

G.I.-30 SEPT. 1976

DIST. 1 REGION

W.P. No. 259-66-08

CONT. No. 80-43

W. O. No. _____

STR. SITE No. 6-298

HWY. No. E.C. POW Expwy

LOCATION C.P.R. of Laurzon

Parkeway

No of PAGES -


OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: _____

.....



Ministry of
Transportation and
Communications

PHOTOS 

FILE No. _____ DATE _____

REMARKS Bev Summers

Const Supervisor Chatarr 812 354-1400

DIST. No 1
CONT No
WP No 259-66-08

SHEET

E.C. ROW EXPRESSWAY
LAUZON PKWY. /C.P.R. O'HEAD
GENERAL ARRANGEMENT

McCORMICK RANKIN
CONSULTING ENGINEERS

D.H.O. PRECISE B.M. #533-66 ELEV. 595.365
TABLET IN SOUTH ABUTMENT OF CONCRETE BRIDGE
CARRYING LAUZON ROAD OVER LITTLE RIVER 1.75
MILE SOUTH OF HWY. NO. 39.

- GENERAL NOTES:**
- CLASS OF CONCRETE**
PRESTRESSED CONCRETE GIRDERS 35 MPa
PIERS, DECK, DIAPHRAGMS & BARRIER WALLS 30 MPa
REMAINDER 20 MPa
- CLEAR COVER ON REINF. STEEL**
FOOTINGS & ABUTMENTS 3"
DECK 2" TOP 1 1/2" BOT.
DIAPHRAGMS 1 1/2"
PIERS & BARRIER WALLS AS NOTED
- REINFORCING STEEL SHALL BE CSA G30.12M
SERIES, GRADE 400 MPa OR AS NOTED.
REIN. BARS WITH THE DESIGNATION 'C' AT
THE END OF BAR MARKS SHALL BE EPOXY
COATED BARS.

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

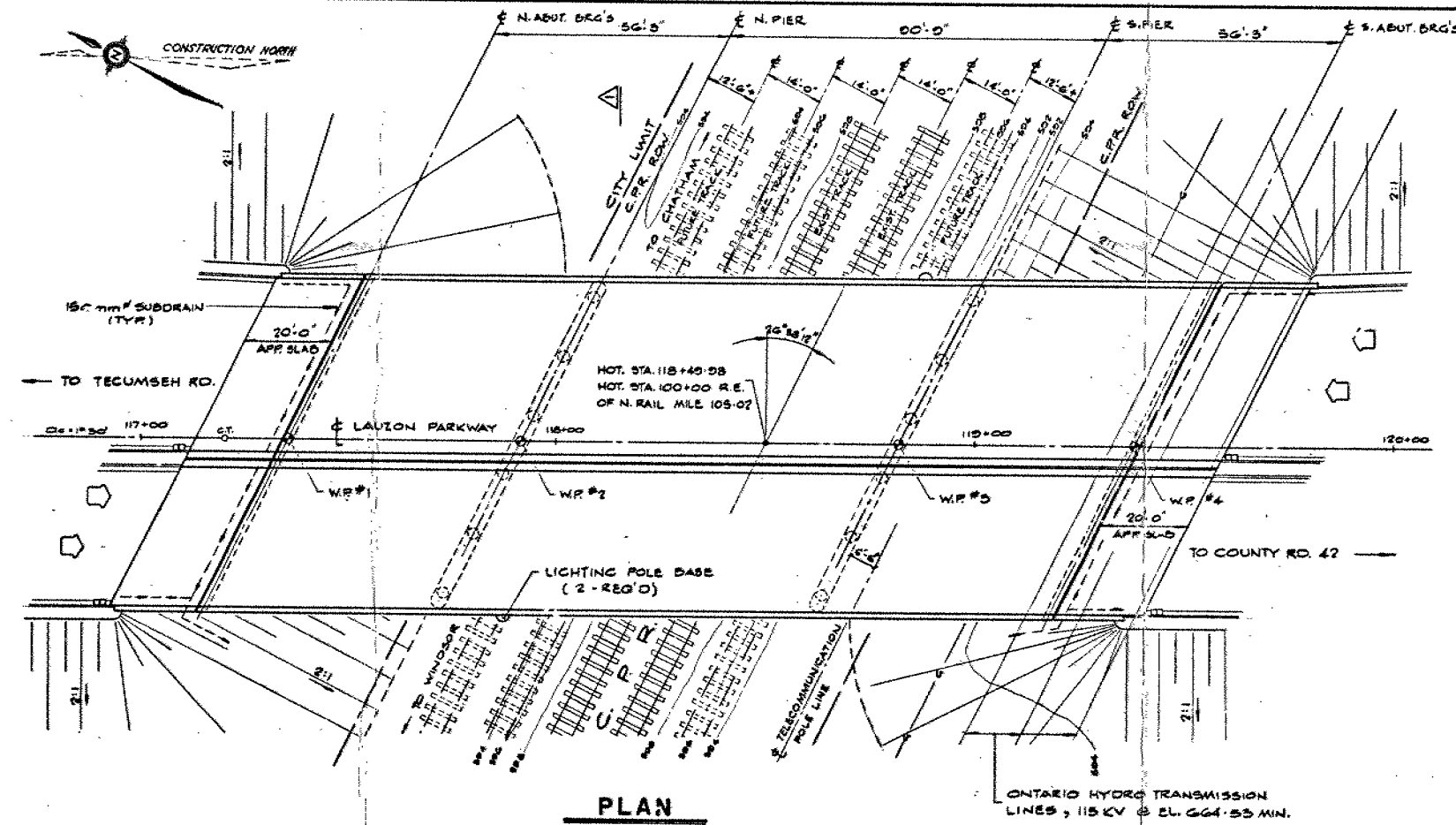
CONSTRUCTION NOTES:
NO CONCRETE SHALL BE PLACED ABOVE THE
ABUTMENT BEARING SEATS UNTIL THE CONCRETE
IN THE DECK HAS BEEN PLACED.

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

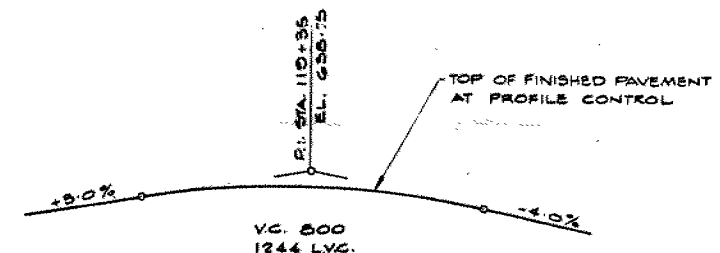
CONCRETE QUANTITIES:
(FOR LUMP SUM TENDER ITEMS)

1	PIERS, ABUTMENTS & WINGWALLS	447 cu. yds.
2	DECK & MEDIAN	446 cu. yds.
3	BARRIER WALLS	38 cu. yds.
4	APPROACH SLABS	99 cu. yds.

- LIST OF DRAWINGS**
1. GENERAL ARRANGEMENT
 2. BOREHOLE LOCATIONS & SOIL STRATA
 3. FOUNDATIONS
 4. PIER DETAILS
 5. NORTH WEST ABUTMENT
 6. NORTH EAST ABUTMENT
 7. SOUTH EAST ABUTMENT
 8. SOUTH WEST ABUTMENT
 9. PRESTRESSED GIRDERS & BEARINGS
 10. DECK DIMENSIONS & REINFORCING
 11. BARRIER WALL
 12. STEEL RAILING (SINGLE TUBE)
 13. APPROACH SLABS
 14. AS CONSTRUCTED ELEVATIONS & DIMENSIONS
 15. STANDARDS
 16. STANDARDS
 17. STANDARDS
 18. STANDARDS
 19. ELECTRICAL EMBEDDED WORK
 20. ELECTRICAL STANDARD DETAILS
 21. CHESAPEAKE & OHIO RAILWAYS PIPE TEST.



