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GEOCRES No. 40P1-79

DIST. 4 REGION

W.P. No. 66-67-07

CONT. No. 90-95

W. O. No.

STR. SITE No. 1-194

HWY. No. 403

LOCATION Garden Ave Interchange

No. of PAGES -

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OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:



Ministry of  
Transportation and  
Communications

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## **FOUNDATION DESIGN SECTION**

**foundation  
investigation and  
design report**

ENGINEERING MATERIALS OFFICE  
FOUNDATION DESIGN SECTION

WP 66-67-07

DIST 4

HWY 403

STR SITE 1-194

Garden Ave. Interchange Underpass

*CONT 90-95*

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# FOUNDATION INVESTIGATION REPORT

for

Garden Ave. Interchange Underpass

W.P. 66-67-07, Site 1-194

Hwy. 403, District 4, Burlington

## INTRODUCTION

This report contains the results of a foundation investigation carried out for the proposed structure at the junction of the existing Garden Ave. and New Hwy. 403, during the periods of 1976 03 11 - 15 and 1979 07 18 - 19. The fieldwork consisted of three sampled boreholes and two dynamic cone penetration tests. The borings were advanced by employing continuous flight auger machines, mounted either on a muskeg vehicle or on an all-terrain vehicle and equipped with 82 mm I.D. hollow stem augers. This report supersedes the original foundation report issued in December 1979.

## SITE DESCRIPTION

The structure site is located at the future junction of the existing Garden Ave. and proposed New Hwy. 403, in the Township of Brantford.

The surrounding terrain is relatively flat, cultivated agricultural land.

## SUBSURFACE CONDITIONS

### General

Generally uniform subsoil conditions were found to exist across the site. The subsoil (apart from the existing Garden Ave. roadway material) consists of a deep deposit (30 - 31 m) of stratified silty clay with trace of sand followed by dolomite type bedrock.

The boundary between the overburden and bedrock, together with the obtained field and laboratory tests results are shown on the Record of Borehole Sheets contained in the Appendix. The stratigraphical profile shown on Drawing No. 666707-A is based on this information. The drawing also shows the locations and elevations of the borings. A detailed description of the encountered subsurface conditions is given below.

### Silty Clay Trace of Sand

This stratum was intersected in all borings and extends from immediately below the ground surface to the bedrock for a depth about 30 - 31 m. The material in the deposit is stratified and classified as silty clay with trace of sand. The stratification is rather random and ranges in thickness from 5 mm to about 100 mm. The plasticity of the individual layers varies from low to high. Occasional silt seams were also observed throughout the stratum. The Atterberg Limit test results for the overall deposit are plotted on the plasticity chart (Figure 1). The

consistency of the stratum varies randomly from stiff to very stiff. This assessment is based on a number of field vane and laboratory unconfined and quick triaxial tests, the results of which are plotted on Figure 2 and summarized below, together with other physical properties determined from field and laboratory tests.

	<u>Range</u>
Natural Moisture Content (w)	19 - 32%
Liquid Limit ( $w_L$ )	16 - 65%
Plastic Limit ( $w_P$ )	12 - 21%
Undrained Shear Strength ( $c_u$ )	
Unconfined	47 - 72 kPa
Quick Triaxial	61 - 70 kPa
Field Vane	50 - over 100 kPa
Unit Weight ( $\gamma$ )	19.3 - 20.5 kN/m <sup>3</sup>
Sensitivity (Based on field vane tests)	2 - 5

Grain size distribution curves are presented in an envelope form on Figure 3 of the Appendix.

Two consolidation tests were performed on samples obtained from this stratum. The test results are plotted on the void ratio versus pressure curves (Figure 4) in the Appendix. The tests indicate that the soil is overconsolidated with a preconsolidation pressure ranging from 560 to 700 kPa.

For design purposes in terms of total stresses an average undrained shear strength value of 50 kPa is recommended.

#### Bedrock

Bedrock was found at a depth about 30 - 31 m below ground (Elevation 185 ±) which consists of moderately fractured, hard, light grey to white dolomite.

#### Groundwater Conditions

The following groundwater levels were observed<sup>47</sup> the boring locations:

B.H. #1 - Elevation 213.7 (4 days after the completion of drilling)

B.H. #2 - Elevation 213.1 (3 days after the completion of drilling)

B.H. #3 - Elevation 211.6 (N.A.)

It is pointed out that the subsoil is relatively impermeable therefore, a considerable time is required for the water levels to stabilize. Measurements carried out immediately after the borings were completed, indicate that the groundwater levels were about 20 m below the ground surface.

For design and construction purposes, it should be assumed that the groundwater level at this site is probably at elevation 214±. Seasonal changes may also influence the groundwater levels.

## DISCUSSION AND RECOMMENDATIONS

### General

It is proposed to construct a two span (34 m - 34 m) structure at the junction of future New Hwy. 403 and the existing Garden Ave. As per the present proposals, the profile grade of Hwy. 403 will be located at elevation 212.5 (H.O.T. 10 + 614.805 @ median of Hwy. 403). The profile grade of Garden Ave. will be at elevation 219.2 (H.O.T. 10 + 000.000 @ Garden Ave). The average original ground level is at approx. elevation 216 ±. The subsoil at this site was found to consist of a 30 - 31 m deep, firm to very stiff, stratified silty clay and followed by dolomite type bedrock.

### Structure Foundation

The encountered subsurface conditions (relatively low bearing capacity value and settlement considerations) do not favour spread footing type foundations. Therefore, piled foundations are recommended. End-bearing steel 'H' piles driven to bedrock (elevation 185 ±) appear to be the most practical solution.

The pile tips should be reinforced with pile driving shoes. The maximum allowable load for the particular section may be assumed for design purposes: 1150 kN (HP 310 x 110) and 900 kN (HP 310 X 79).



For the purposes of the O.H.B.D.C. the following values are recommended:

	<u>HP 310 X 110</u>	<u>HP 310 X 79</u>
Factored Capacity at U.L.S.	1600	1150
Capacity at S.L.S. Type II	1150	900

Earth pressures should be computed (assuming 'active' condition) as per subsection 6.6.1.2.2 of the code.

The granular 'A' or 'B' backfill should be in accordance with Special Provision No. 109F03 (latest revision). The following parameters are recommended for the granular backfill:

	<u>Granular 'A'</u>	<u>Granular 'B'</u>
Angle of Internal Friction	$\phi = 35^\circ$	$\phi = 30^\circ$
Unit Weight ( $\text{kN/m}^3$ )	$\gamma = 22.8$	$\gamma = 21.2$

#### Approach Embankments

To accommodate the proposed profile grades of New Hwy. 403 and Garden Ave., up to 3.5 m deep cuts and up to 3.2 m high fills will be required respectively. No stability problems are anticipated for the approaches (cuts and fill) of this magnitude, constructed with 2:1 forward and side slopes. The fill should consist of well compacted acceptable material. Care should be taken to ensure that no bouldery fill is placed within the approaches through which piles have to be driven, and it is recommended that this portion of the fill

contain no larger grain sizes than 75 mm. Settlement of the silty clay subsoil induced by the construction of approach fills is estimated to be in the range of 50 - 75 mm and will take place over a long term period. In order to minimize the effect of these settlements on the performance of the pavement, it is recommended that the approach embankments be built in advance of the final grading and paving for as long a period as possible.

