conditions across the site were observed by taking readings in the open boreholes during and after the completion of the field investigation. The results of the readings are shown on the Record of Borehole Sheets, as well as on Drawing #1256616-A.

The observations indicate that the groundwater levels vary between elevations 418 and 423, which corresponds to levels 4 to 6.5 feet below the existing ground surface.

## DISCUSSION AND RECOMMENDATIONS

It is proposed to construct a new complex interchange connecting QEW to Hwy. 403 Link and to a re-aligned Ford Drive. Two structures will be required to carry QEW detour traffic and ultimately Hwy. 403 W-N Ramp and N-W Ramp, over Ford Drive.

The proposed profile grade of the W-N Ramp at station 673+37 is about elevation 428 and on a 3% grade increasing to the north. The profile grade of the proposed Ford Drive is to be at approximately elevation 405, therefore requiring a 17 to 24 foot cut at the structure location.

Present proposals call for a 99 foot single span, three lane bridge with closed type abutments for the Ford Drive Underpass at W-N Ramp.

### Structure Foundations

The closed abutment for the proposed Ford Drive Underpass at W-N Ramp can be supported on spread footings located within the sound shale and may be designed for a maximum bearing pressure of upto 10 tsf. A minimum earth cover of 4 feet should be provided to the underside of the footings, since the shale is considered susceptible to frost action. To prevent softening of the shale due to weathering at the footing elevation, it should be covered with 3 inches of mass concrete immediately after the completion of the excavation.

No dewatering problems are anticipated for the construction of the abutment footings. Any minor seepage or surface runoff into the excavations can be handled by pumping from sumps.

### Other Considerations

For estimating the earth pressure of granular backfill on the abutment walls, a coefficient of active earth pressure of  $K_a = 0.33$  may be used if some movement at the top of the wall is permitted. If no movement at the top of the wall is anticipated a coefficient of earth pressure at rest  $K_o = 0.5$  may be used for design purposes.

To estimate the horizontal resistance to sliding between rough concrete and the shale, a coefficient of friction of 0.55 may be used.

In order to relieve the build up of hydrostatic pressure behind the abutment wall the structure should be backfilled with free draining granular material and provided with weepholes or other types of drainage conduit.

Ford Drive


As mentioned previously, a cut of up to 24 feet deep will be required in the vicinity of the structure in order to reach the new grade of proposed Ford Drive. This cut will be made through the cohesive clayey silt and into the shale bedrock.

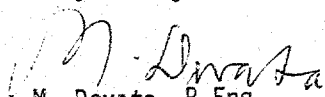
The shale is susceptible to weathering and erosion, therefore, the cuts should be treated as earth cuts and constructed with 2:1 slopes. It is further recommended that the cut slopes be covered with topsoil and sodded according to current MTC standards.

MISCELLANEOUS

The fieldwork for this investigation was carried out under the supervision of Mr. C.T. Johnson, Project Engineer. The equipment used was owned and operated by Geocon Ltd., Toronto, Ontario.

This report was written by Mr. C.T. Johnson and reviewed by Mr. M. Devata, Supervising Engineer.

  
C.T. Johnson  
Project Engineer

  
M. Devata, P.Eng.  
Supervising Engineer

CTJ/MD/1f  
May, 1977

## FOUNDATION REQUEST

In a memorandum dated February 16, 1977, Mr. G.C.E. Burkhardt of the Structural Planning Office requested the Soil Mechanics Section to prepare a Foundation Investigation Report for the Ford Drive Underpass at W-N Ramp.

## FIELD AND LABORATORY INVESTIGATION PROCEDURES

A total of 4 boreholes were put down using a muskeg mounted auger machine equipped with solid stem augers and rock coring equipment.

The locations and elevations of the boreholes were surveyed by personnel from the Central Regional Surveys and Plans Section.

Disturbed soil samples were recovered by means of a 2 inch O.D split spoon sampler driven in accordance with the specifications of the Standard Penetration Test. Rock core of the bedrock was obtained by coring with BXL diamond bits.

The samples were visually examined and identified in the field and again in the laboratory. Following this examination, laboratory testing was carried out on selected representative samples of the cohesive stratum to determine the natural moisture content, Atterberg Limits and grain size distribution.

The rock core was examined and logged in detail in the laboratory by Mr. B.K. Glassford, Geologist.



APPENDIX

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 1

WP 125-66-16 LOCATION Co-ords N 15 803 724; E 954 067 ORIGINATED BY CTJ  
DIST 4 HWY 403 BORING DATE March 23, 1977 COMPILED BY CTJ  
DATUM Geodetic BOREHOLE TYPE Solid Stem Auger, BXL Core CHECKED BY RS

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$ $w_p$ — $w$ — $w_L$ WATER CONTENT % 10 20 30	UNIT WEIGHT $\gamma$	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	N° VALUES		20	40	60	80	100			
425.1	Ground Level													
0.0	Clayey silt, some sand, trace of gravel Very Stiff Reworked		1	SS	30	420								7 22 51 20
417.2			2	SS	16									
415.7	(Weathered)		3	SS	31									
10.0	(Sound)		4	BXL	80% REC									
	Shale Bedrock (See Below)*		5	BXL	90% REC	410								RQD 9%
			6	BXL	100% REC	400								RQD 73%
393.8														
31.3	End of Borehole					390								
	*Intermittent shale, shaley limestone & limestone, fine texture, soft to hard bedding is thin and horizontal, light grey color, shale is fissile with Limestone (hard, fine texture, light grey, fossiliferous, horizontal bedding) seams from 22'0" to 22'8" 27'0" to 28'0"													