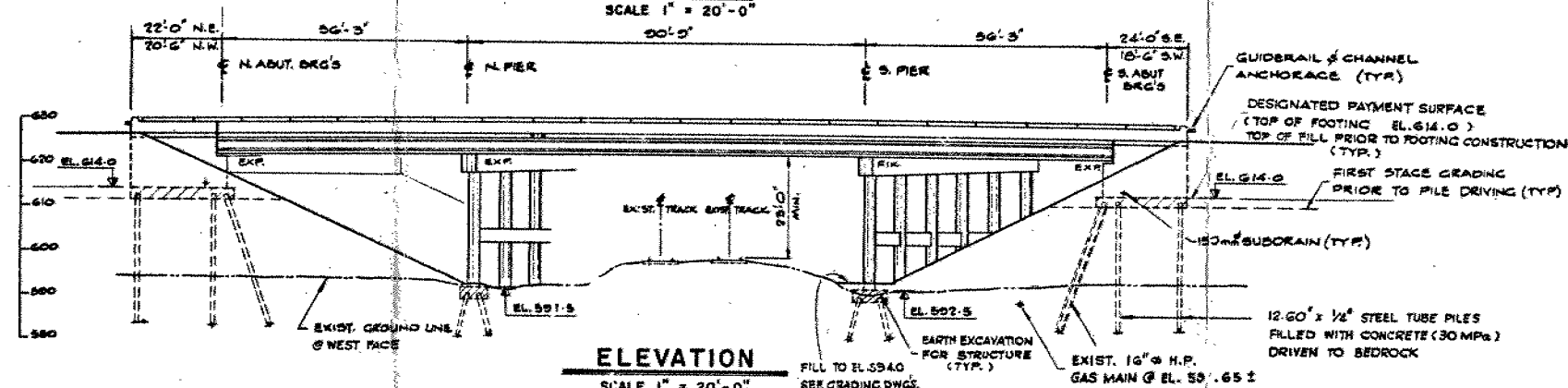
PLAN
SCALE 1" = 20'-0"



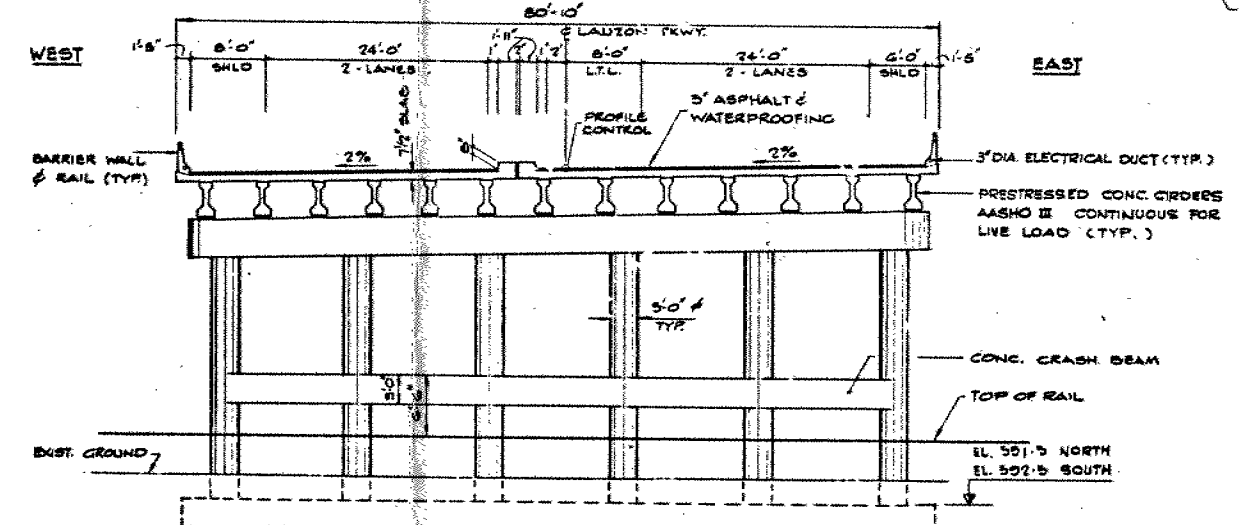
PROFILE LAUZON PARKWAY
N.T.S.

ELEV.	599.35	599.36	599.54	599.57	599.48
STA.	98+00	99+00	100+00	101+00	102+00

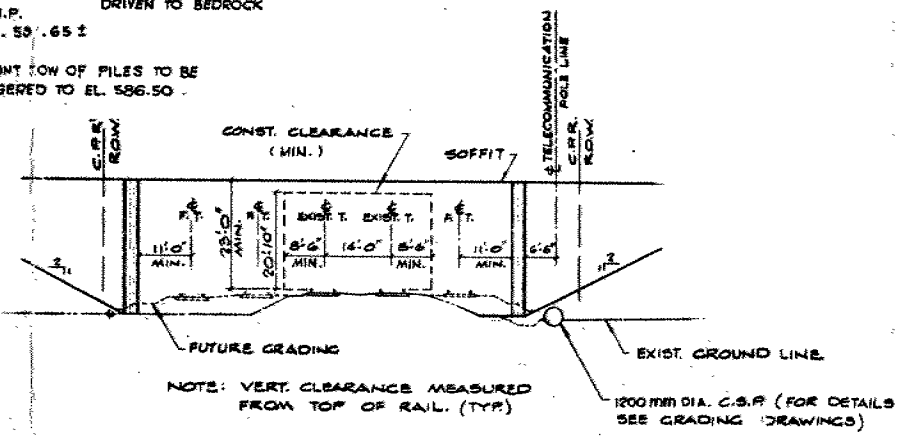
PROFILE C.P.R.
N.T.S.



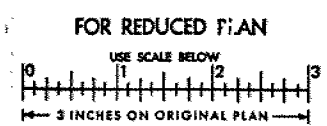
ELEVATION
SCALE 1" = 20'-0"



