

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 30M13-52

DIST. 6 REGION

W.P. No. 153-80-05

CONT. No. 88-30

W. O. No.

STR. SITE No. 37-1112

HWY. No.

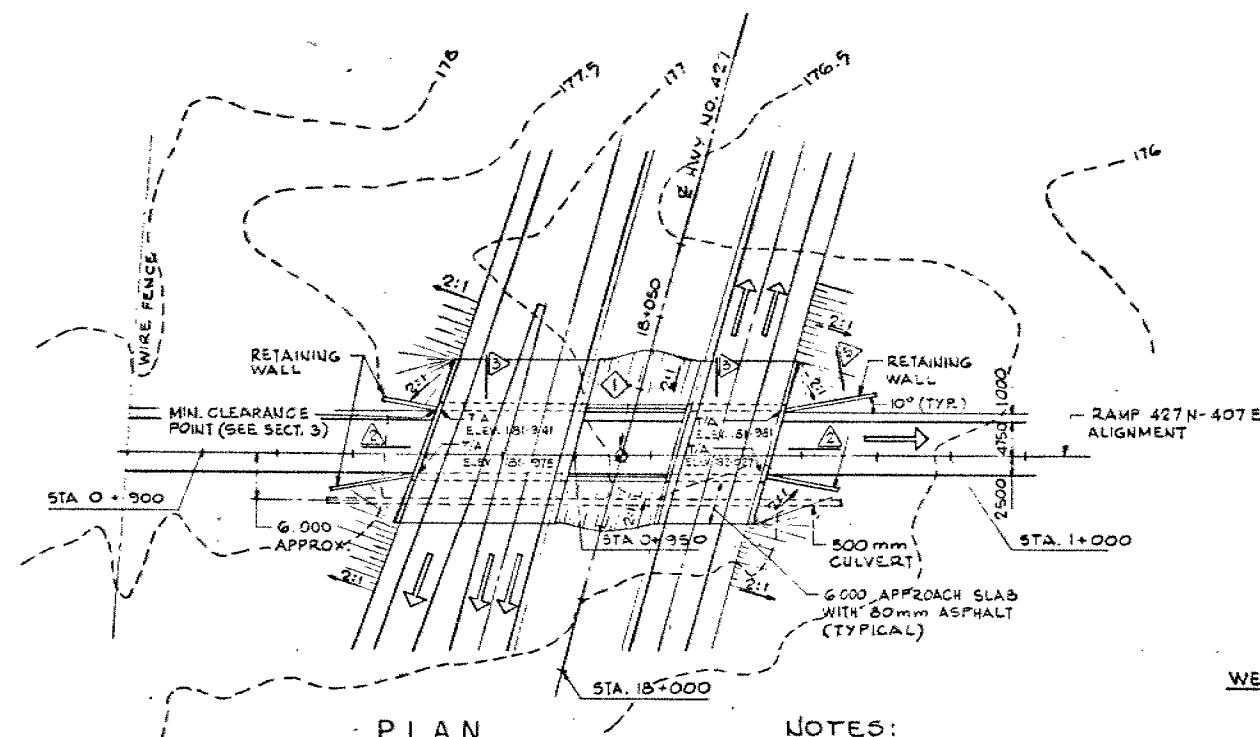
LOCATION Hwy 427 over Ramp
Hwy 427N-407E

No of PAGES -

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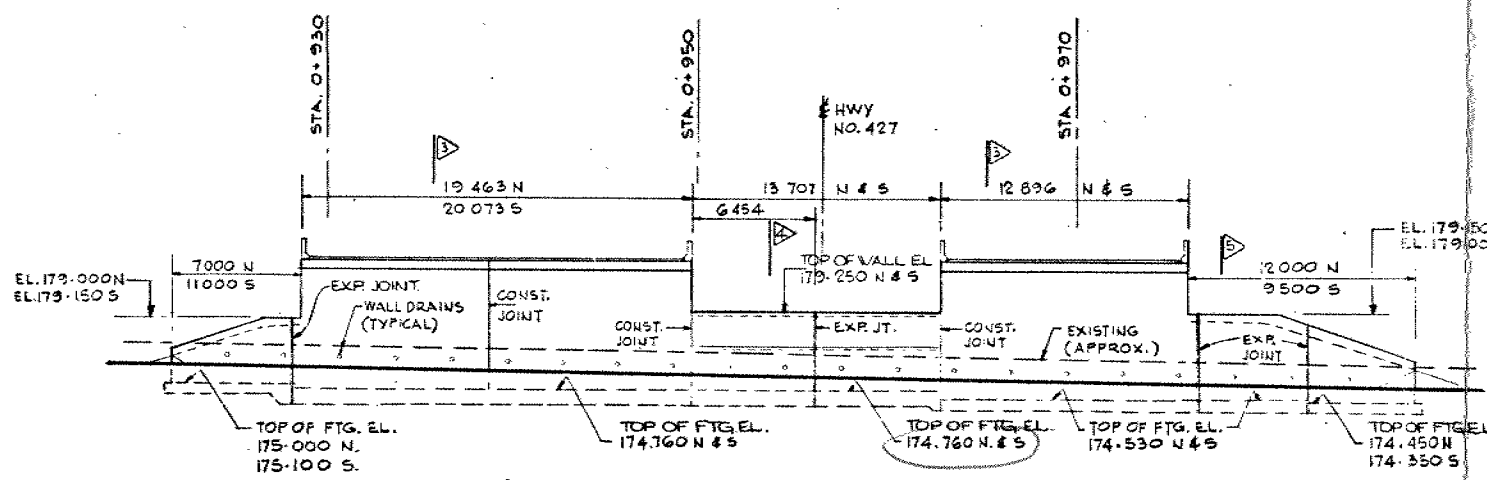
OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:

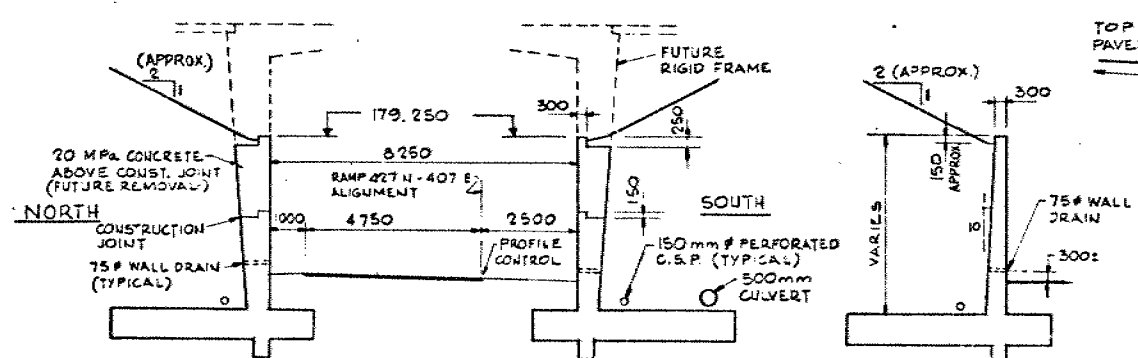


PLAN
SCALE 1:500

NOTES:
1. APPROACH SLABS, ASPHALT AND WATERPROOFING NOT PART OF THIS CONTRACT.
2. T/A DENOTES TOP OF ASPHALT.