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 2

WP 125-66-16 LOCATION Co-ords. N 15 803 823; E 954 078 ORIGINATED BY CTJ  
DIST 4 HWY 403 BORING DATE March 21, 1977 COMPILED BY CTJ  
DATUM Geodetic BOREHOLE TYPE Solid Stem Auger, BXL Core CHECKED BY RS

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$			UNIT WEIGHT $\gamma$	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	VALUES		20	40	60	80	100	$w_p$	$w$	$w_L$		
429.4	Ground Level															
0.0	Clayey silt, some sand, trace of gravel, occ. organic inc. Firm Reworked		1	SS	7											
421.9	Hard		2	SS	44											
7.5	(Weathered)		3	SS	79											
418.9	(Sound)		4	SS	153	420										
10.5	Shale Bedrock (See Below)*		5	BXL	63% REC											RQD 0%
			6	BXL	98% REC	410										RQD 16%
			7	BXL	92% REC	400										RQD 57%
399.4	End of Borehole															
30.0	*Intermittent shale, shaley limestone & limestone, soft to hard, fine texture, light grey colour, shale is fissile, thin bedding - horizontal with limestone, (med. hard to hard, fine texture light grey colour, fossiliferous) seams from 13'8" to 14'4" 20'10" to 21'7" 22' 8" to 24'5" 25' 1" to 26'4"					390										

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 3

WP 125-66-16 LOCATION Co-ords N 15:803 724; E 954 012 ORIGINATED BY CTJ  
 DIST 4 HWY 403 BORING DATE March 23, 1977 COMPILED BY CTJ  
 DATUM Geodetic BOREHOLE TYPE Solid Stem Auger, EXL Core CHECKED BY RS

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$ $w_p$ — $w$ — $w_L$ WATER CONTENT % 10 20 30	UNIT WEIGHT $\gamma$	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100			
422.0	Ground Level													
0.0	Clayey Silt, some Sand, Trace of Gravel	Red	1	SS	46	420								
414.5	Hard	Grey	2	SS	32									
412.5	(Weathered)		3	SS	112	110"								
9.5	(Sound)		4	BXL	91% REC	410								RQD 30%
	Shale Bedrock (See Below)*		5	BXL	100% REC	400								RQD 63%
392.3	End of Borehole					390								
29.7	*Intermittent shale, shaly limestone & limestone, fine texture, soft to med. hard, light grey, shale is fissile, thin bedding with Limestone (med. hard, fine texture, light grey, fossiliferous) seams from 12'8" to 13'6" 19'6" to 20'2" 25'3" to 26'2"													

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO

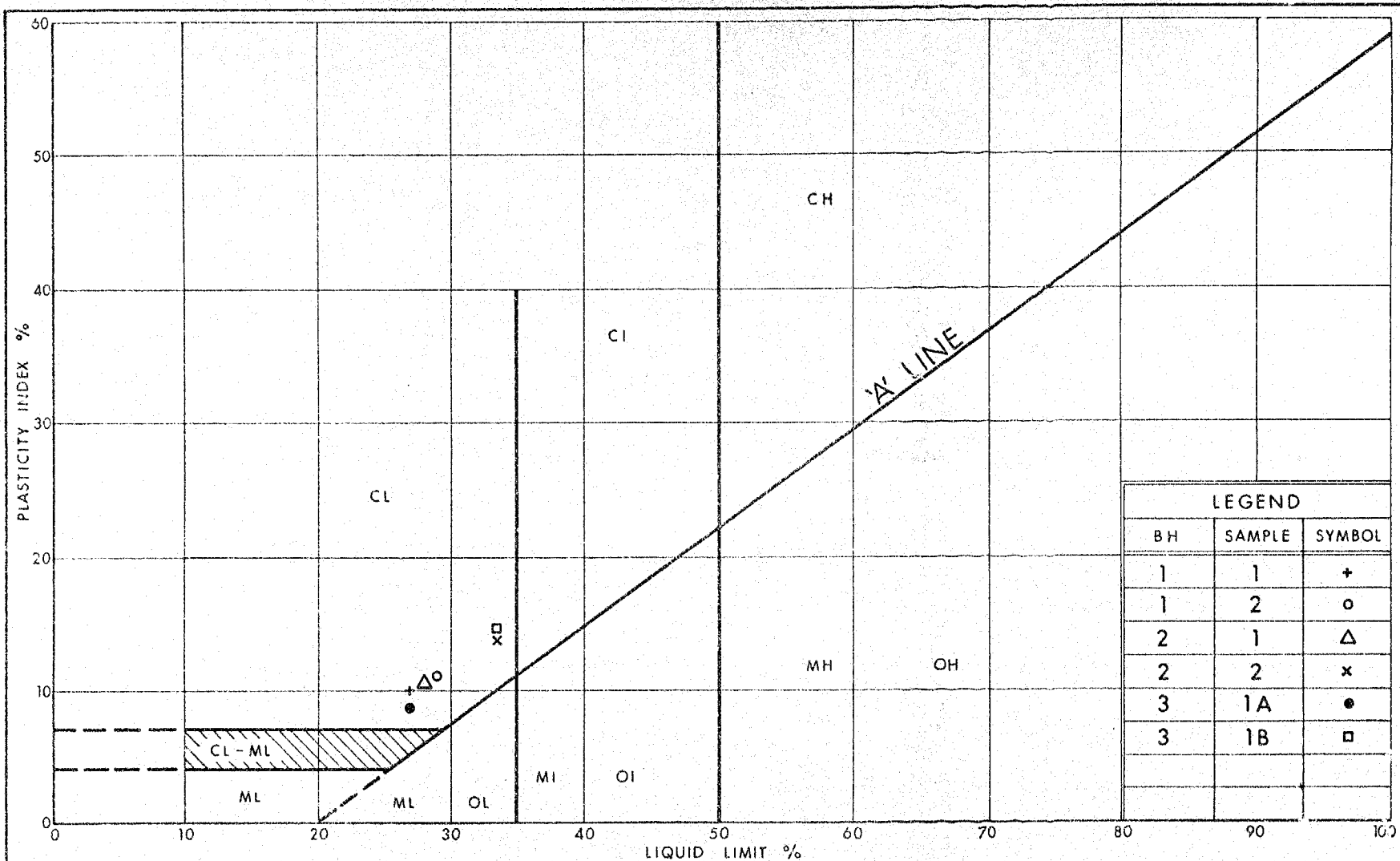
HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 4