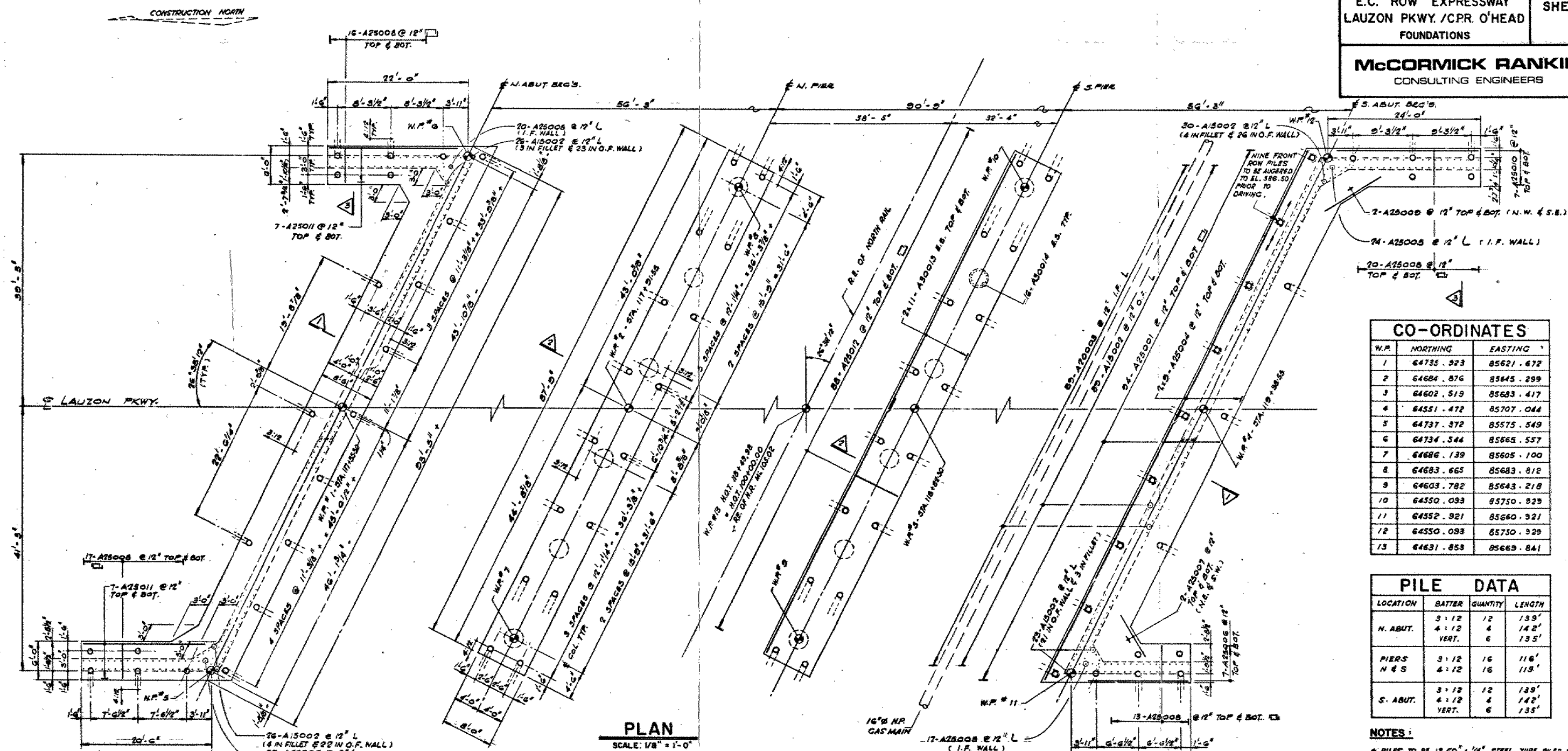
SECTION
SCALE 1" = 10'-0"



CLEARANCE DIAGRAM
SCALE 1" = 20'-0"



REVISIONS	DATE BY	DESCRIPTION
DESIGN	J.L. CHECK	J.B. LOADING HS 20-44
DRAWING	S.A. CHECK	R.S. SITE No 6-298
		DWG 1



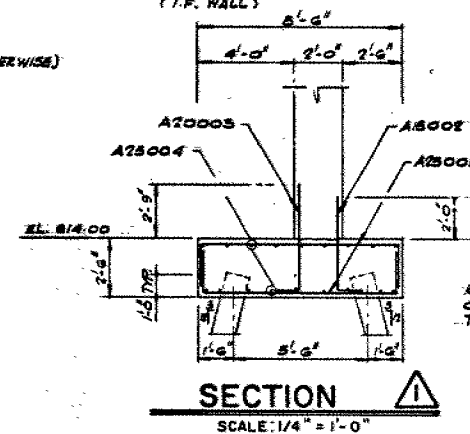
CO-ORDINATES		
W.P.	NORTHING	EASTING
1	64735.923	85621.672
2	64684.876	85645.299
3	64602.519	85683.417
4	64551.472	85707.044
5	64737.372	85575.549
6	64734.544	85665.557
7	64686.139	85605.100
8	64683.665	85683.812
9	64603.782	85643.218
10	64550.093	85750.929
11	64552.921	85660.921
12	64550.093	85750.929
13	64631.853	85663.841

PILE DATA			
LOCATION	BATTER	QUANTITY	LENGTH
N. ABUT.	3 : 12	12	139'
	4 : 12	4	142'
	VERT.	6	135'
PIERS N & S	3 : 12	16	116'
	4 : 12	16	119'
S. ABUT.	3 : 12	12	139'
	4 : 12	4	142'
	VERT.	6	135'

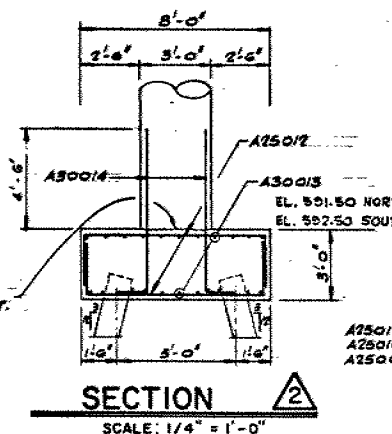
NOTES :

- PILES TO BE 12-60" \times 1/4" STEEL TUBE PILES FILLED WITH CONCRETE (30 MPa) DRIVEN TO BEDROCK. CONCRETE QUANTITY - 291 CU. YDS.
- DESIGN LOAD = 120 TONS
- PILE LAYOUT DIMENSIONS ARE TO BE MEASURED AT THE UNDERSIDE OF FOOTINGS
- PILE LENGTHS SHOWN ARE THE THEORETICAL LENGTHS BELOW CUT-OFF ELEV.
- THE DRIVING ENERGY SHALL BE REDUCED TO LESS THAN 30,000 FT.-LBS PER BLOW WHEN THE TIP OF THE PILE IS BELOW EL. 433.0
- ALL NINE FRONT ROW PILES AT THE SOUTH ABUTMENT FOOTING SHALL BE AUGERED TO ELEV. 586.50 DIA. OF AUGERED HOLES 18"

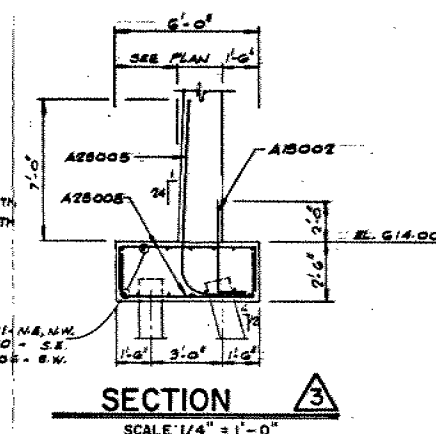
DIMENSIONS
(TYP. UNLESS NOTED OTHERWISE)



ROUGHEN
CONST. 37.
TYPICAL.



PLAN
SCALE: 1/8" = 1'-0"



REINFORCING

(TYP. UNLESS NOTED OTHERWISE)

LEGEND

- Q -- DENOTES BATTERED FILE.
O DENOTES VERTICAL FILE.
G DENOTES AUGURED FILE



FOR REDUCED PLAN

REVISIONS						
	DATE	BY	DESCRIPTION			
	DESIGN	J.L.	CHECK	J.B.	LOADING	HS 20-44
	DRAWING	M.B.	CHECK	R.S.	SITE No	6-298
					DWG	3

ENGINEERING MATERIALS OFFICE
SOIL MECHANICS SECTION

WP 259-66-08

DIST 1

HWY E.C. Row STR SITE 6-298

C.P.R. Overhead on
Lauzon Parkway Extension

80-4/3

DISTRIBUTION

A.P. Watt (2)
J.R. Roy
A. Wittenberg
J.H. Blevins (2)

A.E. McKim
G.A. Wrong
B.J. Giroux
R.S. Pillar

R. Hore

A. Crowley)
J. Anderson) cover only
G. Sloan)

Files ✓

SAMPLE DISPOSITION NOTICE		
TYPE	DISCARD AFTER	RECOMM. BY
JARS	79-05-01	PP
TUBES	79-05-01	PP
ROCK CORES	N/A	

FOUNDATION INVESTIGATION REPORT

For

C.P.R. Overhead
on Lauzon Parkway Extension
W.P. 259-66-08, Site 6-298
E.C. Row Expressway, District 1, Chatham

INTRODUCTION

This report contains the results of a foundation investigation carried out for the above project. Fieldwork consisted of five sampled boreholes, two of which were accompanied by dynamic cone penetration tests. The boreholes were advanced during the period December 18 to 20, 1978 employing a CME 750 auger mounted on a rubber tired all-terrain vehicle. Hollow stem augers were used in all boreholes.