#### Other Considerations

The pile caps should be located not less than 1.2 m below finished ground level so as to provide for frost protection.

No major dewatering problems are anticipated due to the relatively impermeable nature of the subsoil. Topsoil and/or any soft surficial material should be removed in accordance with current M.T.O. practices.

The future abutments in part, will be located over the existing roadway. To avoid damages to the piles during driving, it is recommended that the entire roadbed (pavement and base coarse) be excavated to its full vertical and horizontal extent.

A suitable drainage system should be provided to relieve the build-up of excess hydrostatic pressure behind the abutment walls.

To provide a smooth transition between the structure and the approaches which will undergo settling for a long period of time, it is recommended that the structure be designed with approach slabs.

The exposed cut and fill slopes should be protected against erosion according to M.T.O. standards.

#### MISCELLANEOUS

The fieldwork for this project was supervised by Mr. M. Kalapaca, Project Supervisor and Mr. P.R. Korpel, Trainee Engineer. The equipment used, was owned and operated by Atcost Soil Drilling Inc., and Dominion Soil Investigation Ltd. The original report was written by Mr. P. Payer, Foundations Engineer and reviewed by Mr. K.G. Selby, Senior Foundation Engineer.

In order to comply with the Ontario Highway Bridge Design Code and with some minor changes, Mr. P. Payer prepared the updated version of the original Foundation Investigation and Design Report.



*P. Payer*  
P. Payer, P. Eng.  
Senior Foundation Engineer

*M. Devata*  
M. Devata, P. Eng.  
Chief Foundation Engineer

## **APPENDIX**

## EXPLANATION OF TERMS USED IN REPORT

**N VALUE:** THE STANDARD PENETRATION TEST (SPT) N VALUE IS THE NUMBER OF BLOWS REQUIRED TO CAUSE A STANDARD 51mm O.D SPLIT BARREL SAMPLER TO PENETRATE 0.3m INTO UNDISTURBED GROUND IN A BOREHOLE WHEN DRIVEN BY A HAMMER WITH A MASS OF 63.5kg, FALLING FREELY A DISTANCE OF 0.76m. FOR PENETRATIONS OF LESS THAN 0.3m N VALUES ARE INDICATED AS THE NUMBER OF BLOWS FOR THE PENETRATION ACHIEVED. AVERAGE N VALUE IS DENOTED THUS  $\bar{N}$ .

**DYNAMIC CONE PENETRATION TEST:** CONTINUOUS PENETRATION OF A CONICAL STEEL POINT (51mm O.D. 60° CONE ANGLE) DRIVEN BY 475 J IMPACT ENERGY ON 'A' SIZE DRILL RODS. THE RESISTANCE TO CONE PENETRATION IS MEASURED AS THE NUMBER OF BLOWS FOR EACH 0.3m ADVANCE OF THE CONICAL POINT INTO THE UNDISTURBED GROUND.

SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSENESS.

**CONSISTENCY:** COHESIVE SOILS ARE DESCRIBED ON THE BASIS OF THEIR UNDRAINED SHEAR STRENGTH ( $c_u$ ) AS FOLLOWS:

$c_u$ (kPa)	0 - 12	12 - 25	25 - 50	50 - 100	100 - 200	>200
	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD

**DENSENESS:** COHESIONLESS SOILS ARE DESCRIBED ON THE BASIS OF DENSENESS AS INDICATED BY SPT N VALUES AS FOLLOWS:

N (BLOWS/0.3m)	0 - 5	5 - 10	10 - 30	30 - 50	>50
	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

ROCKS ARE DESCRIBED BY THEIR COMPOSITION AND STRUCTURAL FEATURES AND /OR STRENGTH.

**RECOVERY:** SUM OF ALL RECOVERED ROCK CORE PIECES FROM A CORING RUN EXPRESSED AS A PERCENT OF THE TOTAL LENGTH OF THE CORING RUN.

**MODIFIED RECOVERY:** SUM OF THOSE INTACT CORE PIECES, 100mm+ IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF THE CORING RUN. THE ROCK QUALITY DESIGNATION (RQD), FOR MODIFIED RECOVERY, IS:

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
	VERY POOR	POOR	FAIR	GOOD	EXCELLENT

**JOINTING AND BEDDING:**

SPACING	50mm	50 - 300mm	0.3m - 1m	1m - 3m	>3m
JOINTING	VERY CLOSE	CLOSE	MOD. CLOSE	WIDE	VERY WIDE
BEDDING	VERY THIN	THIN	MEDIUM	THICK	VERY THICK

## ABBREVIATIONS AND SYMBOLS

### FIELD SAMPLING

S S	SPLIT SPOON	T P	THINWALL PISTON
W S	WASH SAMPLE	O S	OSTERBERG SAMPLE
S T	SLOTTED TUBE SAMPLE	R C	ROCK CORE
B S	BLOCK SAMPLE	P H	T W ADVANCED HYDRAULICALLY
C S	CHUNK SAMPLE	P M	T W ADVANCED MANUALLY
T W	THINWALL OPEN	F S	FOIL SAMPLE

### MECHANICAL PROPERTIES OF SOIL

$m_v$	$\text{kPa}^{-1}$	COEFFICIENT OF VOLUME CHANGE
$C_c$	1	COMPRESSION INDEX
$C_s$	1	SWELLING INDEX
$C_\alpha$	1	RATE OF SECONDARY CONSOLIDATION
$c_v$	$\text{m}^2/\text{s}$	COEFFICIENT OF CONSOLIDATION
H	m	DRAINAGE PATH
$T_v$	1	TIME FACTOR
U	%	DEGREE OF CONSOLIDATION
$\sigma'_{vo}$	kPa	EFFECTIVE OVERBURDEN PRESSURE
$\sigma'_p$	kPa	PRECONSOLIDATION PRESSURE
$\tau_f$	kPa	SHEAR STRENGTH
$c'$	kPa	EFFECTIVE COHESION INTERCEPT
$\phi'$	-°	EFFECTIVE ANGLE OF INTERNAL FRICTION
$c_u$	kPa	APPARENT COHESION INTERCEPT
$\phi_u$	-°	APPARENT ANGLE OF INTERNAL FRICTION
$\tau_R$	kPa	RESIDUAL SHEAR STRENGTH
$\tau_r$	kPa	REMOULDED SHEAR STRENGTH
$S_t$	1	SENSITIVITY = $\frac{c_u}{\tau_r}$