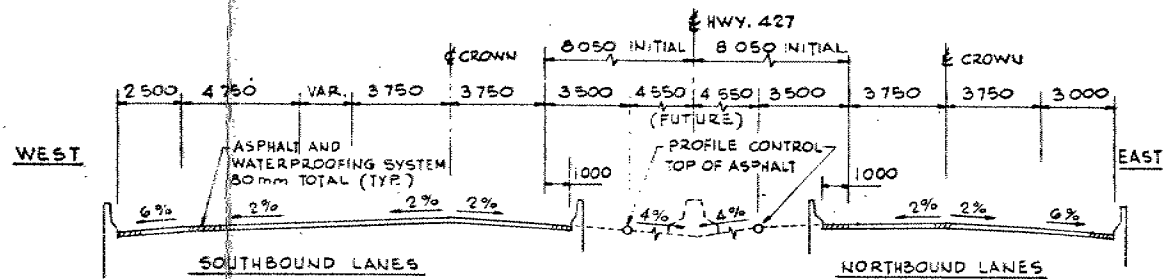
SECTION 2 (SHOWING NORTH ABUTMENT)
SCALE 1:200



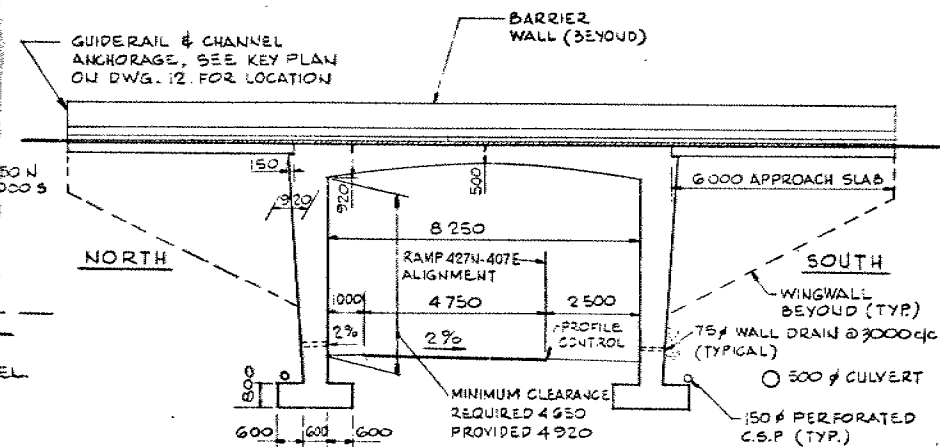
SECTION 4
SCALE 1:100

TYPICAL RETAINING WALL OUTSIDE RIGID FRAMES
SCALE 1:100

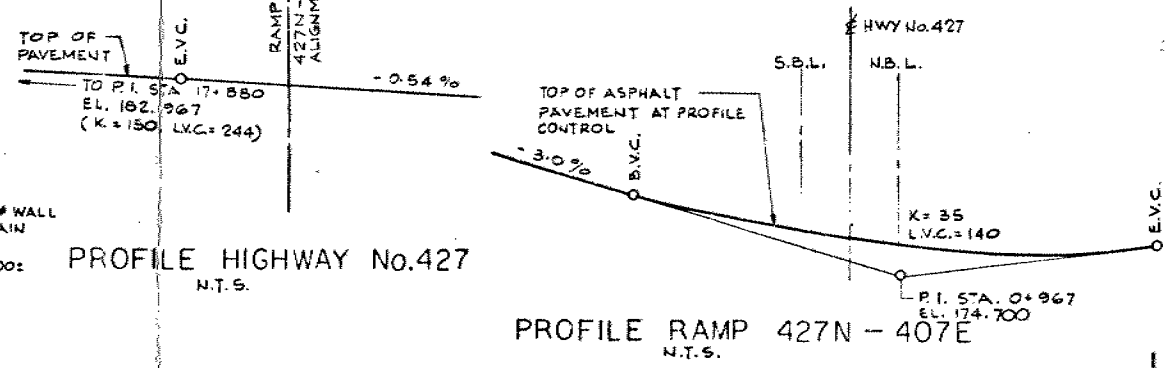
DETAIL 1
N.T.S.



HWY. 427 CROSS-SECTION OVER 427N-407E RAMP
N.T.S.



SECTION 3
SCALE 1:100



PROFILE HIGHWAY No. 427
N.T.S.

PROFILE RAMP 427N-407E
N.T.S.



METRIC

DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN. ELEVATIONS, COORDINATES, CURVE AND ALIGNMENT DATA ARE IN METRES. STATIONS ARE IN KILOMETRES + METRES.

DIST. 6
CONT No
WP No 153-80-05

427N-407E RAMP
OVERPASS AT HWY 427
GENERAL ARRANGEMENT

SWR Engineering Limited
Consulting Engineers
Toronto Canada



SHEET

GENERAL NOTES

REINFORCING STEEL SHALL BE GRADE 400 UNLESS OTHERWISE SPECIFIED. BARS MARKED WITH THE SUFFIX 'C' SHALL BE EPOXY COATED BARS.
CLASS OF CONCRETE:
FOOTINGS, APPROACH SLABS AND WHERE NOTED ON DRAWING... 20 MPa
REMAINDER... 30 MPa
CLEAR COVER TO REINFORCING STEEL
FOOTINGS... 100±25mm
ABUTMENTS, WINGWALLS AND RETAINING WALLS (FRONT SURFACE)... 80±20mm
DECK (BOTTOM ONLY)... 50±10mm
BARRIER WALLS... 50mm
REMAINDER - UNLESS NOTED OTHERWISE... 70±20mm

CONSTRUCTION NOTES

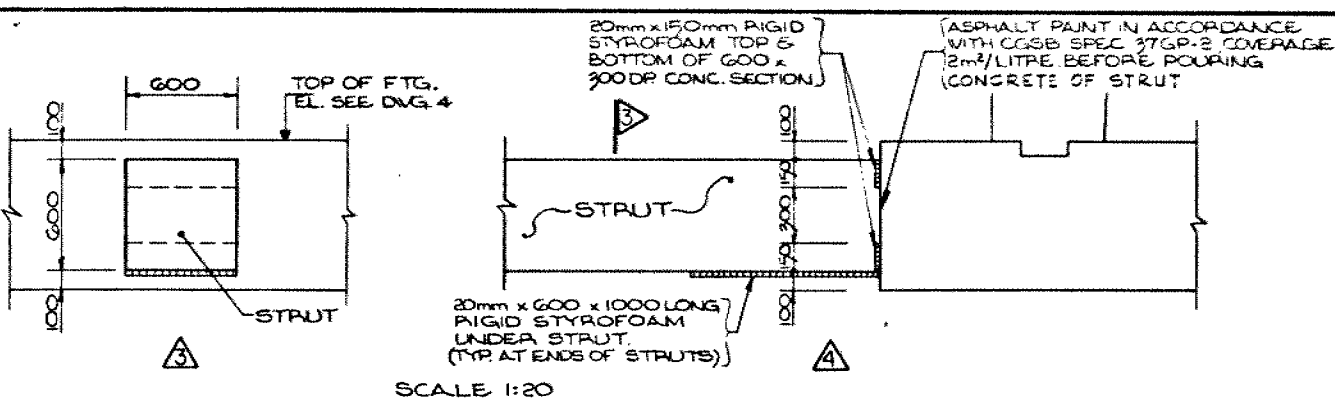
BACKFILL SHALL BE PLACED SIMULTANEOUSLY BEHIND BOTH ABUTMENTS, KEEPING THE HEIGHT OF THE BACKFILL APPROXIMATELY THE SAME. AT NO TIME SHALL THE DIFFERENCE IN ELEVATIONS BE GREATER THAN 0.5 m.
SIDES OF FOOTINGS TO BE CAST AGAINST UNDISTURBED GROUND.

LIST OF DRAWINGS

DRAWING NO.	TITLE
1	GENERAL ARRANGEMENT
2	BORE HOLE LOCATIONS AND SOIL STRATA
3	FOOTING LAYOUT
4	FOOTING REINFORCEMENT
5	ABUTMENTS
6	WINGWALLS I
7	WINGWALLS II
8	DECK REINFORCEMENT
9	SCREED ELEVATIONS
10	6000 mm APPROACH SLAB (S.B.L.)
11	6000 mm APPROACH SLAB (N.B.L.)
12	BARRIER WALL
13	RETAINING WALLS
14	BRIDGE DATE & SITE NUMBER DATA
15	AS CONSTRUCTED ELEVATIONS & DIMENSIONS
16	ELECTRICAL EMBEDDED WORK 1
17	ELECTRICAL EMBEDDED WORK 2
18	QUANTITIES - STRUCTURE

REVISIONS	DATE	BY	DESCRIPTION

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING



SCALE 1:20

METRIC

DIMENSIONS ARE IN MILLIMETRES
UNLESS OTHERWISE SHOWN.
ELEVATIONS, COORDINATES, CURVE
AND ALIGNMENT DATA ARE IN METRES.
STATIONS ARE IN KILOMETRES + METRES.