SITE DESCRIPTION

The site is located on the southeast boundary of the City of Windsor approximately 1/3 of a mile west of the present intersection of Lauzon Road and the C.P.R. rail line. The surrounding area is flat reflecting its physiographic description as part of the St. Clair Clay Plain. This area has remained agricultural and is engaged in the production of cash crops. The twin tracks of the Canadian Pacific Railway run on a low embankment approximately five feet in height. This embankment is flanked by shallow ditches and by a utility corridor on the south side. This corridor contains a high pressure gas main and a number of high voltage power lines running to the transformer station west of Lauzon Road.

SUBSURFACE CONDITIONS

Limestone bedrock is overlain by a cohesive deposit some 115 feet in thickness. It consists primarily of clayey silt (clay of low plasticity) containing traces of sand and gravel, as well as occasional layers of silty clay (clay of intermediate plasticity). A plot of liquid limit versus plasticity index for this deposit is shown as Figure 1 of the Appendix. A desiccated crust has developed

which extends to a depth of between 10 and 15 ft. It is brown in colour and has an undrained shear strength ranging from 2000 to 5000 p.s.f. In the undesiccated zone the shear strength decreases to about 1500 p.s.f. and then increases to in excess of 5000 p.s.f. in the 20 feet above the bedrock. Moisture content for the clayey silt ranges from 14 to 18 percent in the desiccated zone and from 16 to 20 percent in the undesiccated portion. The silty clay has a much higher moisture content ranging from 25 to 35 percent.

Reference should be made to the Record of Borehole Sheets which are contained in the report Appendix. They show a summary of all field and laboratory tests performed. Reference should also be made to Drawing No. 2596608-A which shows the location and elevations of all borings, together with an inferred subsoil stratigraphy.

Groundwater

Groundwater levels were recorded in the open boreholes during the period of the field investigation. During this period groundwater levels were within five feet of the ground surface.

Design Considerations

It is proposed that Lauzon Parkway pass over the C.P.R. tracks on a three span structure approximately 185 feet in length. The proposed grade will require that the approach fills be 34 feet in height.

RECOMMENDATIONS

Piers

The piers may be supported on spread footings at elevation 587 with a design loading of two tons per square foot. Resistance to sliding may be calculated employing a design adhesion value of 2000 pounds per square foot. It is estimated that settlements will be less than three inches.

Perched Abutments

Perched abutments may be supported on steel tube piles (12 3/4" x 1/4") driven into the desiccated crust. Piles driven to elevation 585 will support a design load of 25 tons per pile. It is estimated that settlements of up to 8 inches will occur at the abutments due to the embankment loading. The amount of this settlement which takes place after completion of the structure may be reduced by stage construction.

Piles to Bedrock

Any or all of the footings may be supported on piles driven to bedrock at elevation 478. Either steel tube piles (12 3/4" x 1/4") or HP12X74 H piles will carry design loads of up to 120 tons per pile. If tube piles are adopted the driving energy must be reduced to less than 30,000 ft/lb per blow when the pile tip is below elevation 485. If H piles are employed the tips should be reinforced by standard flange plates to increase the contact area between the pile tip and the bedrock. If piles to bedrock are employed the structure settlement will be less than one inch.

Dewatering

No dewatering problems are anticipated due to the relatively impervious nature of the upper layers of the subsoil.


Frost Protection

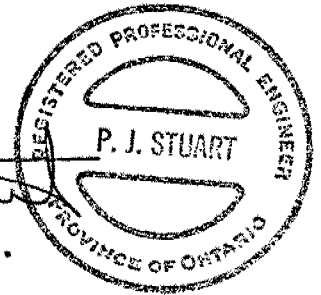
The base of all footings or pile caps should be protected from frost action by a minimum of four feet of cover.

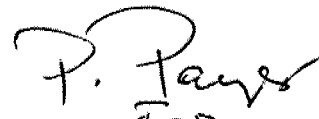
Approach Embankments

No problems of embankment instability are anticipated if the approach fills (35 ft. high) are designed with 2:1 slopes. Settlement

of the subsoil of from 8 to 10 inches is predicted to take place under the approach embankments. Of this amount 60 percent could be expected to take place in the six months following completion of the fill.


P.J. Stuart, P. Eng.
Project Engineer




FOR
K.G. Selby, P. Eng.
Supervising Engineer

April, 1979

APPENDIX



RECORD OF BOREHOLE No 1

W P 259-66-08 LOCATION Coords. N 15 364 722; E 885 627 ORIGINATED BY PJS
DIST 1 HWY E.C. Row BOREHOLE TYPE Hollow Stem Auger COMPILED BY PJS
DATUM Geodetic DATE December 18, 1978 CHECKED BY CP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
594.0	Ground Level																
0.0																	
			1	SS	10		590										
			2	SS	34												
			3	SS	21												
			4	SS	15		580										
			5	SS	13												
			6	SS	11												
			7	SS	9		570										
			8	SS	9												
			9	SS	11		560										
			10	SS	9												
			11	SS	10		550										
			12	SS	14												
			13	SS	9		520										
			14	SS	40		500										
			15	SS	40		480										
478.9	Refusal to Augering																
115.1	End of Borehole																
	Probable Bedrock																

+3, x5: Numbers refer to
Sensitivity

20
15 5 (%) STRAIN AT FAILURE
10



RECORD OF BOREHOLE No 2

W P 259-66-08 LOCATION Coords. N 15 364 670; E 885 607 ORIGINATED BY PJS
DIST 1 HWY E.C. Row BOREHOLE TYPE Hollow Stem Auger & Cone Test COMPILED BY PJS
DATUM Geodetic DATE December 19, 1978 CHECKED BY CP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
592.8	Ground Level																
0.0			1	SS	30		590										
			2	SS	25												
			3	SS	14												
			4	SS	11		580										
			5	SS	8												
			6	SS	10												
			7	SS	11		570										
			8	SS	11												
561.3																	
31.5	End of Borehole																

+3, x5: Numbers refer to
Sensitivity

20
15 5 (%) STRAIN AT FAILURE
10



RECORD OF BOREHOLE No 3

W P 259-66-08 LOCATION Coords. N 15 364 671; E 885 695 ORIGINATED BY PJS
DIST 1 HWY E.C. Row BOREHOLE TYPE Hollow Stem Auger COMPILED BY PJS
DATUM Geodetic DATE December 19, 1978 CHECKED BY CP.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT Σ					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
592.8	Ground Level																
0.0	Brown Grey Clayey Silt Traces of Sand and Gravel Occasional Layers of Silty Clay Hard to Stiff		1	SS	7		590										
			2	SS	31												
			3	SS	14												
			4	SS	13		580										
			5	SS	9												
			6	SS	12												
			7	SS	12		570										
			8	SS	12												
561.3																	
31.5	End of Borehole																