WP 125-66-16 LOCATION Co-ords N 15 803 823; E 954 023 ORIGINATED BY CTJ  
 DIST 4 HWY 403 BORING DATE March 22, 1977 COMPILED BY CTJ  
 DATUM Geodetic BOREHOLE TYPE Solid Stem Auger, BXL Core CHECKED BY RS

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — $w_L$ PLASTIC LIMIT — $w_p$ WATER CONTENT — $w$			UNIT WEIGHT $\gamma$	REMARKS		
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	$w_p$	$w$	$w_L$			10	20
427.1	Ground Level																	
0.0	Clayey Silt, some Sand, trace of gravel (Reworked) Very Stiff		1	SS	16													5 31 39 25
420.0			2	SS	111	8"												
7.1	(Weathered)		3	SS	131	9"												
417.1	(Sound)		4	BXL	84% REC													RQD 25%
10.0	Shale Bedrock (See Below)*		5	BXL	100% REC													RQD 15%
			6	BXL	97% REC													RQD 60%
397.9																		
29.2	End of Borehole																	
	*Intermittent shale, shaly limestone & limestone beds, soft to hard, fine texture, shale is fissile, light grey colour, thin horizontal bedding with Limestone (Hard, fine texture fossiliferous) seams from 11'10" to 12'4" 13'6" to 14'2" 22'2" to 22'6" 23'0" to 23'10" 28'10" to 29'2"					390												

OFFICE REPORT ON SOIL EXPLORATION



Ontario

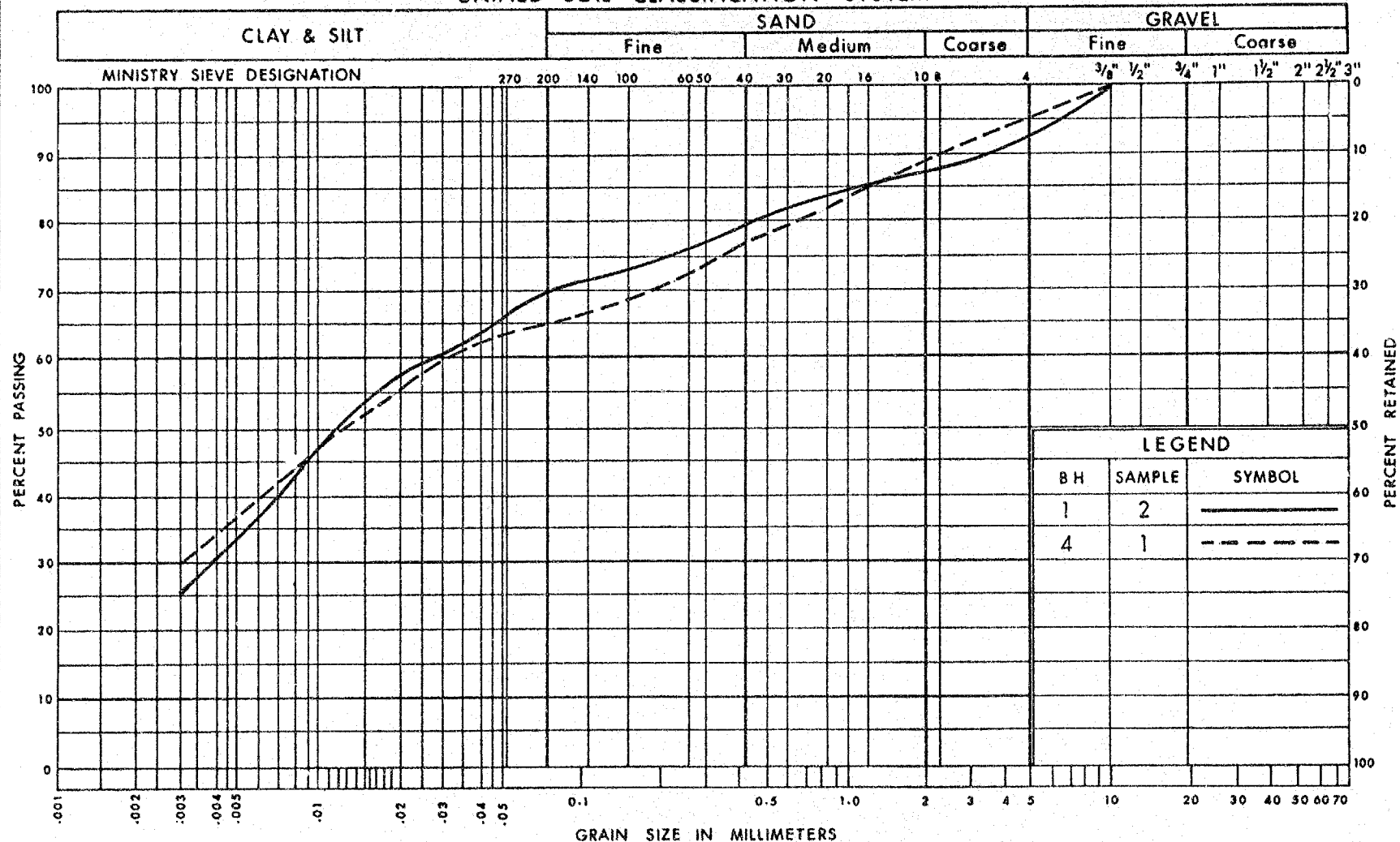
Ministry of  
Transportation and  
Communications