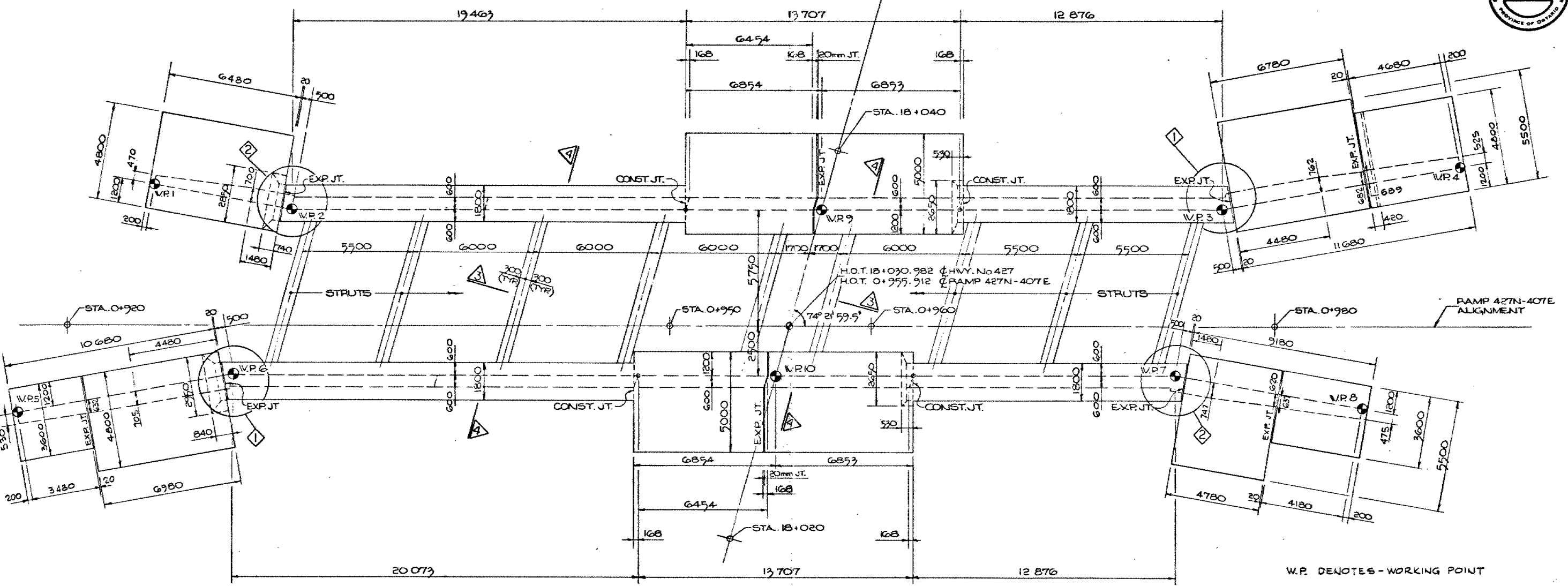
CONT No
WP No 153-80-05

427N - 407E RAMP
OVERPASS AT HWY 427
FOOTING LAYOUT

**SWR
Engineering
Limited**

Consulting
Engineers

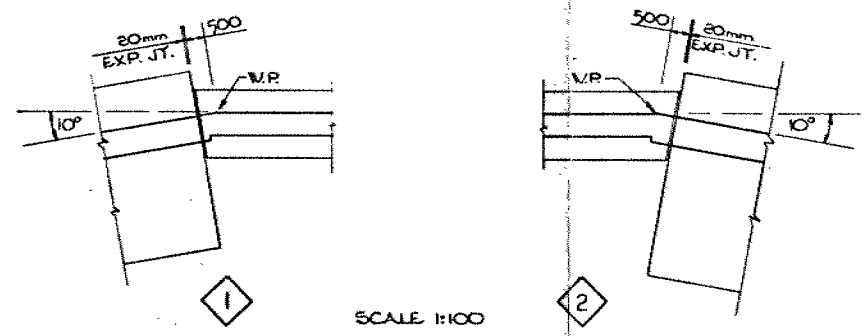
Toronto
Canada



W.P. DENOTES - WORKING POINT

WORKING POINT	STATION ON RAMP 427N-407E	OFFSET FROM ALIGNMENT (METRES)	COORDINATES	
			NORTH	EAST
1	0+924.310	6.966		
2	0+931.204	5.750	4845 684.311	294 188.895
3	0+977.250	5.750	4845 703.119	294 230.925
4	0+989.068	7.834		
5	0+917.452	4.410		
6	0+928.295	2.500	4845 675.588	294 189.601
7	0+974.941	2.500	4845 684.645	294 232.188
8	0+934.257	4.150		
9	0+957.521	5.750	4845 695.060	294 212.917
10	0+955.212	2.500	4845 686.586	294 214.180

FOOTING LAYOUT PLAN
SCALE 1:100



SCALE 1:100

20mm EXPANDED POLYSTYRENE.

EXPANSION JOINT IN FOOTINGS

N.T.S.

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

REVISIONS				
DATE	BY	DESCRIPTION		
DESIGN T.C.	CHECK E.J.R.	LOADING CR. 17-18-79		DATE JAN 83
DRAWING B.C.	CHECK T.S.	SITE 37-23-1102		DWG 1

FOUNDATION INVESTIGATION REPORT
HIGHWAY 427 OVER RAMP 427 N - 407 E
BOROUGH OF ETOBICOKE

W.P. 153-80-05	SITE 37 -1112
DISTRICT 6	TORONTO
01.82.006	FEBRUARY, 1982

CONT. 88-30

DISTRIBUTION:

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PREPARED BY:

MORTON & PARTNERS LIMITED
215 CARLINGVIEW DRIVE
REXDALE, ONTARIO M9W 5X8

GEO. 30M13-52

TABLE OF CONTENTS

	<u>PAGE NUMBER</u>
1.0 INTRODUCTION	1
2.0 SITE	1
3.0 FIELD WORK	1
4.0 SOIL CONDITIONS	2
4.1 Topsoil	2
4.2 Silty Clay (Till)	2
4.3 Sand	2-3
4.4 Sand (Till)	3
4.5 Silt (Till)	3
5.0 GROUNDWATER	4
6.0 DISCUSSION AND RECOMMENDATIONS	4
6.1 General	4
6.2 Foundations	4-5
6.3 Bearing Capacity	5-6
6.4 Stability	6
6.5 Construction	6
6.6 Embankment	7
7.0 MISCELLANEOUS	

GRAINSIZE DISTRIBUTION CURVES

FIGURE 1-3

BOREHOLE RECORDS

BOREHOLE LOCATIONS AND SOIL STRATA

1.0 INTRODUCTION

Morton & Partners Limited has been retained by the Ministry of Transportation and Communications to carry out a foundation investigation for a proposed underpass structure designated as Highway 427 over Ramp 427 N - 407 E.

2.0 SITE

The site is located in the proposed alignment of Highway 427, about 160 m north of Steeles Avenue, in the Borough of Etobicoke. At the present time, the site is part of a ploughed field and is approximately level at about elevation 177.

3.0 FIELD WORK

The field work for this investigation was carried out in the period of January 29 to February 6, 1982 and consisted of three boreholes accompanied by dynamic cone penetration tests and two additional dynamic cone penetration tests at the locations shown on the attached drawing. The work was carried out using a track-mounted CME-55 drilling machine, supplied and operated by Master Soil Investigations Limited.