RECORD OF BOREHOLE No 4

W P 259-66-08 LOCATION Coords. N 15 364 605; E 885 637 ORIGINATED BY PJS
DIST 1 HWY E.C. Row BOREHOLE TYPE Hollow Stem Auger and Cone Test COMPILED BY PJS
DATUM Geodetic DATE December 19, 1978 CHECKED BY EP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40						60	80	100
								SHEAR STRENGTH PSF							WATER CONTENT (%)		
							○ UNCONFINED + FIELD VANE										
							● QUICK TRIAXIAL × LAB VANE										
							500 1000 1500 2000 2500				10 20 30						
592.2	Ground Level																
0.0	Brown Grey Clayey Silt Traces of Sand and Gravel Occasional Layers of Silty Clay Hard to Stiff						590										
			1	SS	11												
			2	SS	44												
			3	SS	24												
			4	SS	9												
			5	SS	10												
			6	SS	16												
			7	SS	13												
559.2			8	SS	12		560	+ 2240									
33.0	End of Borehole																



RECORD OF BOREHOLE No 5

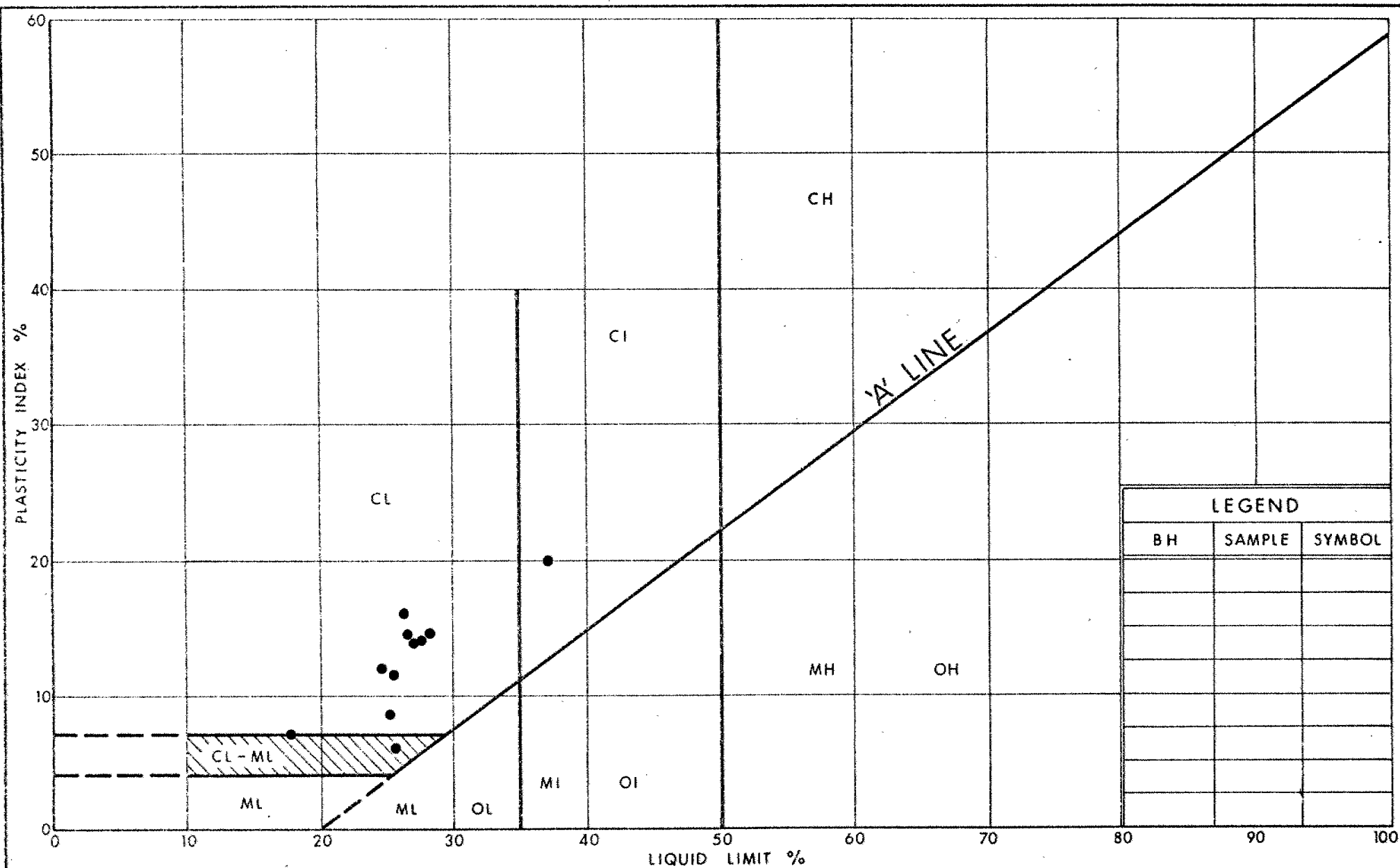
W P 259-66-08 LOCATION Coords. N 15 364 603; E 885 726 ORIGINATED BY PJS
DIST 1 HWY E.C. Row BOREHOLE TYPE Hollow Stem Auger COMPILED BY PJS
DATUM Geodetic DATE December 20, 1978 CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ PCF	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
592.1	Ground Level																
0.0							590										
			1	SS	23												
			2	SS	41												
			3	SS	15												
	Brown Grey		4	TW	PH		580									137	
	Clayey Silt Traces of Sand and Gravel Occasional Layers of Silty Clay		5	SS	9												
			6	TW	PH		570									135	
	Hard to Stiff		7	TW	PH											141	P _c =3.6t/ft ² C _c =0.145 e _o =0.515
							560										
			8	TW	PH											136	P _c =3.5t/ft ² C _c =0.168 e _o =0.516
							550										
			9	TW	PH		540									141	P _c =4.2t/ft ² C _c =0.80 e _o =0.374
							530										
							520										
							510										
							500										
							490										
478.5	Refusal to Augering						480										
113.6	End of Borehole Probable Bedrock																