PLASTICITY CHART  
CLAYEY SILT  
SOME SAND, TRACE OF GRAVEL

FIG No 1

W P 125-66-16

## UNIFIED SOIL CLASSIFICATION SYSTEM



Ministry of  
Transportation and  
Communications  
Ontario  
ENGINEERING SERVICES BRANCH

GRAIN SIZE DISTRIBUTION  
CLAYEY SILT  
SOME SAND, TRACE OF GRAVEL

FIG No 2

W P 125 - 66 - 16

## ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

### PENETRATION RESISTANCE

'N' STANDARD PENETRATION RESISTANCE - 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>c LB/SQ.FT</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 250	VERY LOOSE	0 - 4
SOFT	250 - 500	LOOSE	4 - 10
FIRM	500 - 1000	COMPACT	10 - 30
STIFF	1000 - 2000	DENSE	30 - 50
VERY STIFF	2000 - 4000	VERY DENSE	> 50
HARD	> 4000		

TERMS TO BE USED IN DESCRIBING SOILS:-

TRACE < 10% , SOME 10-25% , WITH 25-40% , > 40% SILTY, SANDY, GRAVELLY, CLAYEY ETC.

### TYPE OF SAMPLE

S.S	SPLIT SPOON	T.W	THINWALL OPEN
W.S	WASHED SAMPLE	T.P	THINWALL PISTON
S.T	SLOTTED TUBE SAMPLE	O.S	OESTERBERG SAMPLE
A.S	AUGER SAMPLE	F.S	FOIL SAMPLE
C.S	CHUNK SAMPLE	R.C	ROCK CORE

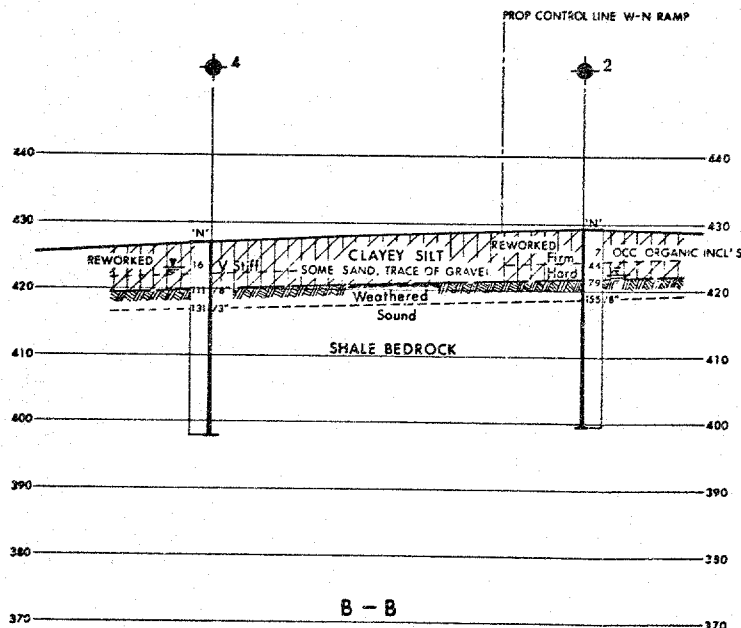
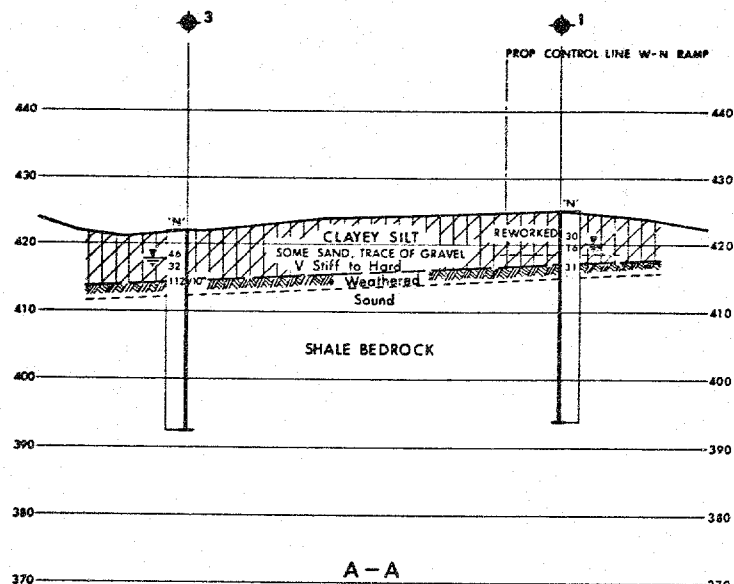
P.H SAMPLE ADVANCED HYDRAULICALLY