### STRESS AND STRAIN

$u_w$	kPa	PORE WATER PRESSURE
$r_u$	1	PORE PRESSURE RATIO
$\sigma$	kPa	TOTAL NORMAL STRESS
$\sigma'$	kPa	EFFECTIVE NORMAL STRESS
$\tau$	kPa	SHEAR STRESS
$\sigma_1, \sigma_2, \sigma_3$	kPa	PRINCIPAL STRESSES
$\epsilon$	%	LINEAR STRAIN
$\epsilon_1, \epsilon_2, \epsilon_3$	%	PRINCIPAL STRAINS
E	kPa	MODULUS OF LINEAR DEFORMATION
G	kPa	MODULUS OF SHEAR DEFORMATION
$\mu$	1	COEFFICIENT OF FRICTION

### PHYSICAL PROPERTIES OF SOIL

$\rho_s$	$\text{kg}/\text{m}^3$	DENSITY OF SOLID PARTICLES	e	1, %	VOID RATIO	$e_{\min}$	1, %	VOID RATIO IN DENSEST STATE
$\gamma_s$	$\text{kn}/\text{m}^3$	UNIT WEIGHT OF SOLID PARTICLES	n	1, %	POROSITY	$I_D$	1	DENSITY INDEX = $\frac{e_{\max} - e}{e_{\max} - e_{\min}}$
$\rho_w$	$\text{kg}/\text{m}^3$	DENSITY OF WATER	w	1, %	WATER CONTENT	D	mm	GRAIN DIAMETER
$\gamma_w$	$\text{kn}/\text{m}^3$	UNIT WEIGHT OF WATER	$S_r$	%	DEGREE OF SATURATION	$D_n$	mm	n PERCENT - DIAMETER
$\rho$	$\text{kg}/\text{m}^3$	DENSITY OF SOIL	$w_L$	%	LIQUID LIMIT	$C_u$	1	UNIFORMITY COEFFICIENT
$\gamma$	$\text{kn}/\text{m}^3$	UNIT WEIGHT OF SOIL	$w_p$	%	PLASTIC LIMIT	h	m	HYDRAULIC HEAD OR POTENTIAL
$\rho_d$	$\text{kg}/\text{m}^3$	DENSITY OF DRY SOIL	$w_s$	%	SHRINKAGE LIMIT	q	$\text{m}^3/\text{s}$	RATE OF DISCHARGE
$\gamma_d$	$\text{kn}/\text{m}^3$	UNIT WEIGHT OF DRY SOIL	$I_p$	%	PLASTICITY INDEX = $w_L - w_p$	v	m/s	DISCHARGE VELOCITY
$\rho_{\text{sat}}$	$\text{kg}/\text{m}^3$	DENSITY OF SATURATED SOIL	$I_L$	1	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$	i	1	HYDRAULIC GRADIENT
$\gamma_{\text{sat}}$	$\text{kn}/\text{m}^3$	UNIT WEIGHT OF SATURATED SOIL	$I_C$	1	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$	k	m/s	HYDRAULIC CONDUCTIVITY
$\rho'$	$\text{kg}/\text{m}^3$	DENSITY OF SUBMERGED SOIL	$e_{\max}$	1, %	VOID RATIO IN LOOSEST STATE	j	$\text{kn}/\text{m}^3$	SEEPAGE FORCE
$\gamma'$	$\text{kn}/\text{m}^3$	UNIT WEIGHT OF SUBMERGED SOIL						

# RECORD OF BOREHOLE No 1

METRIC

W P 66-67-07 LOCATION Co-ords. N 4 780 907.5; E 246 767.7 ORIGINATED BY PRK  
 DIST 4 HWY 403 BOREHOLE TYPE Hollow Stem Auger and Cone Test COMPILED BY PRK  
 DATUM Geodetic DATE 1979 07 18, 19 CHECKED BY RS

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			20 40 60 80 100	100					
215.9	Ground Level												
0.0	Silty clay		1	SS	16								0 2 56 42
			2	SS	22								0 1 54 45
	Brown Gray		3	SS	13								
			4	SS	6								
	Stratified		5	SS	10							19.6	0 0 51 49
	Trace of sand		6	TW	PH								
	Occasional silt seams		7	SS	7								
			8	SS	6							19.6	0 0 70 30
	Stiff to very stiff		9	TW	PH								
			10	TW	PH								
			11	SS	6								
			12	SS	14								
			13	SS	6								
			14	TW	PH							19.5	0 0 93 7 0 0 40 60
			15	TW	PH								
			16	TW	PH							20.0	0 0 83 17 0 0 40 60
			17	SS	8								
189.1			18	SS	50/6mm Bouncing								
187.7													
28.8													
185.6													
30.3	Probable bedrock End of Borehole												

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to  
Sensitivity

20  
15 5 (%) STRAIN AT FAILURE  
10



**METRIC**

W P 66-67-07 LOCATION Co-ords. N 4 780 847.0; E 246 784.0 ORIGINATED BY PRK  
DIST 4 HWY 403 BOREHOLE TYPE Hollow Stem Auger COMPILED BY PRK  
DATUM Geodetic DATE 1979 07 19, 20 CHECKED BY RS

[illegible]

+3, x5 : Numbers refer to Sensitivity

20  
15  $\phi$  5 (%) STRAIN AT FAILURE  
10

OFFICE REPORT ON SOIL EXPLORATION

# RECORD OF BOREHOLE No 3 (Formerly B.H.1 W.P.66-67-01) METRIC

W P 66-67-07 LOCATION Co-ords, N 4 780 877.0; E 246 793.5 ORIGINATED BY MK  
 DIST 4 HWY 403 BOREHOLE TYPE Hollow Stem Auger, BXL Core and Cone Test COMPILED BY PRK  
 DATUM Geodetic DATE 1976 03 11 - 15 CHECKED BY RS

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	100	W <sub>p</sub>	W	W <sub>L</sub>		
215.8	Ground Level													
0.0														
			1	SS	13		214							0 0 54 46
	Brown Gray		2	SS	16		212						19.6	
	Silty clay Stratified		3	TW	PH		210							0 0 70 30
	Trace of Sand		4	SS	11		208							0 0 84 16
	Occasional silt seams		5	SS	8		206						20.0	
	Stiff to very stiff		6	TW	PH		204							
			7	SS	8		202							
			8	SS	11		200							
			9	TW	PH		198							
			10	SS	30		196							
			11	SS	9		194							
			12	SS	11		192							
			13	TW	PH		190							0 0 67 33
			14	SS	8		188							
			15	TW	PH		186							
			16	SS	13									
185.6														
30.2														

