

FILE



Ministry of  
Transportation and  
Communications

# foundation investigation and design report

**ENGINEERING MATERIALS OFFICE**  
**PAVEMENT & FOUNDATION DESIGN SECTION**

WP 7624-81-00R

DIST 14

HWY Municipal STR SITE 47-121

Alligator Creek Structure Replacement (Englehart)

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FOUNDATION INVESTIGATION REPORT  
For  
W.P. 7624-81-00-R, Site: 47-121  
Alligator Creek Structure Replacement  
First Street, Englehart, District 14, New Liskeard

INTRODUCTION

This report summarizes the results of the foundation investigation required for the proposed structure replacement at this site.

The fieldwork was conducted during the period from 82 08 26 - 09 01 utilizing a modified diamond drill equipped with NW casing.

This work consisted of 3 sampled boreholes/dynamic cone penetration tests.

SITE DESCRIPTION

The site is located approximately 2.75 km north of Hwy. 11 where First Street crosses Alligator Creek, a tributary of the Englehart River. (Englehart, Conc. 1 Marter Twp., District of Timiskaming)

Physiographically, the site lies in the Timiskaming Clay Plain, a region of relatively thick clay deposits. The thickness of these deposits is controlled by the bedrock topography.

SUBSURFACE CONDITIONS

General

The Record of Borehole Sheets (Appendix) illustrate the conditions at the borehole locations. The locations and elevations of the boreholes, and stratigraphical profiles based on the borehole data are shown on Drawing No. 76248100R-A.

The overburden is generally composed of clay. The effective stress parameters assumed for slope stability calculations were  $c' = 2$  kPa and  $\phi' = 24^\circ$ .

Gravel; with silty sand, trace cobbles and organics

This compact to dense fill material was encountered for the surface 1.8 m (thickness) at B.H. #2.

Silty Clay (CL) to Silt (CL/ML); trace/some sand, trace/some gravel, occ. organics

This stiff deposit is the native surface material on the existing embankments. It underlies the fill at B.H. #2, while at B.H. #3 it is at the surface (with gravel and sand in the upper metre). The thickness of this material ranges from 3.7 to 3.9 m at the borehole locations.

Physical properties of the material as determined from field and laboratory tests, are summarized below:

	<u>Range</u>	<u>Average</u>	<u>Median</u>
Natural Moisture Content (w)	12.5-29.5%	21.9%	23.5%
Liquid Limit ( $w_L$ )	21.5-24.5%	22.9%	23.0%
Plastic Limit ( $w_p$ )	14.0-16.5%	15.3%	15.5%

Shear Strength

- field vane, undisturbed	57.5-107+kPa	75.3 kPa	61.4 kPa
remolded	7.7-14.4 kPa	10.2 kPa	8.6 kPa

(The material did not fail in 1 field vane shear test, indicating undisturbed shear strengths in excess of 107 kPa in portions of this deposit. The remolded shear strengths indicate an average sensitivity of approximately 7).

Unit Weight ( $\gamma$ )                      19.2 kN/m<sup>3</sup> (one sample)

Figure 1 illustrates a typical grain size distribution for the cohesive portion of this deposit.

Clay (CI to CH); some silt, occ. alternating layers of CL (and silt) and CI (with silt)

This firm to very stiff material is the main deposit at all borehole locations extending for thicknesses ranging from 31.1 to 35.7 m. This material is varved except for the uppermost 4 to 5 m.

Physical properties of the cohesive portion of the material as determined from field and laboratory tests, are summarized below:

	<u>Range</u>	<u>Average</u>	<u>Median</u>
Natural Moisture Content (w)	26.5-52.5%	40.2%	39.8%
Liquid Limit ( $w_L$ )	28.0-62.0%	40.2%	37.3%
Plastic Limit ( $w_p$ )	17.0-23.5%	19.3%	18.8%
Shear Strength	<u>Range</u>	<u>Average</u>	<u>Median</u>
- field vane, undisturbed	46.0-107+kPa	68.1kPa	61.4kPa
remolded	7.7-20.1kPa	11.7kPa	10.5kPa

(The material did not fail in 4 field vane shear tests, indicating undisturbed shear strengths in excess of 107 kPa in portions of this deposit. The remolded shear strengths indicate an average sensitivity of approximately 6).