P.M SAMPLE ADVANCED MANUALLY

### SOIL TESTS

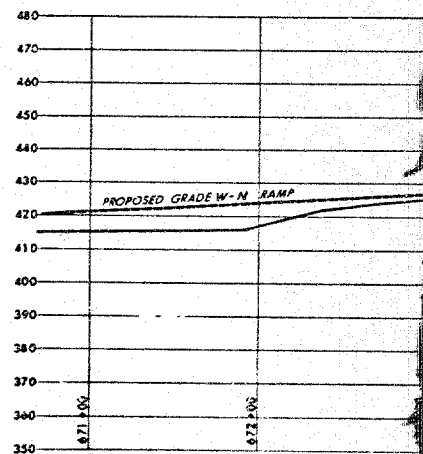
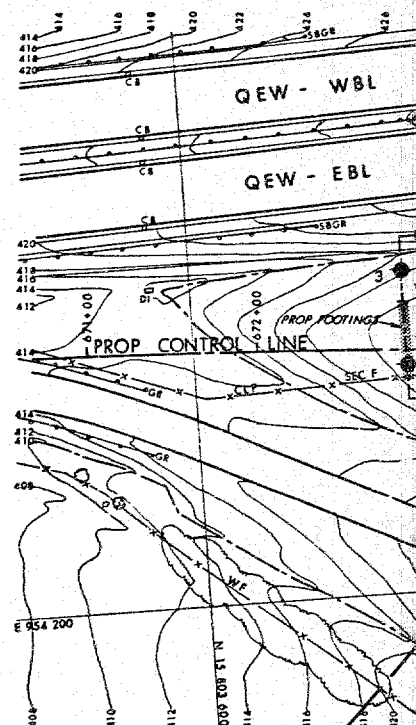
U	UNCONFINED COMPRESSION	L.V	LABORATORY VANE
UU	UNCONSOLIDATED UNDRAINED TRIAXIAL	F.V	FIELD VANE
CU	CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL	C	CONSOLIDATION
CID	" " DRAINED "	S	SENSITIVITY
CAU	" ANISOTROPIC UNDRAINED "		
CAD	" " DRAINED "		





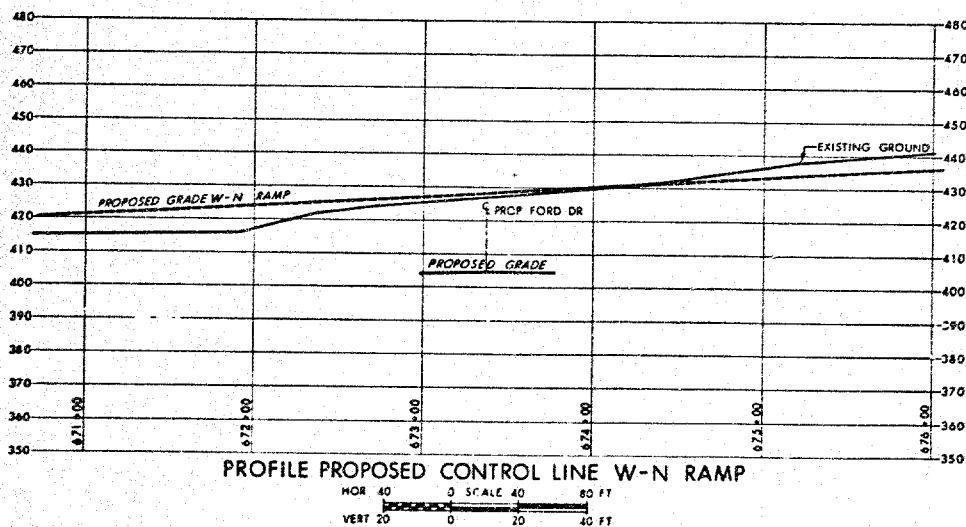
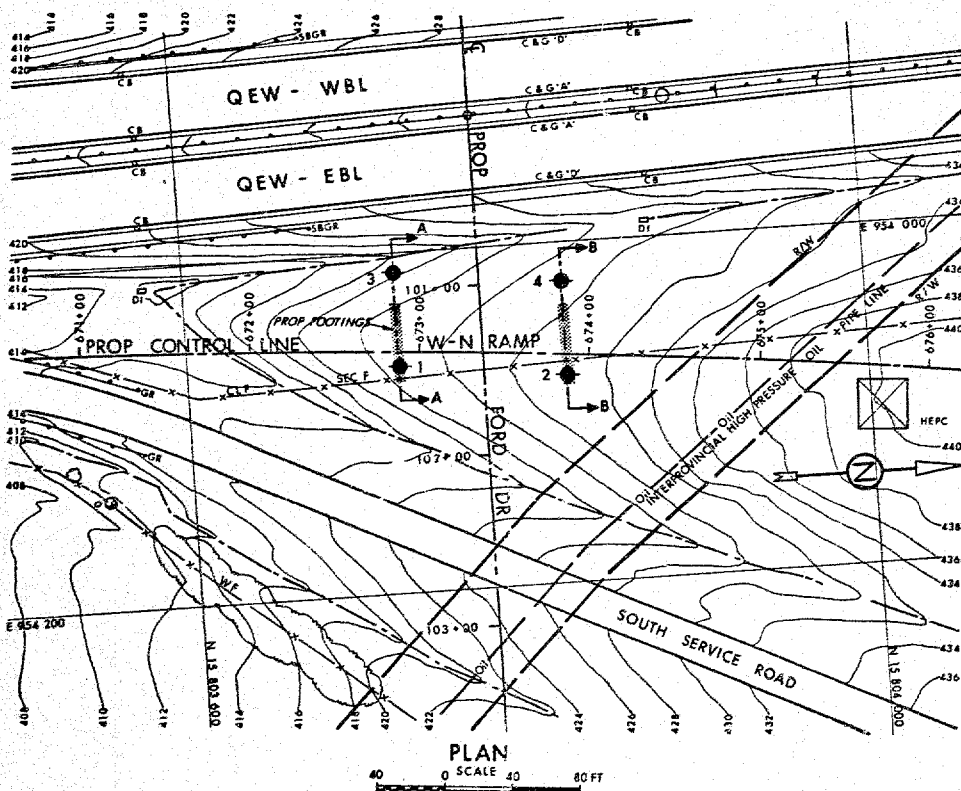
SECTION A-A