Soil samples were taken using the Standard Penetration Test method and brought to our laboratory for further examination and testing. Samples remaining after testing will normally be stored for a period of three months following the date of this report and then discarded, unless other instructions are received.

The elevations of the ground surface at the borehole locations were determined using Borough of Etobicoke Benchmark No. E1010, described as "tablet in centre at north end of west concrete pier of bridge over CNR tracks on Albion Road, 1.16 m above ground level" having a geodetic elevation of (initially 173.317 m and subsequently revised to) 173.217 m.

4.0 SOIL CONDITIONS

The soil conditions encountered at the borehole locations are shown on the Borehole Records attached and are briefly described below.

4.1 Topsoil

All boreholes encountered dark brown to black silty to clayey topsoil, extending to a depth of about 200 mm.

4.2 Silty Clay (Till)

The topsoil covers a layer of brown silty clay, ranging in thickness from 2600 to 3500 mm. The upper 300 to 500 mm are somewhat organic and contain roots. The upper part of the stratum tends to be more clayey and locally appears to have a layered structure. The sand content increases with depth and a trace to some gravel is dispersed throughout. The silty clay is generally considered to be of late glacial origin, although the upper (more clayey and sometimes layered) part may be post glacial representing waterlain sedimentation to temporary pro-glacial lake pondings. The till layer is identified as the Halton Till, while the vaguely layered upper part comprises the Lacustrine-Wildfield Till complex formed in the pro-glacial Peel Pondings.*

On the basis of standard penetration tests, the silty clay stratum is stiff to very stiff in the upper part, increasing rapidly to hard with depth.

The natural moisture content of the stratum ranges from 11 to 22 percent with a median value of 17 percent. The unit weight, as determined from suitable samples, ranged from 20.7 to 22.3 kN/m³ with a median value of 21.4 kN/m³.

4.3 Sand

The silty clay (Halton Till) is underlain by a stratum of brown sand. In Borehole 1 the stratum is about 6500 mm in thickness

* O.L. White - "Quaternary Geology of the Bolton Area, Southern Ontario".
OGS Geological Report 117; 1975

4.3 Sand (Cont'd)

and extends to elevation 168.3. In Boreholes 2 and 3 it is about 2000 mm in thickness and extends to about elevation 171.5.

The sand is generally fine and silty to very silty, but layers or pockets of coarser sand mixed with gravel and rock fragments were encountered. These layers occasionally exhibit a till-like structure and may be part of the Halton Till unit of late Wisconsinan age.

The stratum is very dense as indicated by the results of the standard penetration tests. The natural moisture content of the sand ranges from 6 to 21 percent with a median value of about 10 percent. The unit weight could only be determined on the more silty samples and ranged from 19.8 to 22.2 kN/m³ with a median value of 20.9 kN/m³.

4.4 Sand (Till)

In Boreholes 1 and 3, the brown sand is underlain by grey and grey-brown sand, extending to about elevation 165.5. The sand is generally fine and silty to very silty. It contains scattered gravel and rock fragments and appears to be a glacial till (possibly the Wentworth Till member, see publication by O.L. White).

The natural moisture content ranges from 10 to 20 percent with a median value of 14 percent. The unit weight is of the order of 22.5 kN/m³.

4.5 Silt (Till)

The sand till overlies a stratum of grey silt, extending to the depths explored. The silt contains some sand and a trace of clay. Rock fragments are erratically dispersed throughout the stratum. A layer of what appeared to be a varved silty clay was encountered at about elevation 166. The overall structure of the stratum, however, suggests that it is a till deposit which has been tentatively identified as York Till.

The silt is very dense. Its natural moisture content ranges from 6 to 11 percent with a median value of 8 percent. The unit weight ranged from 21.8 to 23.7 kN/m³ with a median value of 23.6 kN/m³. The clay layer encountered at about elevation 166 had a moisture content of 18 percent and a unit weight of 20.7 kN/m³.

5.0 GROUNDWATER

Stand pipes with piezometer tips were installed at depths of 10.97 m, 10.06 m and 11.43 m in Boreholes 1, 2 and 3 respectively. The groundwater level observations and other relevant information are summarized below:

<u>BH</u>	<u>DRILLING DATE</u>	<u>OBSERVATIONS AT TIME OF DRILLING</u>	<u>GROUNDWATER LEVEL FEB. 10, 1982</u>
1	Feb. 3/82	Borehole caving at depth of ± 7.50 m.	7.55 m
2	Jan. 29/82	Borehole dry during drilling. Borehole open and dry to 18.3 m on Feb. 2, 1982.	dry to 10 m
3	Feb. 2/82	Borehole caving at depth of ± 6.1 m.	7.00 m

On the basis of the above observations, it is concluded that the groundwater level at the time of the investigation was at about elevation 170.

6.0 DISCUSSION AND RECOMMENDATIONS

6.1 General

The proposed Ramp 427 N - 407 E will be a single lane rigid frame underpass structure with a span of 8.25 m and a total length of about 55 m. The location of the footings for the structure are shown on the drawing. From the proposed profile along Highway 427, it would appear that the thickness of earth cover over the structure is of the order of 1 m. The cover measured from ramp grade will range from about 6 m at the west end of the structure to about 6.5 m at the east end.

6.2 Foundations

The structure may be founded on spread footings, as planned. As the soils at the site are frost susceptible, all footings should be provided with an earth cover of about 1400 mm.

6.2 Foundations (Cont'd)

The proposed ramp grade drops from about elevation 176.2 at the west end to about elevation 175.4 at the east end of the structure. Consequently, the frost protection requirements, define the highest founding elevations as 174.8 and 174.0 at the west end (Borehole 1) and at the east end (Borehole 2) respectively. At the approximate centre of the structure (Borehole 3) the corresponding elevation is 174.4.

The recommended founding elevations are in or close to sand at the locations of Boreholes 1 and 3 and in silty clay at the location of Borehole 2. At the latter location, the sand stratum is about 900 mm below the highest recommended founding elevation. The sand is generally very dense and the silty clay is hard. If the relatively greater depth to the sand stratum is more or less confined to the immediate vicinity of Borehole 2, it may be advisable to extend footings in this area to the sand in order to ensure as uniform as possible ground conditions below the footings along the entire structure. This is not mandatory, however, as potential settlement within the limited depth of the silty clay stratum should be negligible and could not be expected to affect the overall performance of the structure by any significant degree.

6.3 Bearing Capacity

The soils at and below the recommended founding elevations are very dense where granular and hard where cohesive. The investigation has further shown that the soil strength increases with depth. For the purpose of determining the bearing capacity, it is therefore considered that the soil mass is essentially unyielding.

For unyielding soil, the normal computations for the factored bearing capacity at the ultimate limit state produce values which are extremely high and not of practical value for structural design. It is recommended that a value of 720 kPa be used as the factored bearing capacity at the ultimate limit state. This is an arbitrary value and is based on practical experience.

6.3 Bearing Capacity (Cont'd)

As the loading required to cause detrimental settlements of the structure is considered to be in excess of 720 kPa, the design of the structure is not governed by the bearing capacity at the serviceability limit state.

6.4 Stability

It is assumed that the backfill along the proposed structure will be a free-draining granular material. The angle of internal friction of such backfill may be assumed to be equal to $\phi = 30^\circ$.

On this basis the coefficients of active and at-rest earth pressures for ultimate limit and serviceability state design may be taken to be equal to:

	<u>Ultimate Limit State</u>	<u>Serviceability Limit State</u>
Active State	0.41	0.33
At-Rest State	0.58	0.50

For resistance to sliding of a horizontal footing on sand, the coefficient of friction is $\tan \phi_f = 0.8 \tan \phi$, where ϕ may be assumed to be 35° . The resistance to sliding of the same footing founded on silty clay may be determined using a cohesion $c_f = 0.65 \times c$, where c may be conservatively assumed to be 175 kPa.