Note: Water Level
Not Established

+³, x⁵: Numbers refer to
Sensitivity

20
15 5 (%) STRAIN AT FAILURE
10



Ontario

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Communications

PLASTICITY CHART
CLAYEY SILT, TRACES OF SAND & GRAVEL
OCC LAYERS OF SILTY CLAY

FIG No 1

W P 259-66-08

VOID RATIO - PRESSURE CURVES

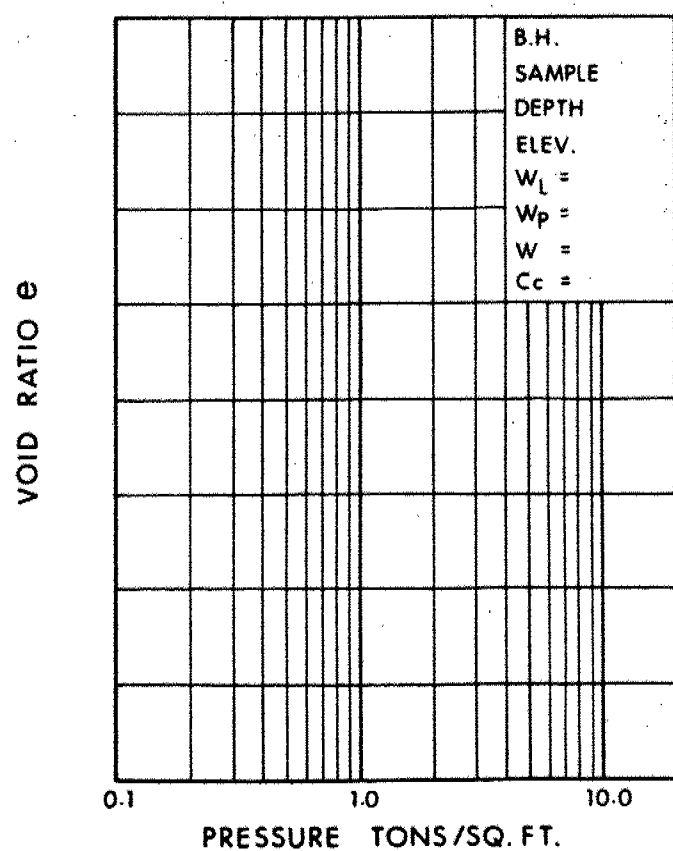
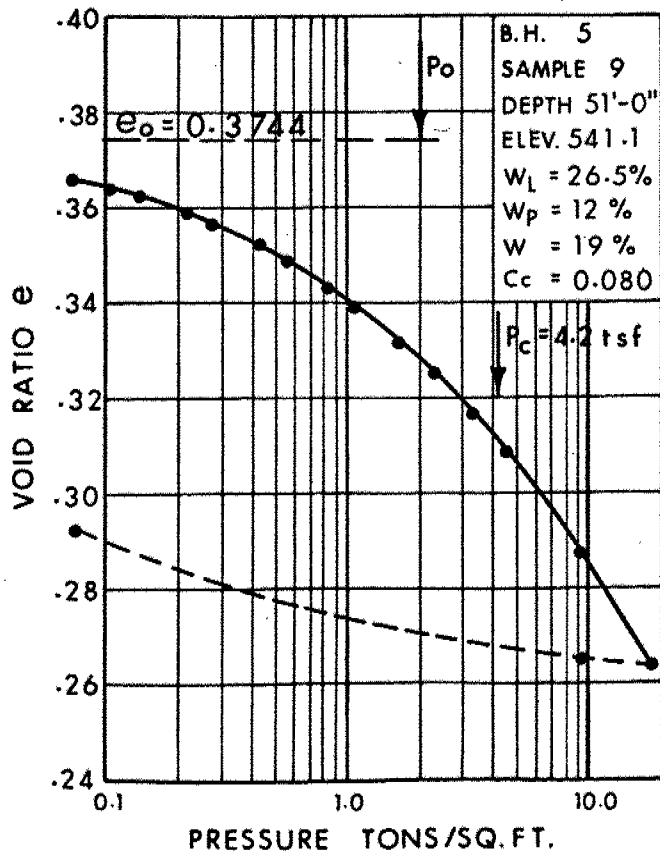
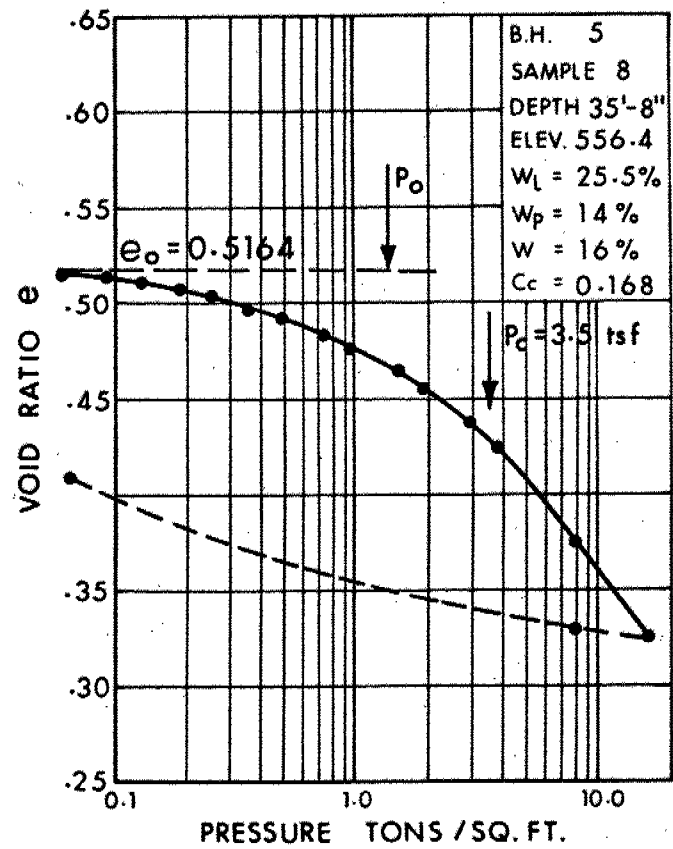
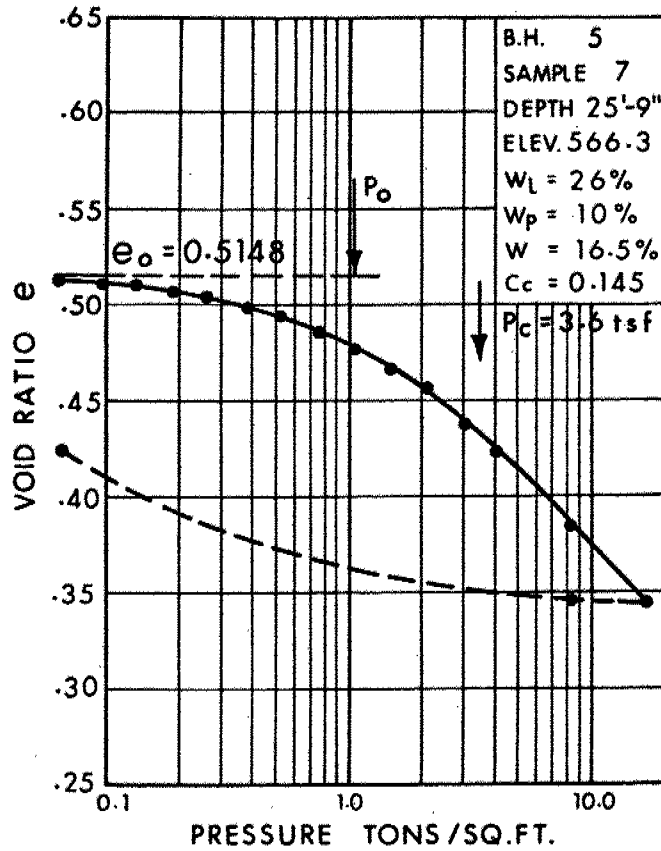


FIG. 2

WP 259-66-08

EXPLANATION OF TERMS USED IN REPORT

'N' VALUE: AN INDICATOR OF SUBSOIL QUALITY. IT IS OBTAINED FROM THE STANDARD PENETRATION TEST (CSA STD. A119.1). SPT 'N' VALUE IS THE NUMBER OF BLOWS REQUIRED TO CAUSE A STANDARD 2 INCH O.D. SPLIT-BARREL SAMPLER TO PENETRATE 12 INCHES INTO UNDISTURBED GROUND IN A BOREHOLE WHEN DRIVEN BY A HAMMER WEIGHING 140 POUNDS, FALLING FREELY A DISTANCE OF 30 INCHES. FOR PENETRATIONS OF LESS THAN 12 INCHES 'N' VALUES ARE INDICATED AS THE NUMBER OF BLOWS FOR THE PENETRATION ACHIEVED. 'N' VALUES CORRECTED FOR OVERBURDEN PRESSURE ARE DENOTED THUS N_c .

DYNAMIC CONE PENETRATION TEST (CSA STD. A119.3): CONTINUOUS PENETRATION OF A CONICAL STEEL POINT (2" O.D. 60 CONE ANGLE) DRIVEN BY 350 FT-LB IMPACTS ON "A" SIZE DRILL RODS. THE RESISTANCE TO CONE PENETRATION IS MEASURED AS THE NUMBER OF BLOWS FOR EACH 12 INCH ADVANCE OF THE CONICAL POINT INTO THE UNDISTURBED GROUND.