Unit Weight ( $\gamma$ )                      17.4 kN/m<sup>3</sup> (one sample)

Silty Clay (CL) to Silt (CL/ML); some sand, trace gravel

This hard material was encountered beneath the clay layer at B.H. #2 and #3 for thicknesses in the order of 2 m.

Physical properties of the cohesive portion of the material as determined from field and laboratory tests, are summarized below:

	<u>Range</u>	<u>Average</u>	<u>Median</u>
Natural Moisture Content (w)	8.5-16.5%	12.5%	12.5%
Liquid Limit ( $w_L$ )	23.0-31.0%	27.0%	27.0%
Plastic Limit ( $w_p$ )	13.5-16.0%	14.8%	14.8%

#### BEDROCK

The bedrock elevations were estimated from refusal to the Standard Penetration Test. Refer to the Record of Borehole Sheets and Drawing No. 76248100R-A for these estimated elevations.

#### GROUNDWATER

Due to the impermeable nature of the soil it was necessary to estimate the groundwater elevation at B.H. #2 and #3 as elev. 183 m at the time of the field investigation. The water level in the creek (B.H. #1) was 181.1 m.

## DISCUSSION AND RECOMMENDATIONS

It is proposed to replace the existing tressle structure with a bridge to provide a final road grade of 189.5 to 190.0 m.

### Slope Design

The recommended slope geometry is illustrated in Figure 2. That is, from the final creek bottom the ground should slope at 3:1 or flatter to a 4.6 m (minimum length) berm at approximately elev. 185.6+. From the berm, the ground should slope at 3:1 or flatter to a 3 m (minimum length) berm at the toe of the abutment. Note that the berms should be sloped at 20:1 to facilitate surface drainage.

In the horizontal direction, the recommended geometry should extend a minimum of 3 m on each side of the abutments.

The recommended geometry should be graded into existing contours at slopes of 3:1 or flatter.

The recommended geometry should be constructed from the creek bottom up, to maintain slope stability during construction.

Erosion protection, in the form of random rip rap (minimum blanket thickness = 0.6 m) should be placed on the slope extending from the toe to 0.6 m above the high water level. The rip rap should extend a minimum of 2 m out along the creek bottom (see Figure 2). The remaining constructed slope and the adjacent transition zones should be protected by vegetation cover as soon as possible.

### Structure Design

Two alternatives are proposed. The alternative which leads to the least expensive design should be adopted.

#### ALTERNATIVE 1: Steel H Piles Driven to Bedrock

The structures may be supported on steel H Piles equipped with reinforced tips and driven to bedrock. Refer to the Record of Borehole Sheets and Drawing No. 76248100R-A for estimated bedrock elevations at the borehole locations.

The following design values are recommended:

<u>Pile Type</u>	<u>Safe Capacity</u>
310 HP 79	890 kN per pile

and, for the purposes of the O.H.B.D.C.:

<u>Pile Type</u>	<u>Factored Capacity at U.L.S.</u>	<u>Capacity at S.L.S. Type II</u>
310 HP 79	1335 kN per pile	890 kN per pile

- Earth pressure acting on abutments and retaining walls should be computed as per Subsection 6.6.1.2.2 of the O.H.B.D.C. assuming a non-yielding foundation with  $K_0 = 0.43$  for granular backfill.
- For frost protection, cover should be greater than 2.1m.
- Differential settlements should not exceed 25 mm.
- Dewatering is not anticipated to be a major problem because of the impermeable nature of the surface soil, and because the groundwater elevation is below the assumed abutment elevations.

#### ALTERNATIVE 2: Timber Piles in Overburden

The structure may be supported on treated Size 36 timber piles driven a minimum of 15 m into undisturbed soil.

The following design values are recommended:

<u>Pile Type</u>	<u>Safe Capacity</u>
Treated Timber Size 36	140 kN per pile



and for the purposes of the O.H.B.D.C.:

<u>Pile Type</u>	<u>Factored Capacity at U.L.S.</u>	<u>Capacity at S.L.S. Type II</u>
Treated Timber Size 36	210 kN per pile	140 kN per pile

- Earth pressure acting on abutments and retaining walls should be computed as per Subsection 6.6.1.2.2 of the O.H.B.D.C. assuming a yielding foundation with  $K_0 = 0.33$  for granular backfill.
- For frost protection, cover should be greater than 2.1 m.
- Differential settlements will be greater with this alternative as opposed to ALTERNATIVE 1, but should not exceed 30 mm.
- Dewatering is not anticipated to be a major problem because of the impermeable nature of the surface soil, and because the groundwater elevation is below the assumed abutment elevations.