6.5 Construction

The recommended founding elevations lie well below the extent of topsoil, while being well above the groundwater level at the time of the investigation. It is therefore unlikely that unusual construction problems will be experienced.

6.6 Embankment

At the borehole locations, the depth of the topsoil was about 200 mm. This should be stripped off prior to placing the embankment fill. The silty clay below the topsoil tends to be somewhat organic to a total depth of the order of 600 mm below present ground level. This organic soil does not necessarily have to be removed, but this will have to be determined following the stripping of topsoil.

The maximum height of the embankment fill in the area of this investigation is about 5 m. The natural soil, below the topsoil, is suitable for the support of the embankment with normal side slopes 1 vertical to 2 horizontal.

7.0 MISCELLANEOUS

The field work for this investigation was carried out under the direction of Mr. A. Bacopoulos, P.Eng., using equipment owned and operated by Master Soil Investigations Limited. Laboratory testing was carried out in the company's Toronto area facility. This report was prepared by Mr. A. Prior, P.Eng. and Mr. J.D. Morton, M.Eng., P.Eng., P.Geol.

Respectfully Submitted,

MORTON & PARTNERS LIMITED



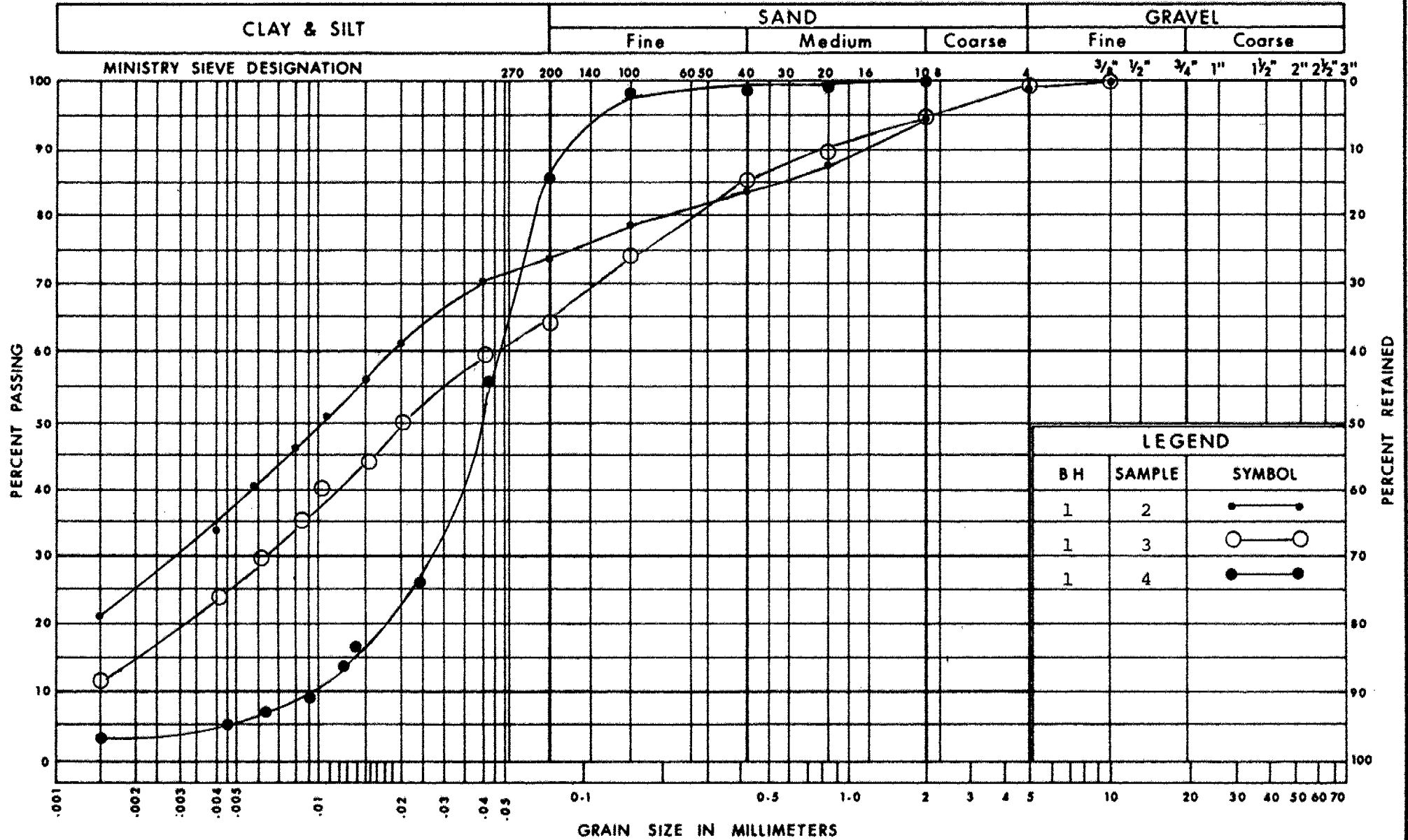
J.D. Morton, M.Eng., P.Eng., P.Geol.