OFFICE REPORT ON SOIL EXPLORATION

Continued

+<sup>3</sup>, x<sup>5</sup>: Numbers refer to  
Sensitivity

20  
15  
10  
5  
0  
5  
10  
15  
20  
(%) STRAIN AT FAILURE



W P 66-67-07 LOCATION Co-ords. N 4 780 876.0; E 246 793.5 ORIGINATED BY MK  
DIST 4 HWY 403 BOREHOLE TYPE Hollow Stem Auger, BXL Core & Cone Test COMPILED BY PRK  
DATUM Geodetic DATE 1976 03 11 - 15 CHECKED BY RS

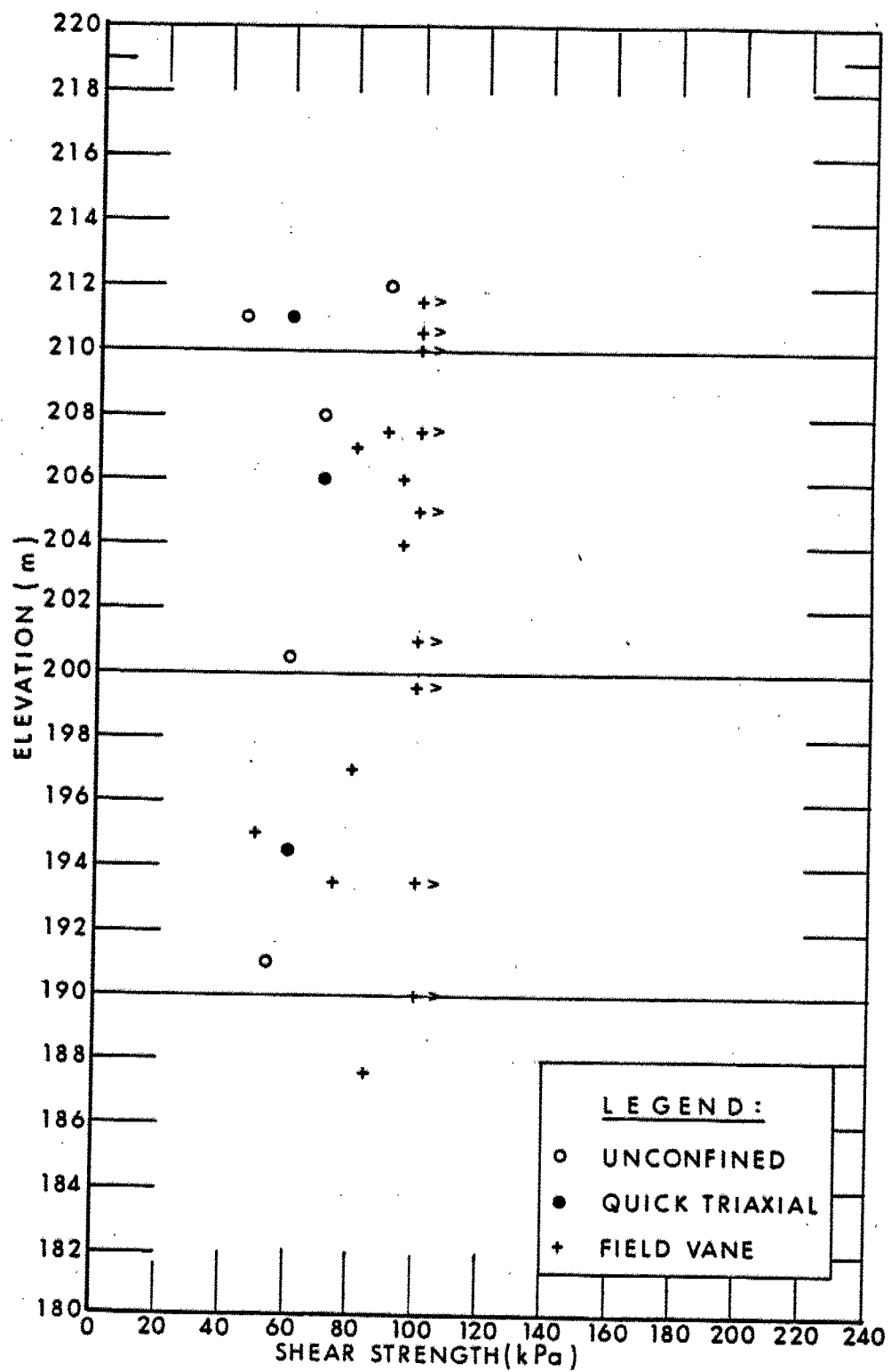
[illegible]