10 0 SCALE 10 20 FT



PROFILE PROPOSED

HOR 40  
VERT 20



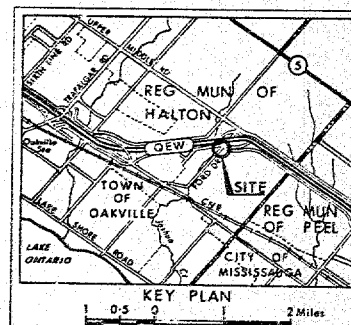
CONT No  
WP No 125-66-16

PROPOSED FORD DRIVE

BORE HOLE LOCATIONS & SOIL STRATA



SHEET



# LEGEND

- Bore Hole
- ⊕ Dynamic Cone Penetration Test (Cone)
- ⊕ Bore Hole & Cone
- ✦ Blows/ft (Std Pan Test 350 ft lbs energy)
- ✦ CONE Blows/ft (60° Cone, 350 ft lbs energy)
- ↓ WL at time of investigation on March 1977

No	ELEVATION	CO-ORDINATES NORTH	EAST
1	425.1	15 803 724	954 067
2	429.4	15 803 823	954 078
3	422.0	15 803 724	954 012
4	427.1	15 803 823	954 023

# NOTE

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore holes the boundaries are assumed from geological evidence.

DATE	BY	DESCRIPTION

PLAN No 403 W-N RAMP  
S. SMD CTJ CHECKED DATE May 4, 1977  
ORGAN 85 CHECKED DATE  
REF No 8-82-QEW-2, Sept 1976  
SHEET 10-287  
No 1256616-A

## ABBREVIATIONS & SYMBOLS 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
$w_S$	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
$S_r$	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
$\sigma'$	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



## Memorandum

To: Mr. C. Mirza  
Head, Soil Mechanics Section  
West Building

From: R.A. Jeffries  
Structural Section  
3501 Dufferin Street

Attention:

Date: February 16, 1977

Our File Ref.

In Reply to

Subject:

Re: Q.E.W./403/Ford Drive Interchange  
Site 24 W.P. 159-75-05  
District 4

A new complex interchange connecting Q.E.W. to Highway 403 Link and to a re-aligned Ford Drive is presently scheduled for 1978. Due to the intricate staging that is required for this above-mentioned interchange and the adjacent and interconnected, Q.E.W./Winston Churchill Blvd. Interchange, the detour scheme necessary for the Q.E.W. traffic will require four structures to be constructed as an advance structure contract.

Also as part of this contract, additional structures (possibly twin cell box culverts) will be required to carry the Q.E.W. and associated ramps over Joshua Ck., possibly on a new alignment slightly north of the existing creekbed, this data will be submitted to your office when available.

Two structures will be required to carry Q.E.W. detour traffic, and ultimately Highway 403 W -N Ramp and N-W Ramp, over Ford Drive. Ford Drive will be relocated to the south and will be in cut, crossing under Q.E.W. At present single span structures, 3 lanes wide are proposed to carry Q.E.W. over Ford Dr.

A Third structure will be necessary to carry Highway 403 W-N Ramp over the North Service Rd.