#### MISCELLANEOUS

The fieldwork for this project was carried out under the supervision of Mr. B. Yiu, student field technician. The report was written by Mr. D.H. Dundas, Project Foundations Engineer, and reviewed by Mr. K.G. Selby, Senior Foundations Engineer. The equipment used was owned and operated by Atcost Soil Drilling Inc.



*D. H. Dundas*

D. H. Dundas, P. Eng.  
Project Foundations Engineer

*K. G. Selby*

K.G. Selby, P. Eng.  
Senior Foundations Engineer

## A P P E N D I X



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# RECORD OF BOREHOLE No 1

METRIC

W P 7624-81-00-R LOCATION Sta. 10 + 244.4 2.4 m Lt. of Line B ORIGINATED BY BY  
DIST 14 HWY Mun. BOREHOLE TYPE NX Casing & Cone Test COMPILED BY DD  
DATUM Geodetic DATE 82 08 26-27 CHECKED BY DD

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE 20 40 60 80 100	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
181.1	Creek Surface												
180.9													
0.2	Creek Bottom		1	SS	5		180						
	Sandy Silt		2	SS	2								
	Clay (CI to CH)		3	SS	2		178						
	Some Silt		4	SS	2								
	Firm to Stiff												
	occ. alternating layers of CL (and Silt) and CI (with Silt)		5	SS	2		176						
			6	SS	1								
			7	SS	3		174						
			8	SS	5								
			9	SS	2		172						
			10	SS	3								
167.8							170						
13.3	End of Borehole						168						
							166						
							164						
							162						
							160						
							158						
							156						
154.7													
26.4	End of Cone Test												

+3, x5: Numbers refer to  
Sensitivity

20  
15  
10  
5  
0.5 (%) STRAIN AT FAILURE

# RECORD OF BOREHOLE No 2

METRIC

W P 7624-81-00-R LOCATION Sta. 10 + 269.2 1.4 m Rt. of Line B ORIGINATED BY BY  
DIST 14 HWY Mun. BOREHOLE TYPE NX Casing & Cone Test COMPILED BY DD  
DATUM Geodetic DATE 82 08 31 - 09 01 CHECKED BY DD

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	'N' VALUES			SHEAR STRENGTH kPa						
189.2	Ground Surface							20 40 60 80 100	20 40 60					
0.0	Gravel with Silty Sand Trace Cobbles & Org. Compact to Dense (Fill)		1	SS	15		188	○ UNCONFINED + FIELD VANE						
187.4	Compact to Dense (Fill)		2	SS	35		186	● QUICK TRIAXIAL x LAB VANE						23 19 43 15
1.8	Silty Clay (CL) to Silt (CL/ML) Trace/some Sand Trace/some Gravel occ. Organics Stiff		3	SS	6		184							0 3 83 14
183.7			4	TW	PM		182							
5.5	Clay (CI to CH) Some Silt Firm to Very Stiff		5	SS	3		180							
			6	CS	-		178							0 0 73 27
			7	TW	PM		176							0 0 35 65
			8	SS	3		174							
	occ. alternating layers of CL (and Silt) and CI (with Silt)		9	TW	PM		172							
			10	SS	2		170							
			11	TW	PM		168							
			12	SS	4		166							
			13	SS	2		164							
			14	SS	2		162							
158.7							160							

30.5

Cont

+3, x5: Numbers refer to  
Sensitivity

20  
15  
10  
5 (%) STRAIN AT FAILURE



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# RECORD OF BOREHOLE No 2 Cont

METRIC

W P 7624-81-00-R LOCATION Sta. 10 + 269.2 1.4 m Rt. of Line B ORIGINATED BY BY  
DIST 14 HWY Mun. BOREHOLE TYPE NX Casing & Cone Test COMPILED BY DD  
DATUM Geodetic DATE 82 08 31 - 09 01 CHECKED BY DD