SOIL QUALITY: SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSITY.

CONSISTENCY: COHESIVE SOILS ARE DESCRIBED ON THE BASIS OF THEIR UNDRAINED SHEAR STRENGTH AS FOLLOWS:

S_u (PSF)	0 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 4000	> 4000
	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD

DENSNESS: COHESIONLESS SOILS ARE DESCRIBED ON THE BASIS OF SPT 'N' VALUES AS FOLLOWS:

'N' (BLOW/FT)	0 - 5	5 - 10	10 - 30	30 - 50	> 50
	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

ROCK QUALITY: 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 DRILLED IN THAT CORING RUN.

MODIFIED RECOVERY: SUM OF THOSE NATURALLY FRACTURED CORE PIECES, 4"+ 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	2"	2" - 12"	1' - 3'	3' - 10'	> 10'
JOINTING	VERY CLOSE	CLOSE	MOD. CLOSE	WIDE	VERY WIDE
BEDDING	VERY THIN	THIN	MEDIUM	THICK	VERY THICK

ABBREVIATIONS & SYMBOLS

LABORATORY TESTING

TRIAXIAL TESTS ARE DESCRIBED IN TERMS OF WHETHER THEY ARE CONSOLIDATED (C) OR NOT (U) ISOTROPICALLY (I) OR NOT (A) AND SHEARED DRAINED (D) OR UNDRAINED (U) WITH PORE PRESSURE MEASUREMENTS (BAR OVER SYMBOLS) EG. $C\bar{U}$ = CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL WITH PORE PRESSURE MEASUREMENT UNLESS OTHERWISE SPECIFIED IN REPORT ALL TESTS ARE IN COMPRESSION

FIELD SAMPLING

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

EARTH PRESSURE TERMS

μ COEFFICIENT OF FRICTION
 δ ANGLE OF WALL FRICTION
 k_o COEFFICIENT OF EARTH PRESSURE AT REST
 k_A COEFFICIENT OF ACTIVE EARTH PRESSURE
 k_P COEFFICIENT OF PASSIVE EARTH PRESSURE
 i ANGLE OF INCLINATION OF SURCHARGE
 w SLOPE ANGLE-BACKFACE OF WALL
 β ANGLE OF SLOPE
 N, N_q, N_c BEARING CAPACITY FACTORS
 D_f DEPTH OF FOOTING
 B, L FOOTING DIMENSIONS

INDEX PROPERTIES

γ UNIT WEIGHT OF SOIL (BULK DENSITY)
 γ_w UNIT WEIGHT OF WATER
 γ_d UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
 γ' UNIT WEIGHT OF SUBMERGED SOIL
 G_s SPECIFIC GRAVITY OF SOLIDS
 e VOIDS RATIO
 e_o INITIAL VOIDS RATIO
 e_{max} e IN LOOSEST STATE
 e_{min} e IN DENSEST STATE
 D_r RELATIVE DENSITY = $\frac{e_{max} - e}{e_{max} - e_{min}}$
 n POROSITY
 w WATER CONTENT
 w_L LIQUID LIMIT
 w_P PLASTIC LIMIT
 w_S SHRINKAGE LIMIT
 I_P PLASTICITY INDEX = $w_P - w_L$
 I_L LIQUIDITY INDEX = $\frac{w - w_P}{P}$
 I_c CONSISTENCY INDEX = $\frac{w_L - w}{I_P}$
 A_c ACTIVITY = $\frac{I_P \text{ of soil}}{w_L - w \text{ of } 2\mu m \text{ Soil Fraction}}$
 Om ORGANIC MATTER CONTENT
 S_r DEGREE OF SATURATION
 S SENSITIVITY = $\frac{S_u (\text{undisturbed})}{S_u (\text{remoulded})}$

STRENGTH PARAMETERS

ϕ ANGLE OF SHEARING RESISTANCE
 τ_f PEAK SHEAR STRENGTH
 τ_R RESIDUAL SHEAR STRENGTH
 c COHESION INTERCEPT
 $\sigma_1, \sigma_2, \sigma_3$ NORMAL PRINCIPAL STRESSES
 u PORE WATER PRESSURE
 u_e EXCESS u
 r_u PORE PRESSURE RATIO
 q_u UNCONFINED COMPRESSIVE STRENGTH
 s_u UNDRAINED SHEAR STRENGTH
 ϵ LINEAR STRAIN
 γ SHEAR STRAIN
 ν POISSON'S RATIO
 E MODULUS OF ELASTICITY
 G MODULUS OF SHEAR DEFORMATION
 k_s MODULUS OF SUBGRADE REACTION
 m, n STABILITY COEFFICIENTS
 A, B PORE PRESSURE COEFFICIENTS

HYDRAULIC TERMS

h HYDRAULIC HEAD OR POTENTIAL
 q RATE OF DISCHARGE
 v VELOCITY OF FLOW
 i HYDRAULIC GRADIENT
 j SEEPAGE FORCE PER UNIT VOLUME
 η COEFFICIENT OF VISCOSITY
 k COEFFICIENT OF HYDRAULIC CONDUCTIVITY
 k_h k IN HORIZONTAL DIRECTION
 k_v k IN VERTICAL DIRECTION
 m_v COEFFICIENT OF VOLUME CHANGE
 c_v COEFFICIENT OF CONSOLIDATION
 C_c COMPRESSION INDEX
 C_r RECOMPRESSION INDEX
 d DRAINAGE PATH DISTANCE
 T_v TIME FACTOR
 U DEGREE OF CONSOLIDATION
 O_r OVERCONSOLIDATION RATIO (OCR)