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to Sensitivity

20  
15  $\phi$  5 (%) STRAIN AT FAILURE  
10

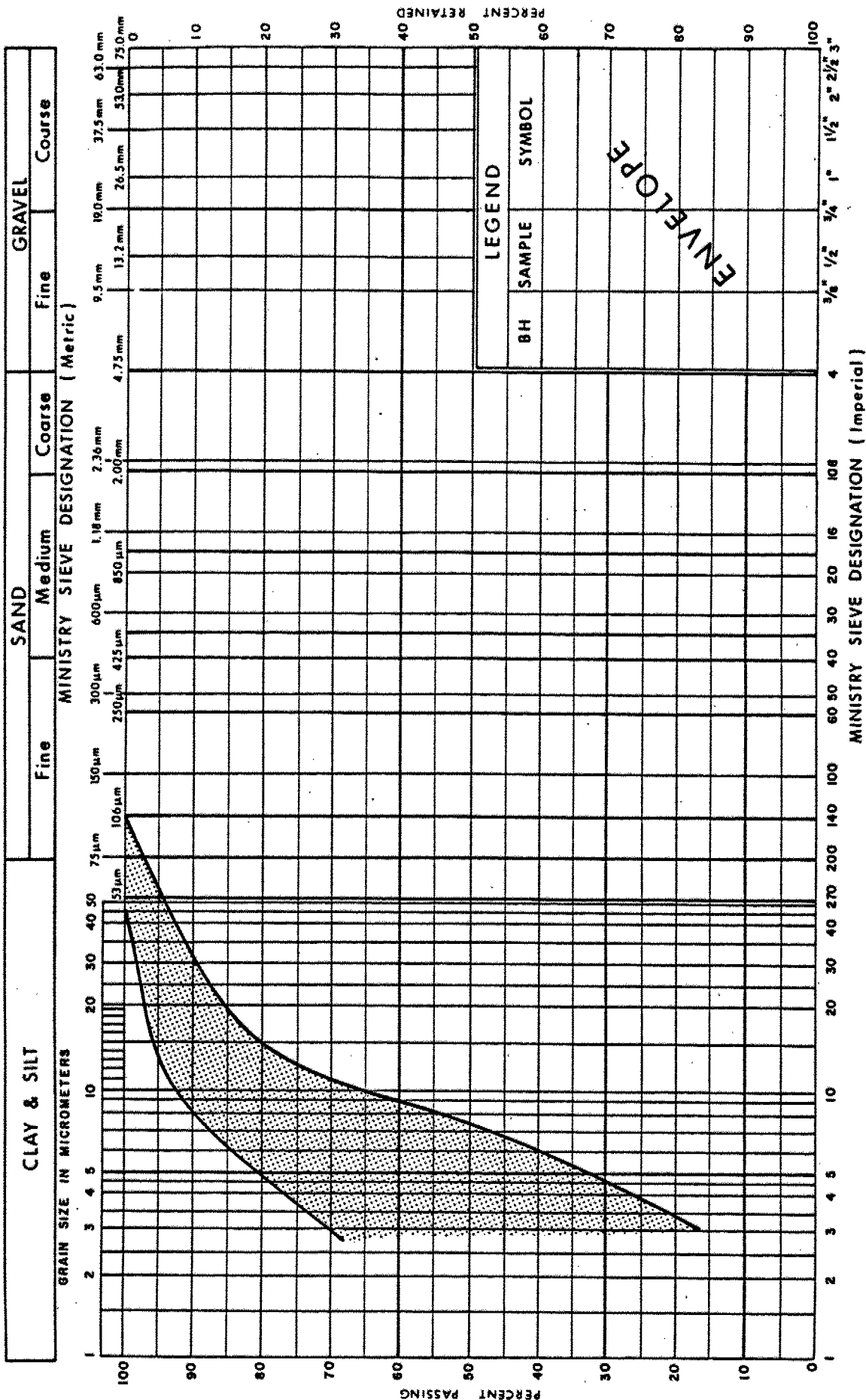




SHEAR STRENGTH vs ELEVATION

WP 66-67-07

FIG 2



**Ministry of  
Transportation**

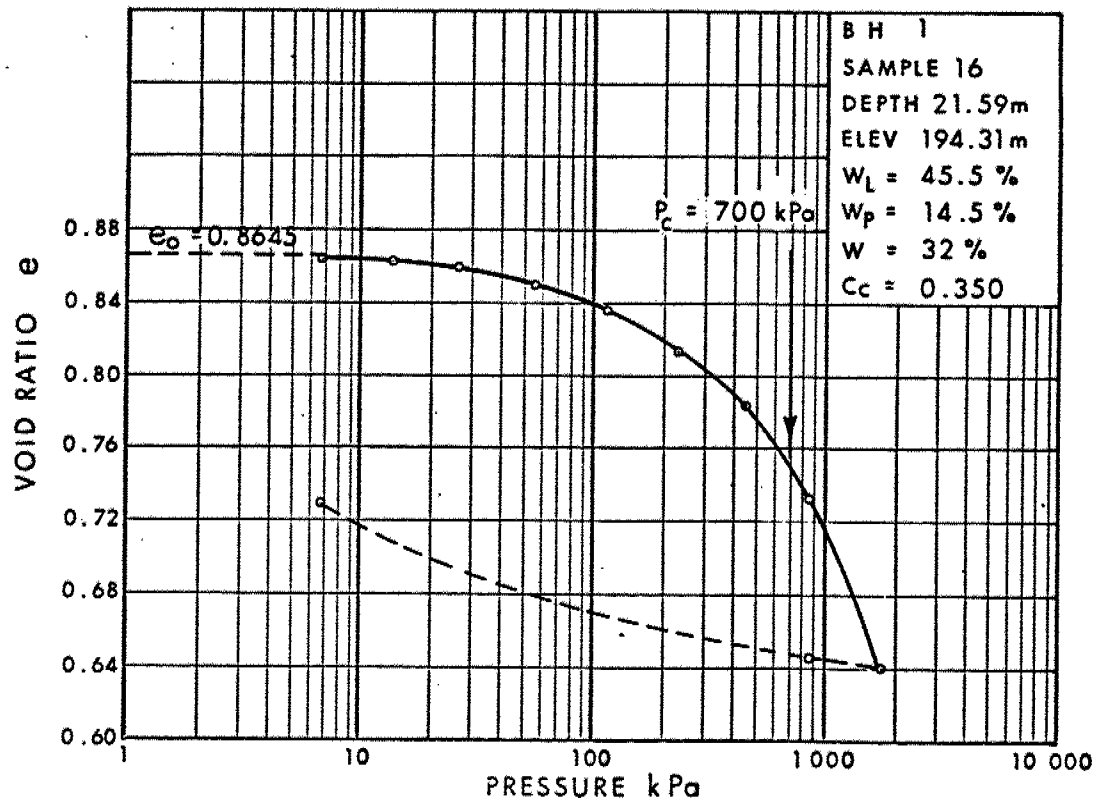
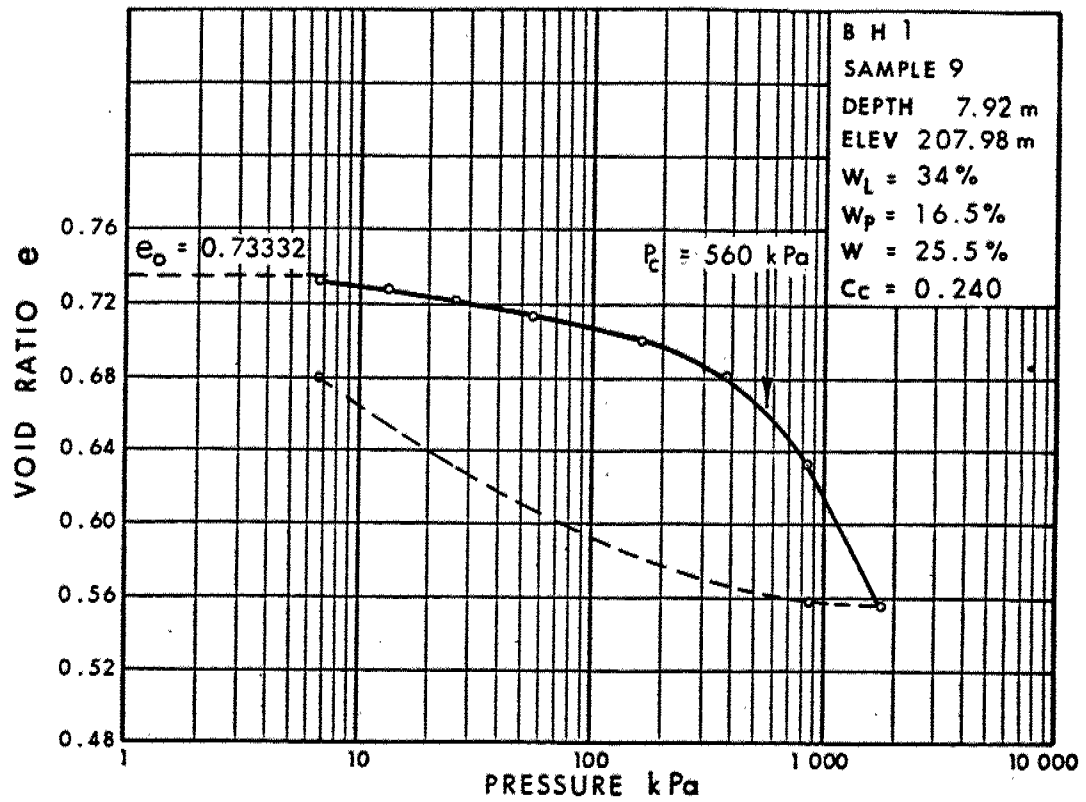