A. Prior, P.Eng.

JDM+AP/sf

UNIFIED SOIL CLASSIFICATION SYSTEM



Ministry of
Transportation and
Communications

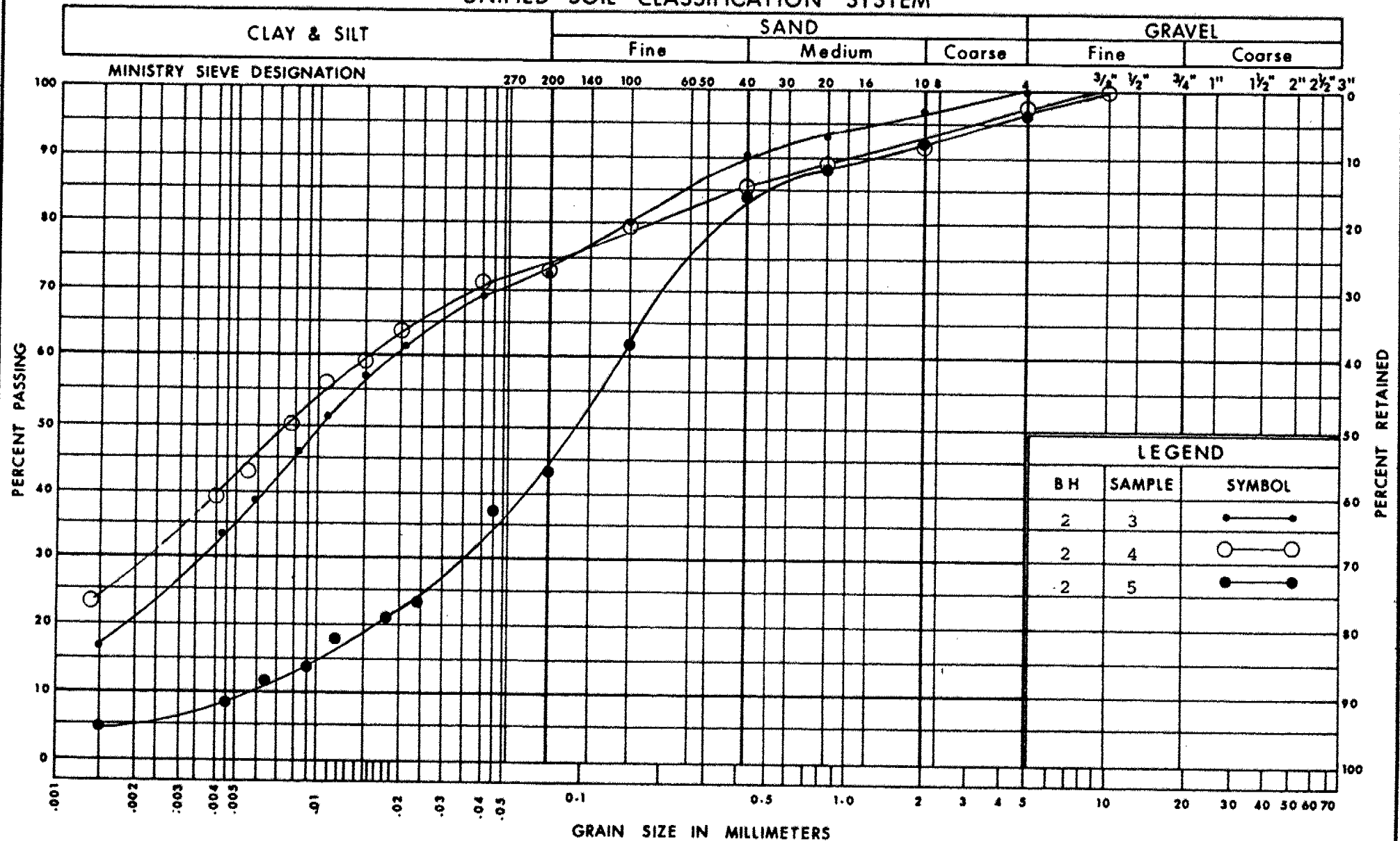
GRAIN SIZE DISTRIBUTION

Silty clay (Till) (Sa. 2 & 3)
Silty sand (Sa. 4)

FIG No 1

W P 153-80-05

UNIFIED SOIL CLASSIFICATION SYSTEM



Ministry of
Transportation and
Communications

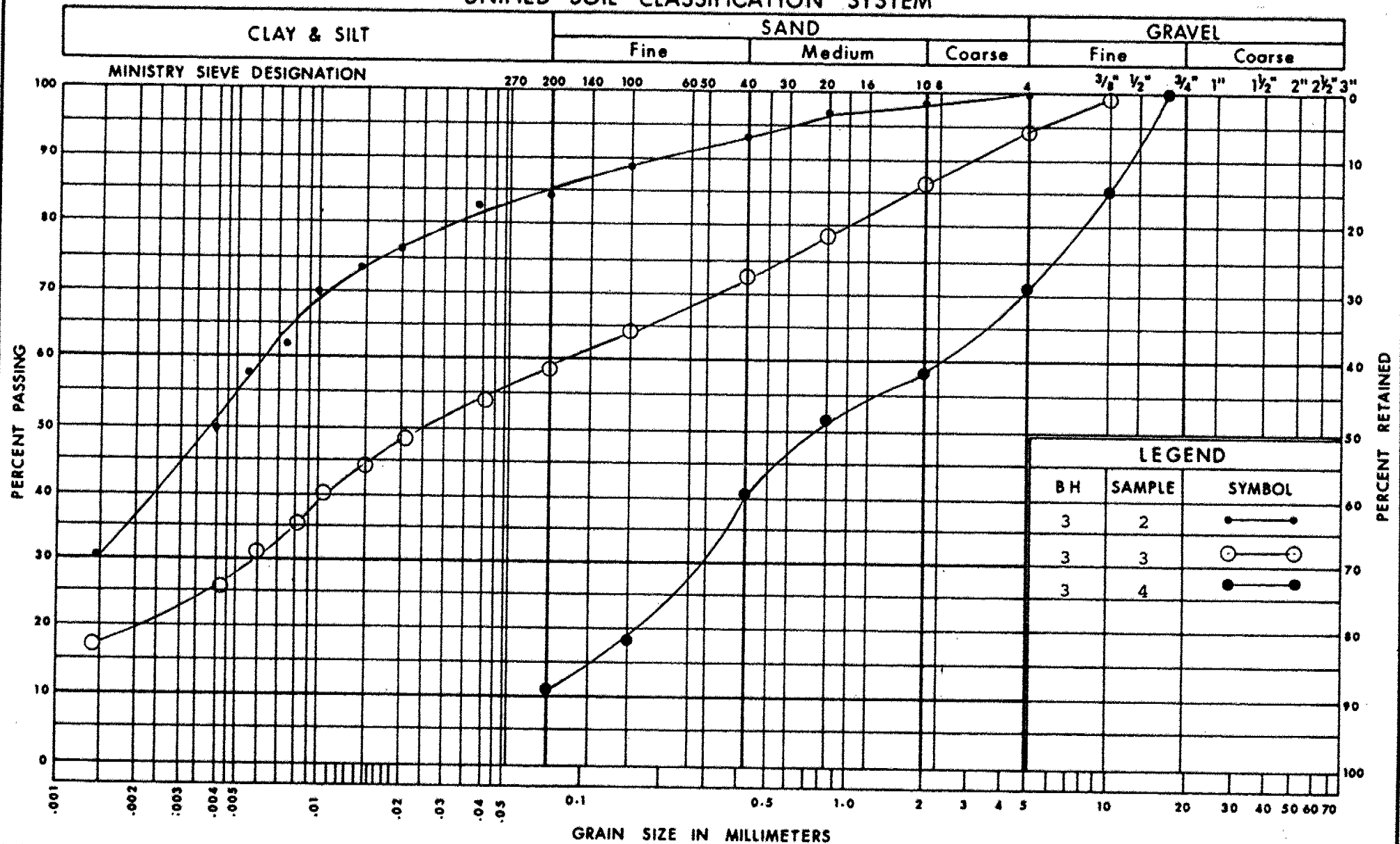
GRAIN SIZE DISTRIBUTION

Silty clay (Till) (Sa. 3 & 4)
Silty sand (Sa. 5)

FIG No 2

W P 153-80-05

UNIFIED SOIL CLASSIFICATION SYSTEM



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 (R Q D), 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

STRESS AND STRAIN

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

MECHANICAL PROPERTIES OF SOIL

m_v	kPa ⁻¹	COEFFICIENT OF VOLUME CHANGE
C_c	1	COMPRESSION INDEX
C_s	1	SWELLING INDEX
C_α	1	RATE OF SECONDARY CONSOLIDATION
c_v	m ² /s	COEFFICIENT OF CONSOLIDATION
H	m	DRAINAGE PATH
T_v	1	TIME FACTOR
U	%	DEGREE OF CONSOLIDATION
σ'_{vo}	kPa	EFFECTIVE OVERBURDEN PRESSURE
σ'_p	kPa	PRECONSOLIDATION PRESSURE
τ_f	kPa	SHEAR STRENGTH
c'	kPa	EFFECTIVE COHESION INTERCEPT
ϕ'	-°	EFFECTIVE ANGLE OF INTERNAL FRICTION
c_u	kPa	APPARENT COHESION INTERCEPT
ϕ_u	-°	APPARENT ANGLE OF INTERNAL FRICTION
τ_R	kPa	RESIDUAL SHEAR STRENGTH
τ_r	kPa	REMOULDED SHEAR STRENGTH
S_t	1	SENSITIVITY = $\frac{c_u}{\tau_r}$