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 Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
158.7																	
30.5	Clay (CH) occ. layers of CL (and Silt) Firm to Very Stiff																
			15	SS	5												
152.6																	
36.6	Silty Clay (CL) to Silt (CL/ML) Some Sand, Trace Gravel, Hard																
150.5			16	SS	100/28 cm												
38.7	Probable Bedrock End of Borehole  ** groundwater level estimated due to impermeable nature of soil															*Cu > 107 kPa	

+3, x5: Numbers refer to  
Sensitivity

20  
15 5 (%) STRAIN AT FAILURE  
10

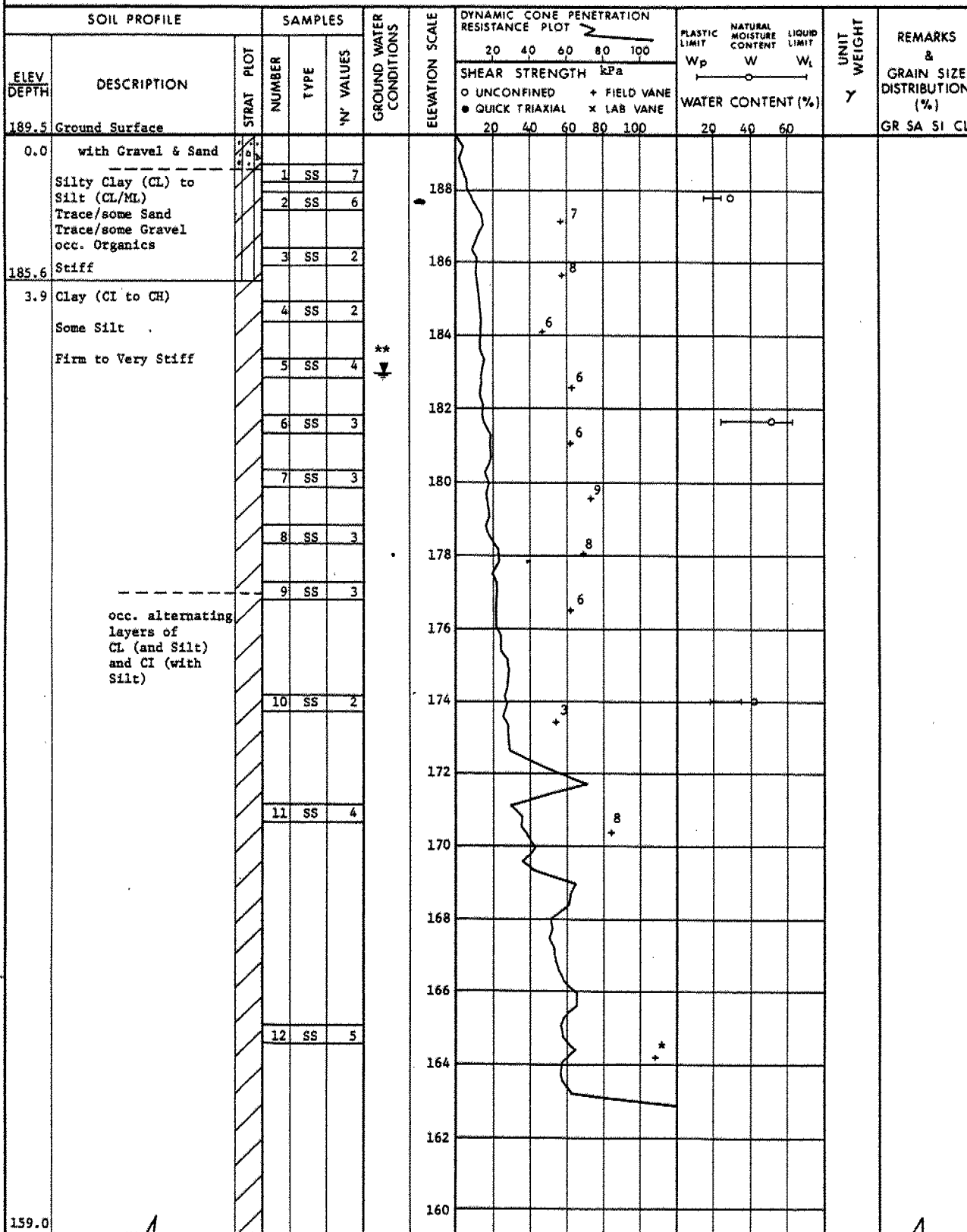


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# RECORD OF BOREHOLE No 3

METRIC

W P 7624-81-00-R LOCATION Sta. 10 + 227.8 2.2 m Rt. of Line B ORIGINATED BY BY  
DIST 14 HWY Mun. BOREHOLE TYPE NX Casing & Cone Test COMPILED BY DD  
DATUM Geodetic DATE 82 08 28-30 CHECKED BY DD