GRAIN SIZE DISTRIBUTION  
SILTY CLAY  
TRACE OF SAND  
(STRATIFIED)

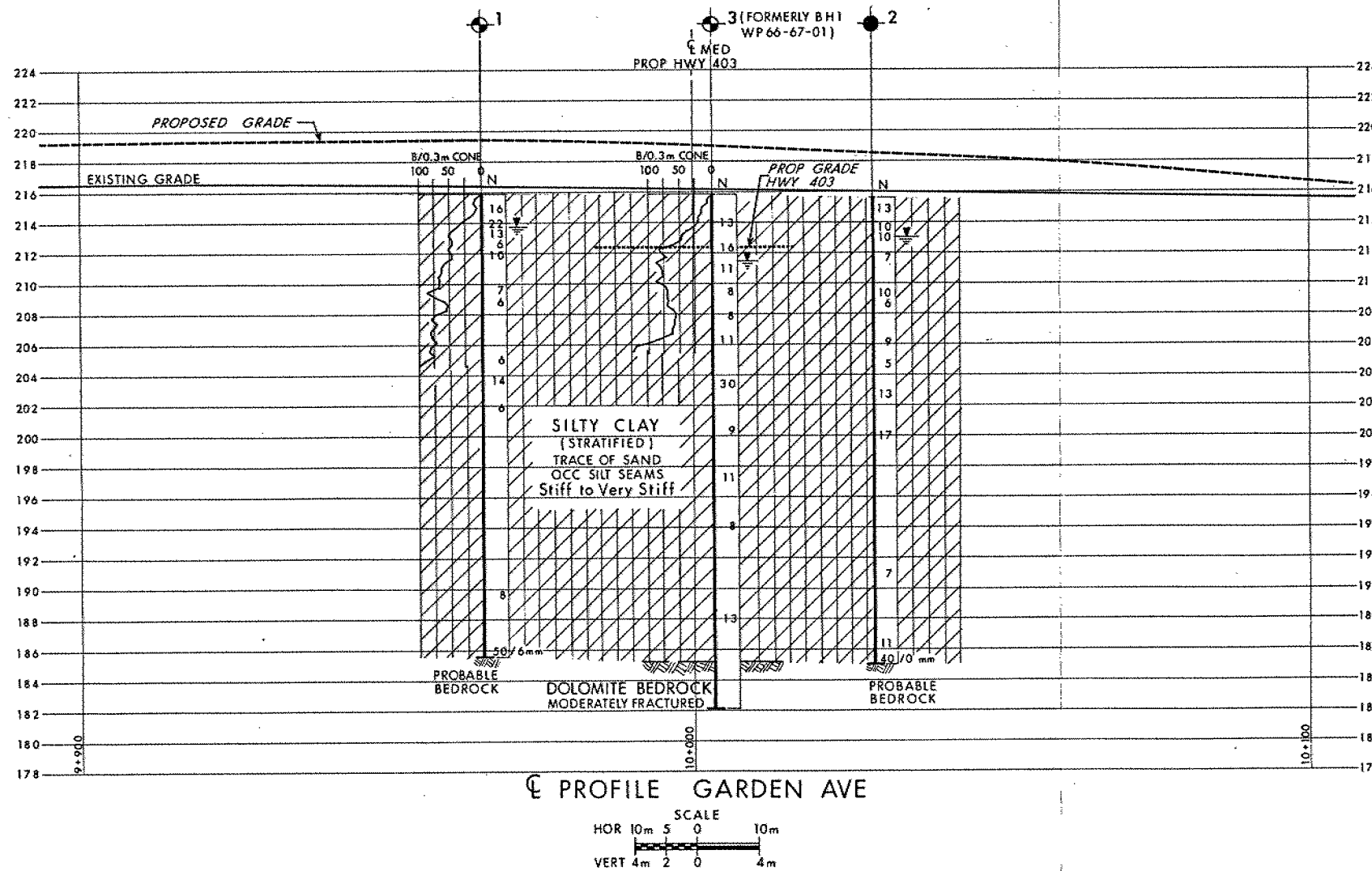
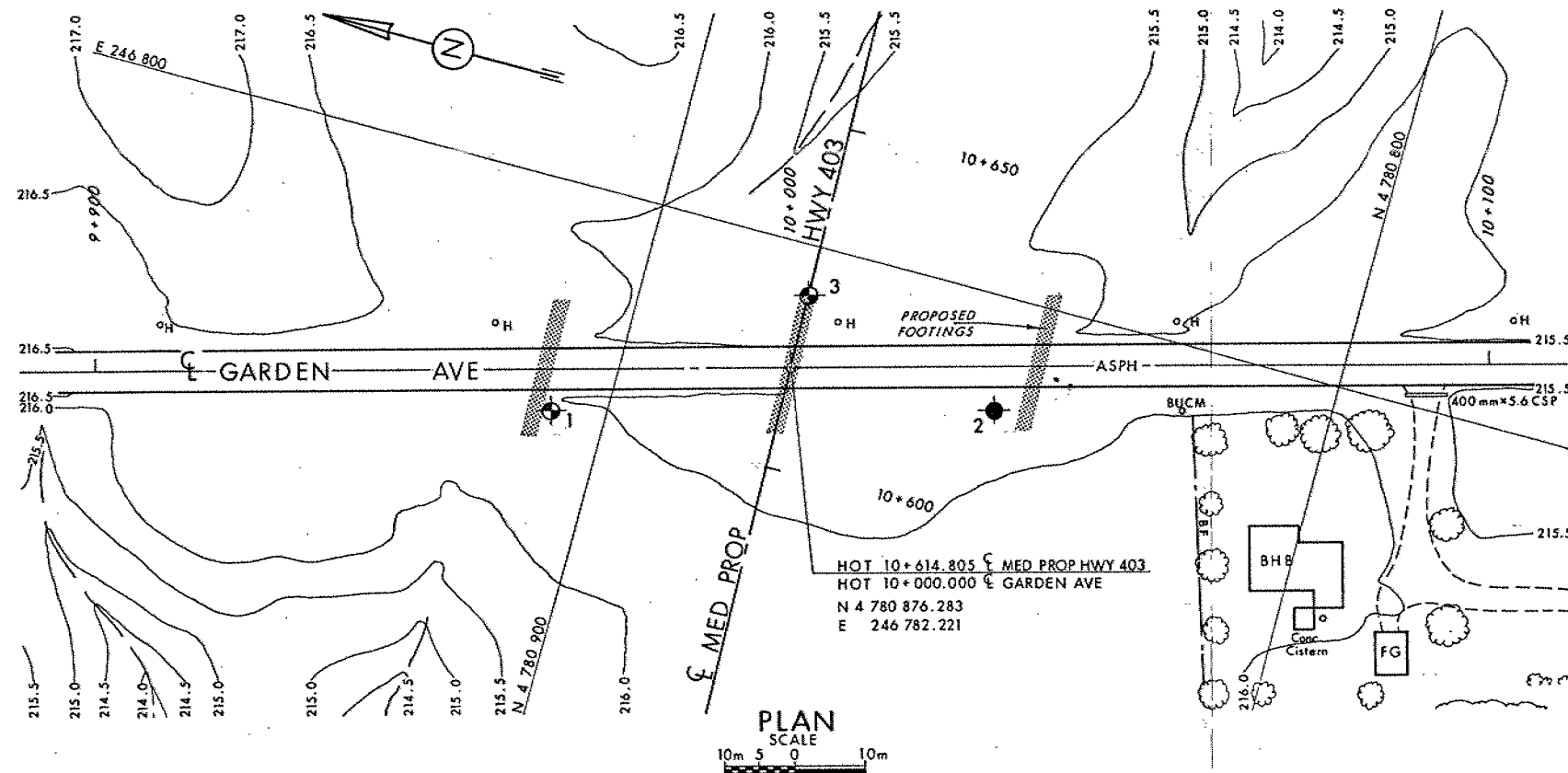
**FIG No 3**