PHYSICAL PROPERTIES OF SOIL

ρ_s	kg/m ³	DENSITY OF SOLID PARTICLES	e	1, %	VOID RATIO	e_{min}	1, %	VOID RATIO IN DENSEST STATE
γ_s	kN/m ³	UNIT WEIGHT OF SOLID PARTICLES	n	1, %	POROSITY	I_D	1	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
ρ_w	kg/m ³	DENSITY OF WATER	w	1, %	WATER CONTENT	D	mm	GRAIN DIAMETER
γ_w	kN/m ³	UNIT WEIGHT OF WATER	S_r	%	DEGREE OF SATURATION	D_n	mm	n PERCENT - DIAMETER
ρ	kg/m ³	DENSITY OF SOIL	w_L	%	LIQUID LIMIT	C_u	1	UNIFORMITY COEFFICIENT
γ	kN/m ³	UNIT WEIGHT OF SOIL	w_p	%	PLASTIC LIMIT	h	m	HYDRAULIC HEAD OR POTENTIAL
ρ_d	kg/m ³	DENSITY OF DRY SOIL	w_s	%	SHRINKAGE LIMIT	q	m ³ /s	RATE OF DISCHARGE
γ_d	kN/m ³	UNIT WEIGHT OF DRY SOIL	I_p	%	PLASTICITY INDEX = $w_L - w_p$	v	m/s	DISCHARGE VELOCITY
ρ_{sat}	kg/m ³	DENSITY OF SATURATED SOIL	I_L	1	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$	i	1	HYDRAULIC GRADIENT
γ_{sat}	kN/m ³	UNIT WEIGHT OF SATURATED SOIL	I_C	1	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$	k	m/s	HYDRAULIC CONDUCTIVITY
ρ'	kg/m ³	DENSITY OF SUBMERGED SOIL	e_{max}	1, %	VOID RATIO IN LOOSEST STATE	j	kN/m ³	SEEPAGE FORCE
γ'	kN/m ³	UNIT WEIGHT OF SUBMERGED SOIL						

RECORD OF BOREHOLE No 1

METRIC

W P 153-80-05 LOCATION Co-ords. 4 845 667 N; 294 187 E. ORIGINATED BY _____
 DIST 6 HWY 427 BOREHOLE TYPE Solid Stem Auger COMPILED BY _____
 DATUM Geodetic DATE 82-02-03 CHECKED BY _____

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 (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
177.6	Ground Level																
	TOPSOIL																
0.2	Silty clay, sandy, trace of gravel (Till)		1	SS	23		176									20.9	
	Very stiff to hard, brown		2	SS	37											21.8	2 24 49 25
174.8			3	SS	61											20.9	1 35 50 14
2.8	Sand, fine, silty to very silty, occasional coarser layers with some gravel		4	SS	96		174									19.8	14 83 3
	Very dense, brown		5	SS	117												
			6	SS	65/130mm		172									22.2	
			7	SS	21/250mm		170									20.6	
168.3			8	SS	75/150mm		168										
9.3	Sand, fine, with silt and some gravel. (Till)		9	SS	21/230mm		166									22.6	
165.9	Very dense, grey		10	SS	7/7.50mm		164									22.9	
11.7	Silt, some sand, trace of clay, occasional rock fragments (Till)		11	SS	100/7.00mm		162									23.9	
	Very dense, grey		12	SS	100/7.30mm		160									23.1	
			13	SS	70/7.00mm											21.8	
159.1			14	SS	56/7.00mm											23.7	
18.5	End of Borehole																

+3, x5: Numbers refer to
Sensitivity

20
15
10
5 (%) STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

METRIC

W P 153-80-05 LOCATION Co-ords. 4 845 713 N; 294 232 E. ORIGINATED BY _____
DIST 6 HWY 427 BOREHOLE TYPE Solid Stem Auger COMPILED BY _____
DATUM Geodetic DATE 82-01-29 CHECKED BY _____

[illegible]

+3, x5: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 3

METRIC

W P 153-80-05 LOCATION Co-ords. 4 845 689 N; 294 212 E. ORIGINATED BY _____
 DIST 6 HWY 427 BOREHOLE TYPE Solid Stem Auger COMPILED BY _____
 DATUM Geodetic DATE 82-02-02 CHECKED BY _____

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ KN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L		
177.1	Ground Level												
0.2	TOPSOIL												
	Silty clay, sandy, trace to some gravel (Till)		1	SS	20		176					20.7	
	Stiff to hard, brown		2	SS	43							21.2	16 47 37
174.1			3	SS	43							21.7	6 36 38 20
3.0	Sand, fine to coarse, silty to very silty, trace to some gravel, Very dense, brown		4	SS	73		174						28 60 12
			5	SS	56		172					21.2	
171.6			6	SS	93		170					22.3	
5.5	Sand, fine, silty to very silty, occasional coarser layers with some gravel and rock fragments		7	SS	115								
	Very dense, brown to grey-brown		8	SS	50		168						
			9	SS	73		166						
165.0			10	SS	69/150mm		164					23.3	
12.1	Silt, sandy, trace of clay, trace of gravel (Till)		11	SS	100/270mm							23.4	
163.0	Very dense, grey												
14.1	End of Borehole												

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to
Sensitivity

20
15 5 (%) STRAIN AT FAILURE
10

RECORD OF CONE No 4

METRIC

W P 153-80-05 LOCATION Co-ords. 4 845 692 N; 294 240 E. ORIGINATED BY
DIST 6 HWY 427 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY
DATUM Geodetic DATE (Cone 4 82-01-29) (Cone 5 82-02-02) CHECKED BY

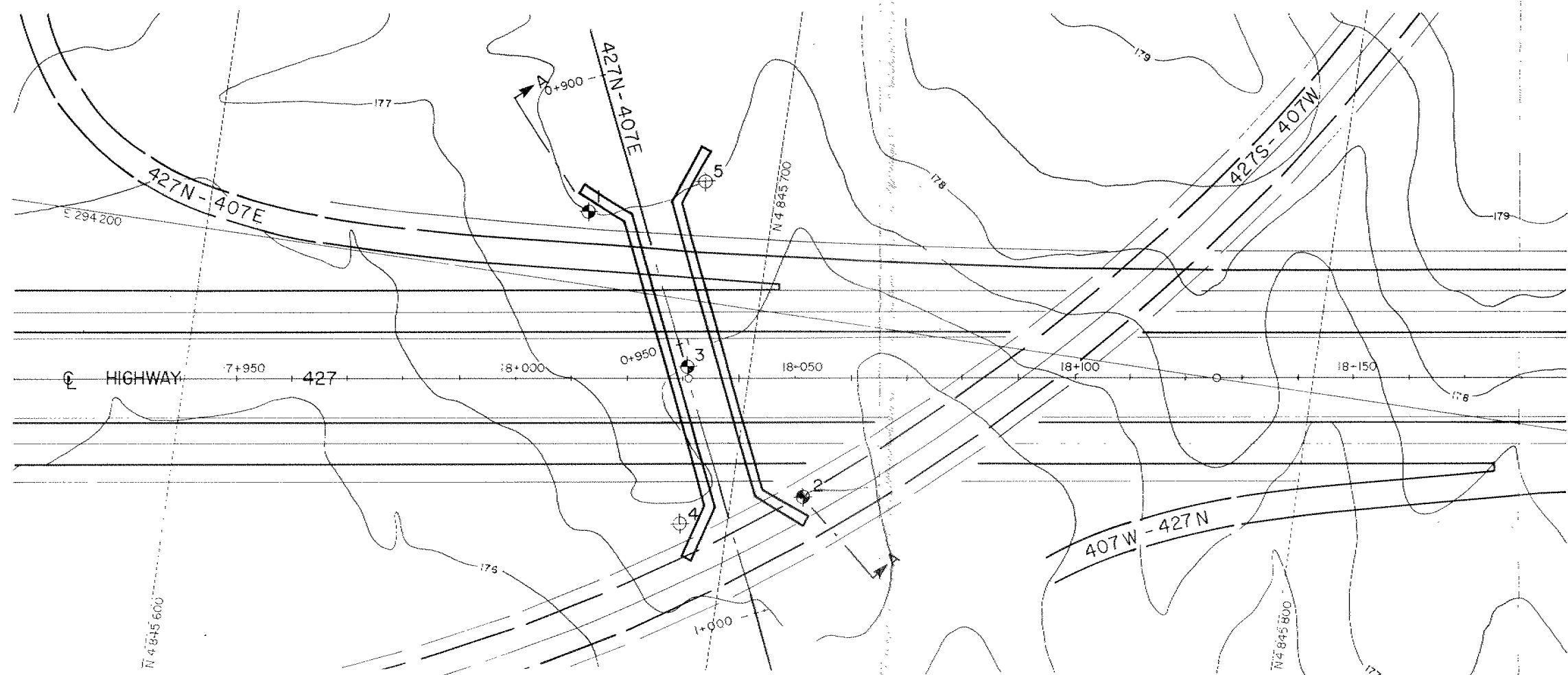
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20					
176.8	Ground Level												
173.6						176							
3.2	End of Dynamic Cone 4 Penetration Test					174							
177.6	Ground Level												
175.2						177							
2.4	End of Dynamic Cone 5 Penetration Test					175							