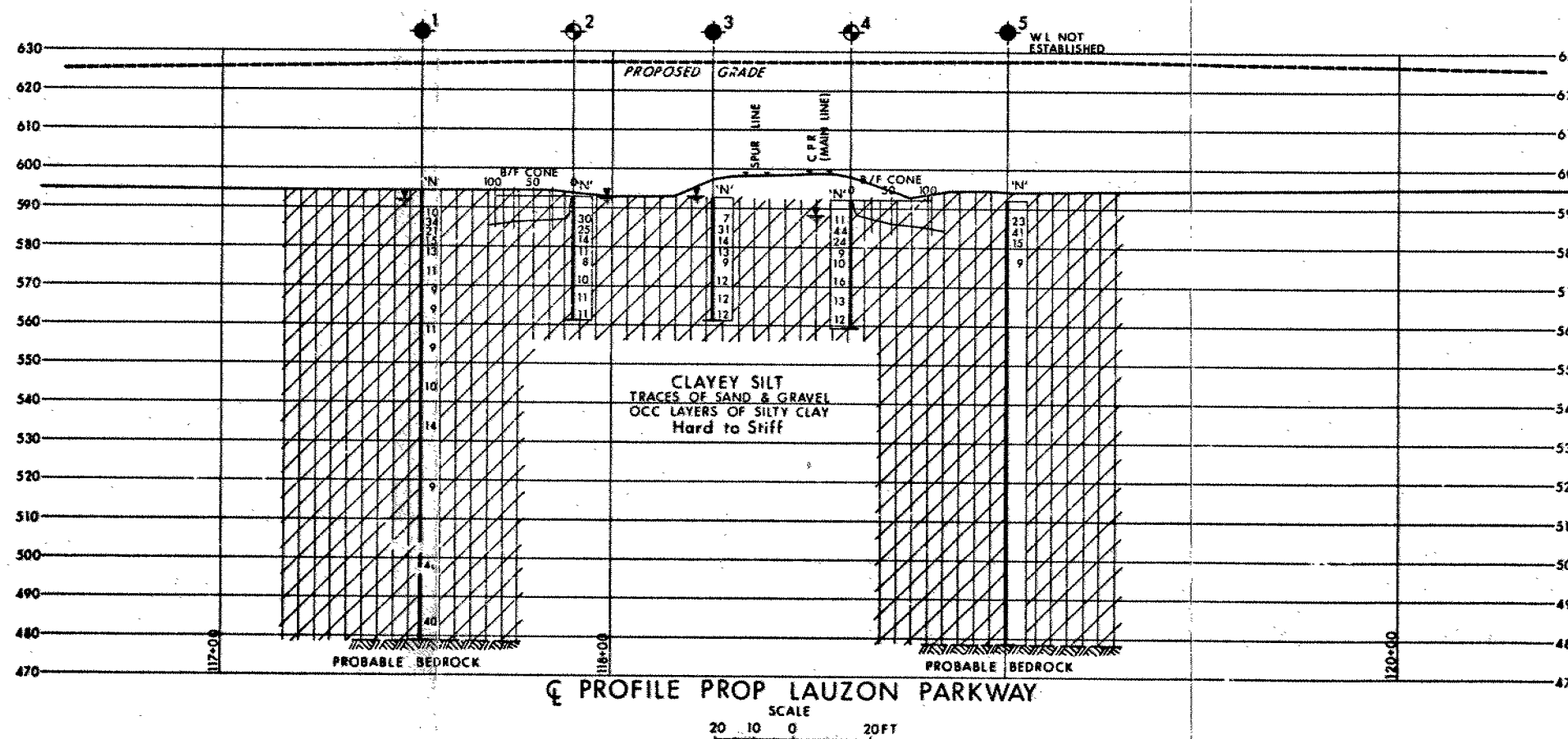
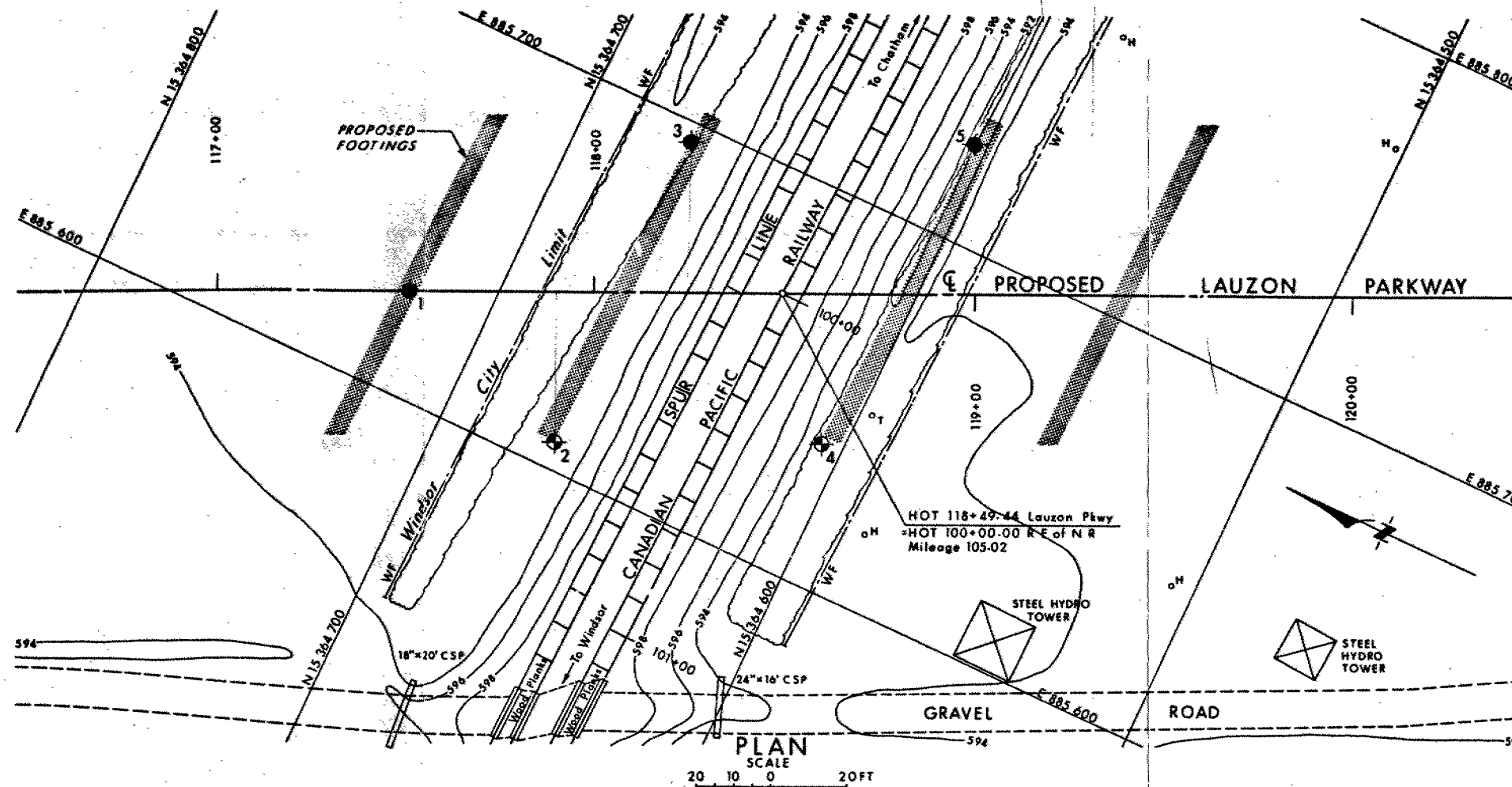
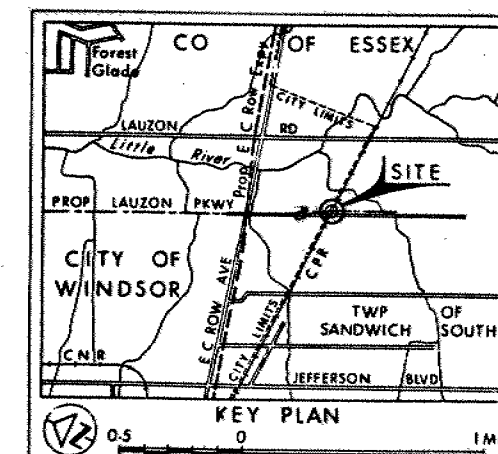
NOTE: EFFECTIVE STRESS PARAMETERS ARE DENOTED BY USE OF APOSTROPHE ABOVE THE SYMBOL, THUS:
 ϕ' = EFFECTIVE ANGLE OF SHEARING RESISTANCE;
 σ' = EFFECTIVE NORMAL STRESS

CONT No
WP No 259-66-08



C P R OVERHEAD ON
LAUZON PARKWAY
BORE HOLE LOCATIONS & SOIL STRATA

SHEET



LEGEND

- Bore Hole
- ⊕ Dynamic Cone Penetration Test (Cone)
- ⊕ Bore Hole & Cone
- 'N' Blows/ft (Std Pen Test 350ft lbs energy)
- CONE Blows/ft (60° Cone, 350ft lbs energy)
- ↓ W/L at time of investigation Dec 1978
- W/L NOT Established in BH 5

No	ELEVATION	CO-ORDINATES NORTH	EAST
1	594.0	15 364 722	885 627
2	592.8	15 364 670	885 607
3	592.8	15 364 671	885 695
4	592.2	15 364 606	885 637
5	592.1	15 364 603	885 726

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

Geocres No 4037-17
HWY No Prop E C ROW Expy DIST 1
SUBMIDPJS CHECKED DATE Apr 20, 79 SITE 6-298
DRAWN CHECKED APPROVED DWG 2596608-A