**WP 66-67-07**

# VOID RATIO - PRESSURE CURVES



WP 66-67-07



**METRIC**  
ALL DIMENSIONS ARE IN METRES  
UNLESS OTHERWISE SHOWN

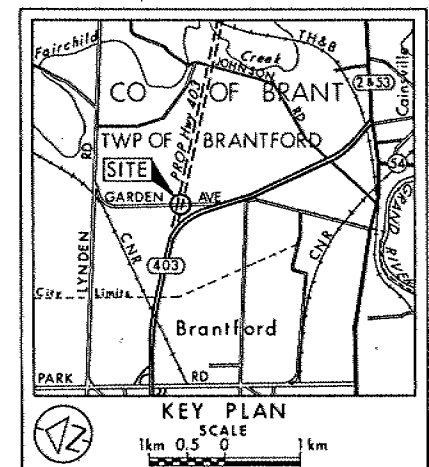
CONT No  
WP No 66-67-07

GARDEN AVE INTERCH U'PASS

BORE HOLE LOCATIONS & SOIL STRATA



SHEET



LEGEND

- Bore Hole
- ⊕ Dynamic Cone Penetration Test (Cone)
- ⊙ Bore Hole & Cone
- N Blows/0.3m (Std Pen Test, 475 J/blow)
- CONE Blows/0.3m (60° Cone, 475 J/blow)
- W.L. at time of investigation  
For Bore Hole No's 1 & 2 79.07,  
For Bore Hole No 3 76.03

No	ELEVATION	CO-ORDINATES	
		NORTH	EAST
1	215.9	4780 907.5	246 767.7
2	215.6	4780 847.0	246 784.0
3	215.8	4780 877.0	246 793.5