RECORD OF CONE No 5

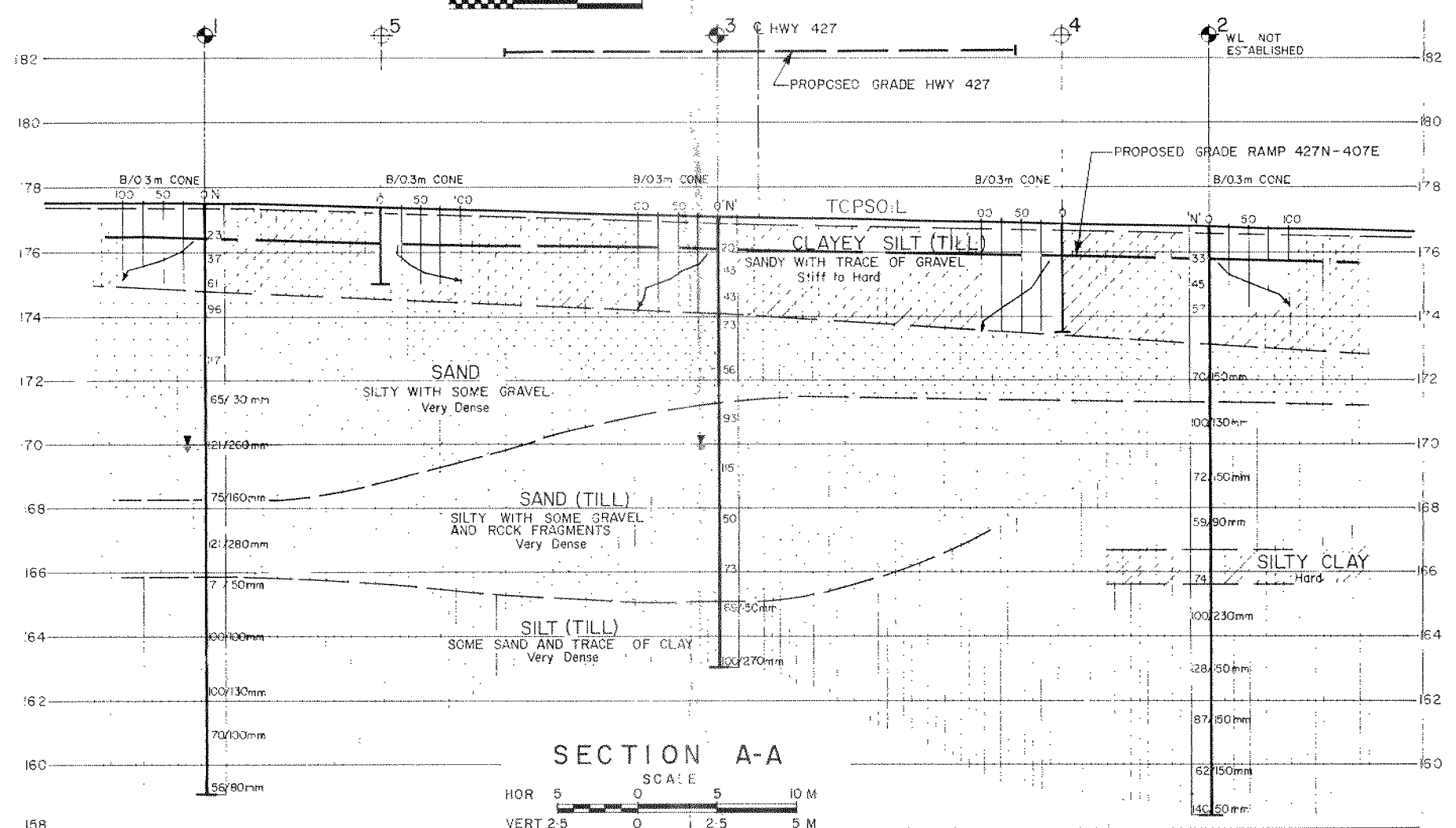
Co-ords. 4 845 687 N; 294 179 E.

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO PR.D. 207 (Formerly OB-MT-308W 7-6-06)



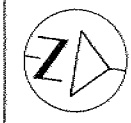
PLAN
SCALE 10 0 10 20 M



SECTION A-A
SCALE
HOR 5 0 5 10 M
VERT 2.5 0 2.5 5 M

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

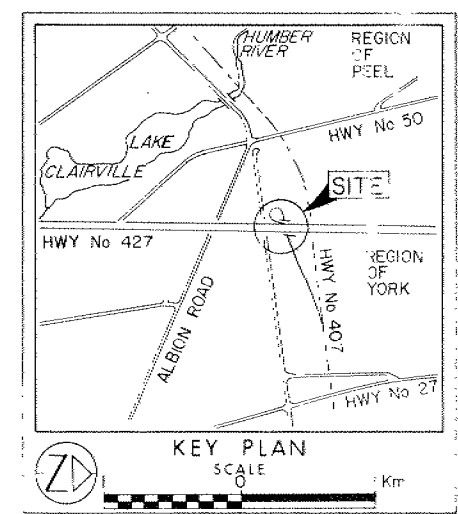
CONT No
WP No 153-80-05



HWY 427 OVER RAMP 427N-407E
BORE HOLE LOCATIONS & SOIL STRATA

SHEET

MORTON AND PARTNERS LTD



- 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 82-02

No	ELEVATION	CO-ORDINATES	
		NORTH	EAST
1	177.6	N 4 845 667	E 294 187
2	176.8	N 4 845 713	E 294 232
3	177.1	N 4 845 689	E 294 212
4	176.8	N 4 845 692	E 294 240
5	177.6	N 4 845 687	E 294 179

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 30413-52
HWY No 427
SUBMD CHECKED DATE 82-02-09 SITE 37-1112
DRAWN CHECKED APPROVED DWG 1538005-A

memorandum



To: Mr. K. Pilgrim
Senior Structural Engineer
Structural Section
Central Region

Date: 83 05 02

From: Pavement & Foundation Design Section
Room 315, Central Building
Downsview

Re: Hwy. 427 over ramp N-407E
W.P. 153-80-05, Site 37-1112
District 6, Toronto,
Central Region

We have reviewed the final bridge drawings and the special provisions for the above-mentioned site and provide the following comments:

- 1) A note indicating that 1.4 m (min.) of earth cover must be provided to the bottom of the footings should be included.
- 2) We note that dimensions for the footings in sections 4 and 5 have been omitted.
- 3) We also note changes in the top of footing elevations along section 2.

A handwritten signature in cursive script that reads "Brian Ruck".

Brian Ruck,
Trainee Engineer

for

BR:gm

M. Devata, P.Eng.,
Senior Foundation Engineer.

memorandum



To: Mr. G.C. Burkhardt
Head, Structural Planning
Central (5000 Yonge St.) Region

Date: 82 08 26

From: Pavement & Foundation Design Section
Room 315, Central Bldg.
Downsview

Re: 427N - 407E Ramp Overpass at Hwy. 427
W.P. 153-80-05, Site 37-1112
District 6, Toronto

We have reviewed the preliminary bridge plan drawing (P1) for the above-mentioned structure and have noted the structural change from a 55 m single span rigid frame to twin single span rigid frame structures with connecting 4.5 metre high retaining walls. We have no comments on the preliminary design at this time.

A handwritten signature in dark ink, appearing to read "Tom Kazmierowski".

Tom Kazmierowski, P. Eng.
Foundations Engineer

TK:syc

cc: K. Bassi