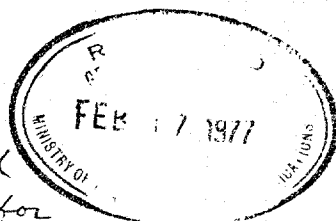
The fourth structure required to complete the detour staging will be Highway 403W-N Ramp over the E-N S Ramp.

Preliminary details of the proposed structure and roadway alignments are indicated on the enclosed plans.

These plans include:

Q.E.W./403/Ford Dr. Interchange sketch plan -- 1 copy  
Ford Dr. Underpass at N-W Ramp --- 2 copies  
Ford Dr. Underpass at W-N Ramp --- 2 copies  
North Service Rd. Underpass at W-N Ramp and E-NS Ramp Underpass at W-N Ramp - 2 copies  
Photographs

*munty* Please advise me  
when individual W.P.'s and  
site numbers are received for  
recording purposes. Also, please tell me if this  
should be recorded as 'one request or four' and  
whether you consider this to be adequate to justify field work.



To complete the interchange to the extent shown on the sketch plan (ultimately two addition ramps may be constructed) at least 6 more structures are to be constructed. The Foundation request for these bridges will be submitted at a later date as part of the main Q.E.W./403/Ford Dr. contract.

Could you please prepare a Foundation Investigate Report of sufficient scope to facilitate the design of the proposed structure for each of the four structures.

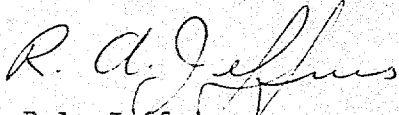
The current schedule calls for a complete Foundation Investigation for the first 4 structures, as follows:

first structure on April 20  
second structure on May 4  
third structure on May 18  
fourth structure on June 1

Individual W.P.'s and Bridge Site No.s will be forwarded to your office as soon as they are assigned.

Should additional clarification and/or details be required, please do not hesitate to call this office.

RAJ:sg  
attch:

  
R.A. Jeffries  
Structural Supervisor  
for:  
G.C.E. Burkhardt  
Head, Structural Section

c,c, W.Roters  
J. Anderson  
R. Fitzgibbon

DOCUMENT MICROFILMS IDENTIFICATION

GEOCRES No. 364 S - 706

DIST 4 REGION CENTRAL

W.P. No. 125-66-16

CONT. No. 78-104

W. O. No. \_\_\_\_\_

STR. SITE No. 10 - 287

HWY. No. \_\_\_\_\_

LOCATION V-N RmPs HWY 403

STRUCTURE OVER FORD DRIVE, GEN/FORD DR/403

INTERCHANGE

OVER-SIGHT PHOTOGRAPH NOT USED. 3 FIELD REPORT

REMARKS: \_\_\_\_\_

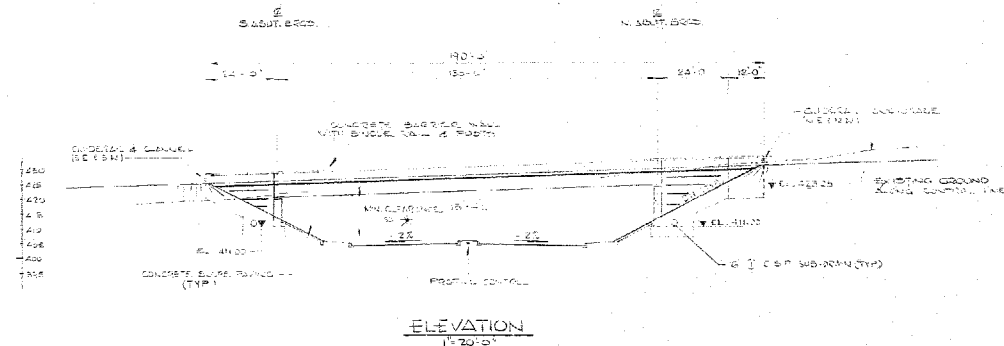
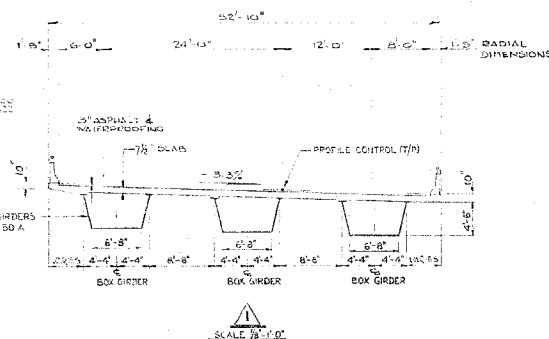
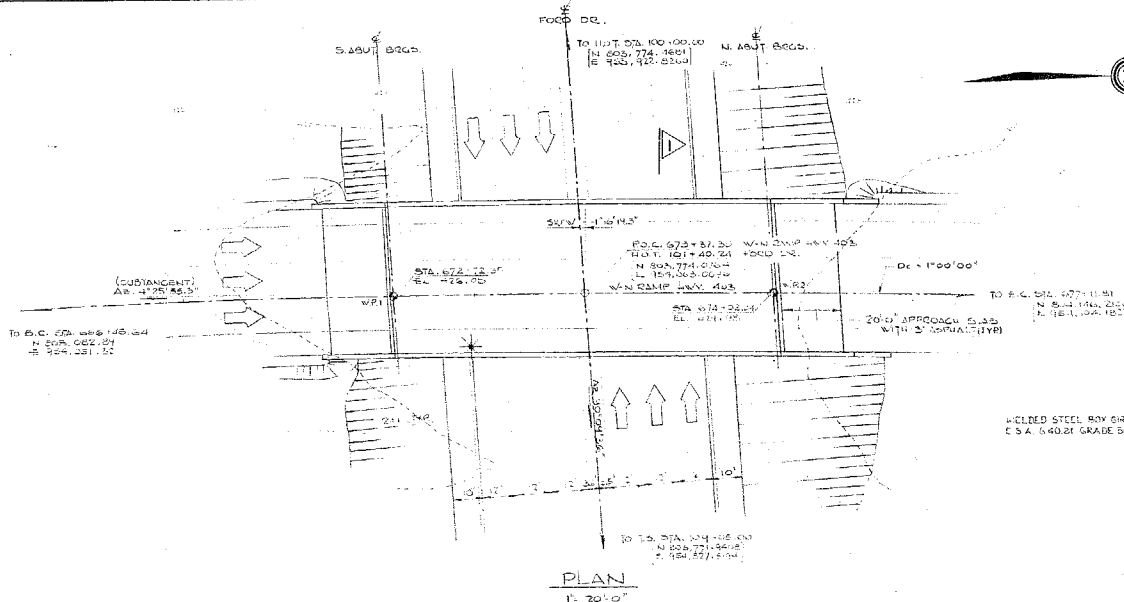
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3045-106