FORMERLY BH 1  
WP 66-67-01

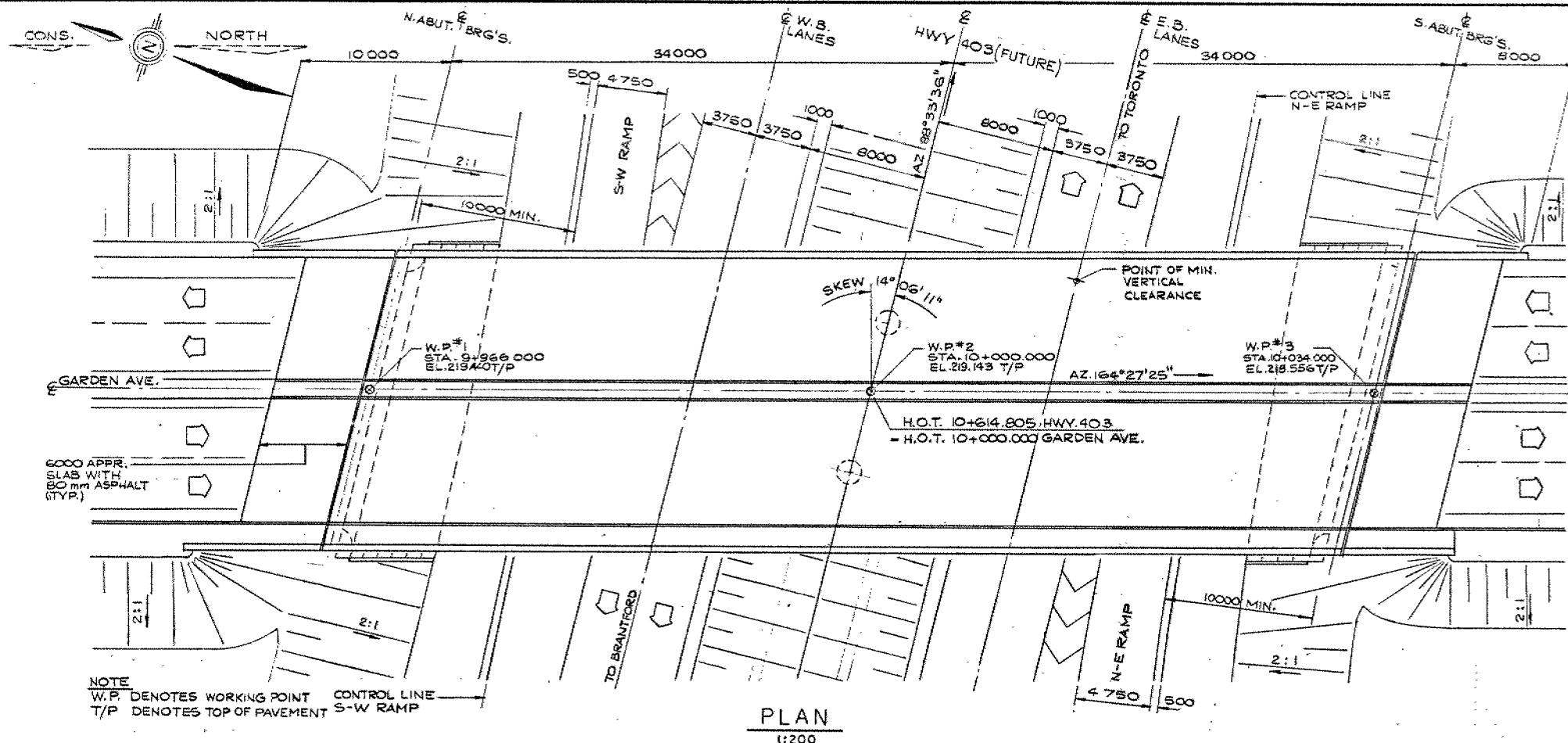
NOTE

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

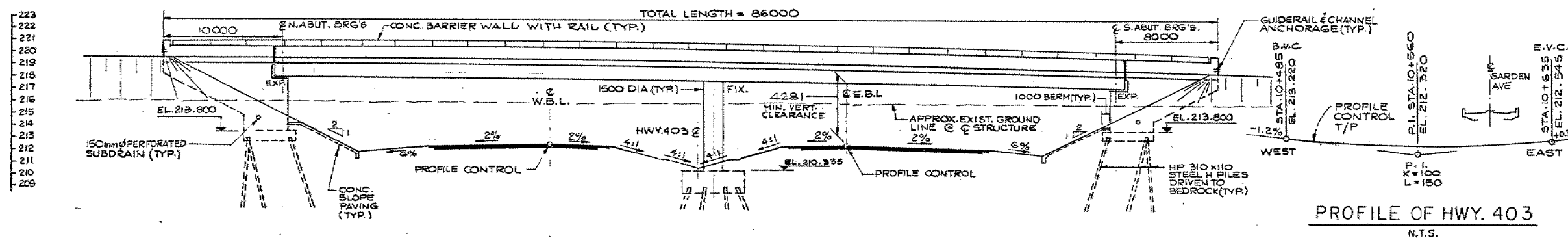
REVISIONS	DATE	BY	DESCRIPTION
89 06 30	DT		PROPOSED GRADES REVISED

Geocres No 40P01-79

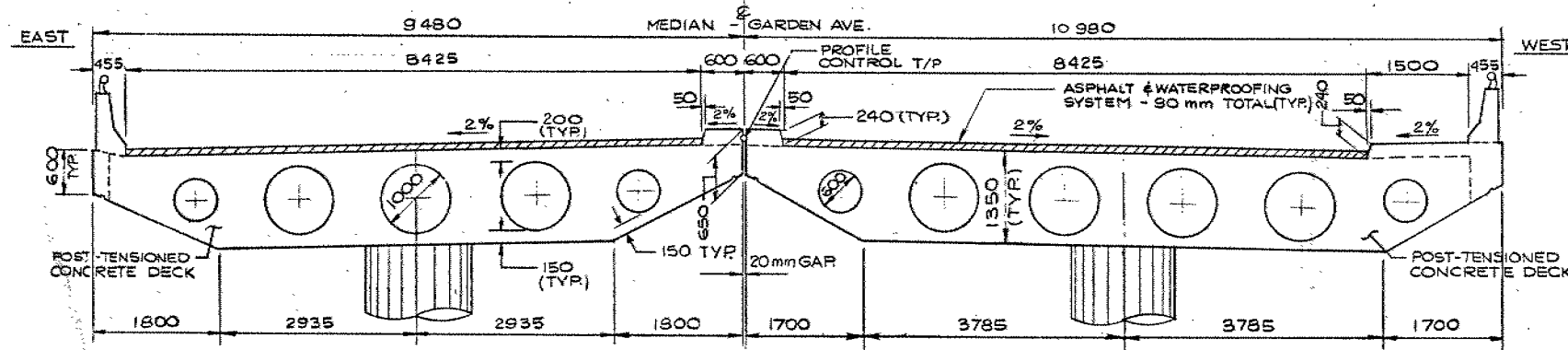
HWY No 403	SUBM'D PP	CHECKED	DATE 1979 12 10	DIST 4
				SITE 1-194
				DWG 666707-A



PLAN  
1:200



ELEVATION  
1:200



SECTION  
1:50

B.M.  
EL. 216.218  
NEW SW ROOT 0.5 HICKORY  
109.0 LT 10+461.0  
HWY. 403

**METRIC**  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

DIST 4  
CONT No  
WP No 66-67-07  
GARDEN AVE. UNDERPASS  
AT HWY. 403  
GENERAL ARRANGEMENT



SHEET

### GENERAL NOTES

## CLASS OF CONCRETE

DECK, MEDIAN, SIDEWALK & PIER COLUMNS	35 MPa
REMAINDER	30 MPa

CLEAR COVER TO REINFORCING STEEL

FOOTINGS	100 ± 25
ABUTMENTS, WING WALLS	
FRONT FACE	80 ± 20
BACK FACE	70 ± 20
PIER COLUMNS	80 ± 20
DECK	
TOP	70 ± 20
BOTTOM	50 ± 10
REMAINDER (UNLESS OTHERWISE SPECIFIED)	70 ± 20

## REINFORCING STEEL

REINFORCING STEEL SHALL BE GRADE 400  
UNLESS OTHERWISE SPECIFIED.  
BAR MARKS WITH SUFFIX 'C' SHALL BE  
COATED BARS.

### CONSTRUCTION NOTES

IF THE ACTUAL BEARING HEIGHTS ARE DIFFERENT FROM THE ASSUMED HEIGHTS GIVEN WITH THE BEARING DESIGN DATA, THE CONTRACTOR SHALL ADJUST THE BEARING SEAT ELEVATIONS AND THE REINFORCING STEEL TO SUIT THE ACTUAL HEIGHTS.

## LIST OF DRAWINGS

1. GENERAL ARRANGEMENT
2. BORE HOLE LOCATIONS & SOIL STRATA
3. FOOTING DETAILS I
4. FOOTING DETAILS II
5. NORTH ABUTMENT
6. NORTH ABUTMENT WINGWALLS
7. SOUTH ABUTMENT
8. SOUTH ABUTMENT WINGWALLS
9. PIERS
10. BEARING DESIGN DATA
11. DECK DETAILS
12. TRANSVERSE TENDON DETAILS
13. LONGITUDINAL TENDON DETAILS I
14. LONGITUDINAL TENDON DETAILS II
15. DECK REINFORCING I
16. DECK REINFORCING II
17. DECK REINFORCING III
18. DECK REINFORCING IV
19. JOINT ANCHORAGE AND ARMOURING
20. BARRIER WALLS N.B.L. BRIDGE - STD
21. BARRIER WALLS S.B.L. BRIDGE - STD
22. RAILING FOR BARRIER WALL
23. 6000 mm APPROACH SLAB
24. DETAILS OF CONCRETE SLOPE PAVING
25. AS CONSTRUCTED ELEV. & DIM.
26. STANDARD DETAILS
27. QUANTITIES STRUCTURE I
28. QUANTITIES STRUCTURE II

APPLICABLE STANDARD DRAWINGS

DD 3502 MIN. GRANULAR BACKFILL REQUIREMENTS



DRAWING NOT TO BE SCALED  
100 mm ON ORIGINAL DRAWING

REVISIONS								
	DATE	BY	DESCRIPTION					
	DESIGN	N.C.	CHK	CODE	OHEDC-83	LOAD	CL-A	DATE JUN-1990
	DRAWN	J.P.	CHK	F.C.	SITE	H-194	STRUCT	SCHEME
								DWG. 1