30.5

Cont

+3, x5: Numbers refer to Sensitivity

20  
15 5 (%) STRAIN AT FAILURE  
10



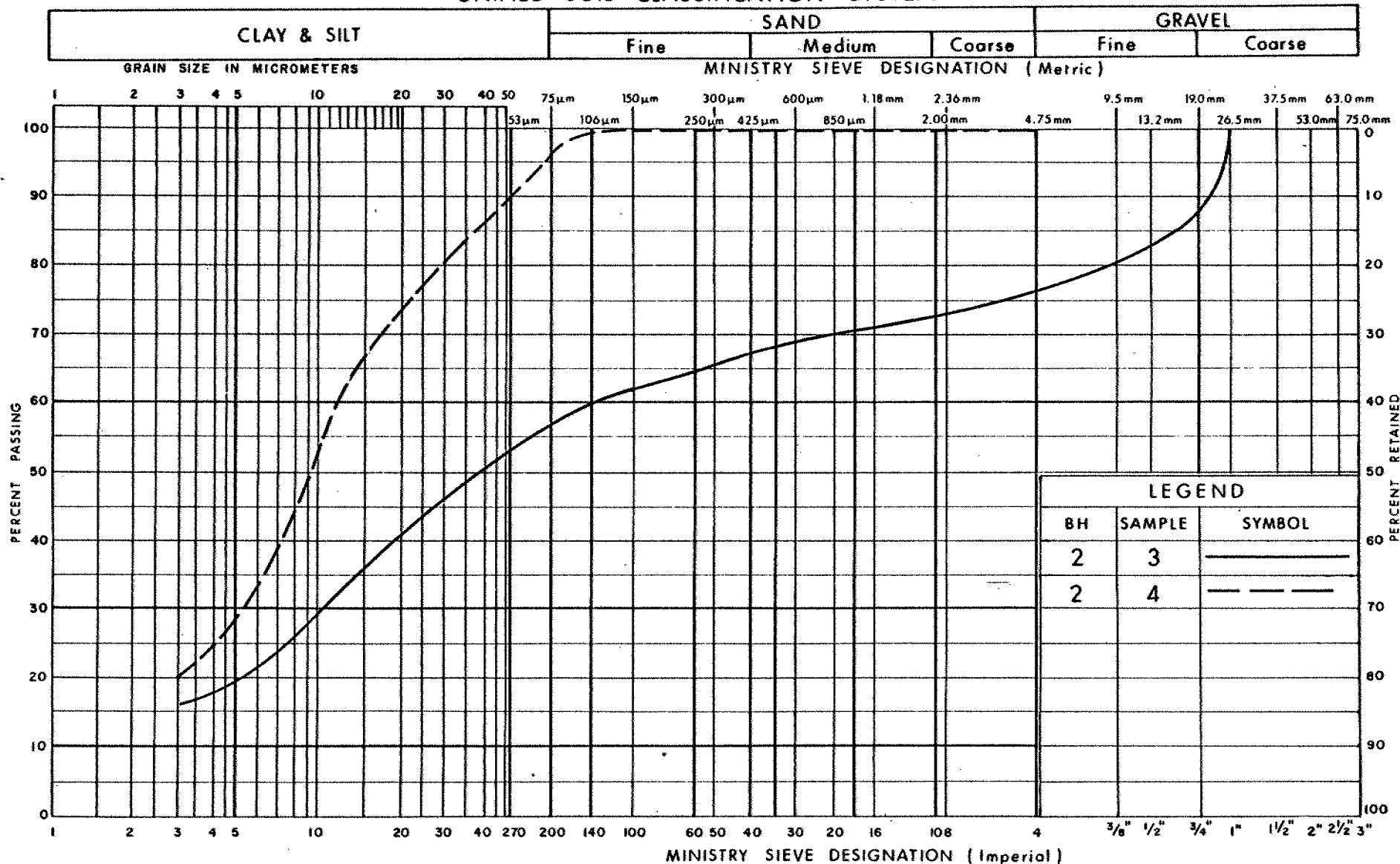
## METRIC

W P 7624-81-00-R LOCATION Sta. 10 + 227.8 2.2 m Rt. of Line B ORIGINATED BY BY  
DIST 14 HWY Mon. BOREHOLE TYPE NX Casing & Cone Test COMPILED BY DD  
DATUM Geodetic DATE 82 08 28-30 CHECKED BY DD