DIST. NO. 4	
CONT. No WP No 125-66-16	
W-N RAMP HWY. 403 OVER FORD DRIVE GENERAL PLAN	SHEET



B.M. ELEV. 440.81

BENCH MARK IS LOCATED ON TOP OF NW CORNER OF CONC. PAVEMENT OF S.W. WEST OF FORD DR. 6' EAST OF G.W. 150 FT. RT. STA. 109+27 EXISTING FORD DR.

- LIST OF DRAWINGS
1. GENERAL PLAN
  2. BORE HOLE LOCATIONS & SOIL STRATA
  3. FOOTING DETAILS
  4. SOUTH ABUTMENT
  5. NORTH ABUTMENT & RETAINING WALLS
  6. STRUCTURAL STEEL
  7. DECK REINFORCING
  8. DECK LAYOUT & SCREED ELEVATIONS
  9. BARRIER WALL
  10. STEEL RAILING (SINGLE TUBE)
  11. 20 FT. APPROACH SLAB
  12. DETAILS OF CONC. SLOPE PAVING
  13. STANDARD DETAILS I
  14. STANDARD DETAILS II
  15. STANDARD DETAILS III
  16. AS CONSTRUCTED ELEV. & DIM.

# GENERAL NOTES

## CLASS OF CONCRETE

ABUT. DECK & BARRIER WALLS 4000 P.S.I.  
REMAINDER 3000 P.S.I.

## CONCRETE QUANTITIES

RETAINING WALL 10 CU. YDS.  
ABUTMENTS & WINGWALLS 236 CU. YDS.  
DECK 182 " "  
BARRIER WALLS 29 " "  
APPROACH SLABS 62 " "  
SLOPE PAVING 36 " "

## STRUCTURAL STEEL QUANTITIES-106 TONS

## CLEAR COVER TO REINF. STEEL

FOOTINGS & ABUTMENTS 3"  
DECK 2" TOP; 1" BOTTOM  
BARRIER WALLS 1/2" (EXCEPT AS NOTED)  
APPROACH SLABS 2"

TO ACHIEVE THE MIN. CLEAR COVER OF 2" SPECIFIED, THE TOP LAYER OF DECK STEEL SHALL BE PLACED PRIOR TO CONCRETING WITH A CLEAR COVER OF 2 1/2" ± 1/2" TOLERANCE

REINFORCING STEEL: GRADE 60

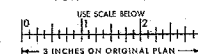
## CONSTRUCTION NOTES

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF ± 1/8".

NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.



FOR REDUCED PLAN



REVISION	DATE	BY	DESCRIPTION
1	NOV 24 1977	E.C. LANE	DESIGN
2			CHECK
3			LOADING
4			NOV 24 1977
5			NOV 24 1977
6			NOV 24 1977
7			NOV 24 1977
8			NOV 24 1977
9			NOV 24 1977
10			NOV 24 1977

SHEET



- THICKS OF FIGS. & MASS CONCRETE TO BE CAST AGAINST UNDISTURBED MATERIAL.
- MASS CONCRETE TO BE CAST IMMEDIATELY AFTER FIG. EXCAVATION IS COMPLETED.
- WALL LENGTHS MEASURED ALONG FRONT FACE.

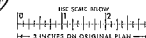
SOUTH  
 $\frac{1}{2}h = 1' - 0"$

NORTH  
1/4" = 1'-0"

W.F. PROVINCIAL CO-ORDINATES			
W.F.	STATIONS	CO-ORDINATES	
		N	E
1	672+72.85	805704.25	954058.41
2	674+02.85	805888.86	954068.46



FOR REDUCED PLAN



## Systems

DATE	BY	DESCRIPTION
DESIGN-CL	CHECK	URG LOADING IS 20 44
		DATE NOV 7