[illegible]

+3, x5: Numbers refer to Sensitivity

## UNIFIED SOIL CLASSIFICATION SYSTEM



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**GRAIN SIZE DISTRIBUTION**  
**SILTY CLAY TO SILT**  
TRACE/SOME SAND & GRAVEL, OCC ORGANICS

FIG No 1

W P 7624-81-00R



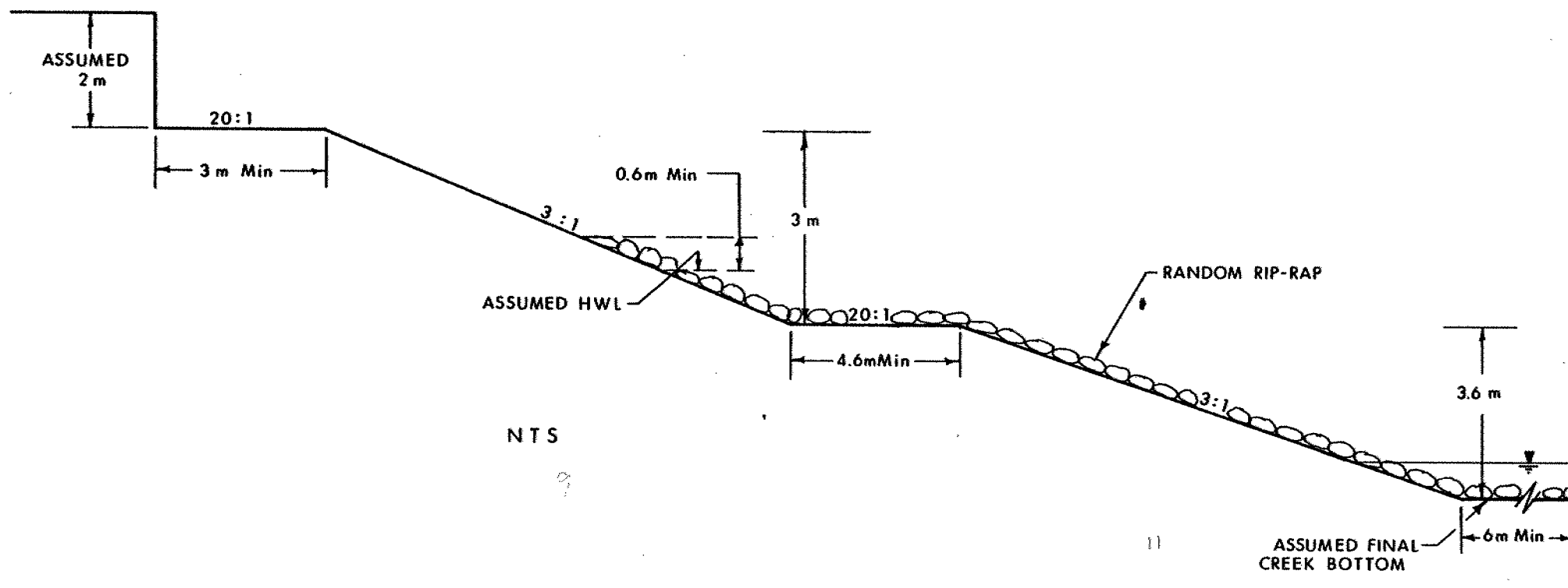


FIG 2 - RECOMMENDED GEOMETRY

WP 7624-81-00 R

## 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

SS	SPLIT SPOON	TP	THINWALL PISTON
WS	WASH SAMPLE	OS	OSTERBERG SAMPLE
ST	SLOTTED TUBE SAMPLE	RC	ROCK CORE
BS	BLOCK SAMPLE	PH	TW ADVANCED HYDRAULICALLY
CS	CHUNK SAMPLE	PM	TW ADVANCED MANUALLY
TW	THINWALL OPEN	FS	FOIL SAMPLE

### 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

### MECHANICAL PROPERTIES OF SOIL

$m_v$	kPa <sup>-1</sup>	COEFFICIENT OF VOLUME CHANGE
$C_c$	1	COMPRESSION INDEX
$C_s$	1	SWELLING INDEX
$C_\alpha$	1	RATE OF SECONDARY CONSOLIDATION
$c_v$	m <sup>2</sup> /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
$S_f$	1	SENSITIVITY = $\frac{c_u}{\tau_r}$

### PHYSICAL PROPERTIES OF SOIL

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

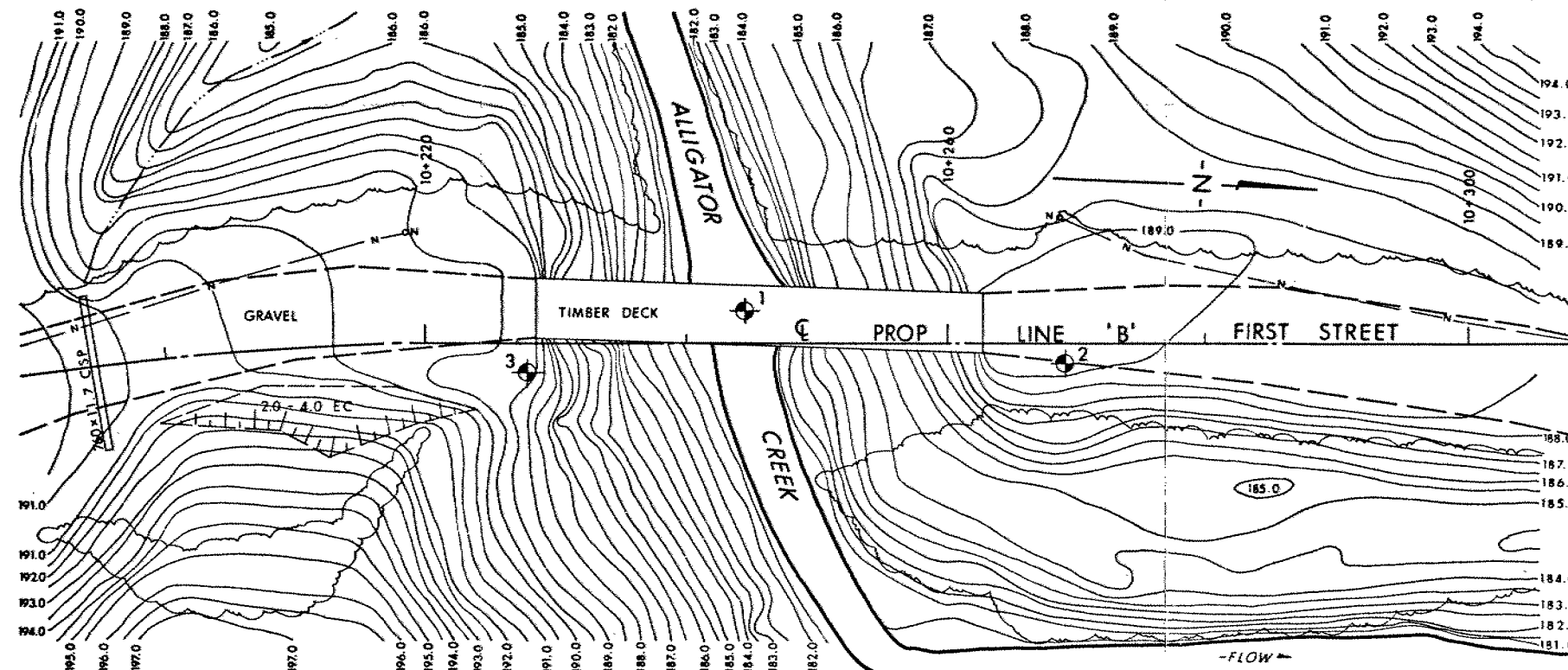
**METRIC**  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES UNLESS  
OTHERWISE SHOWN. STATIONS  
IN KILOMETRES + METRES.

CONT No  
WP No 7624-81-00R

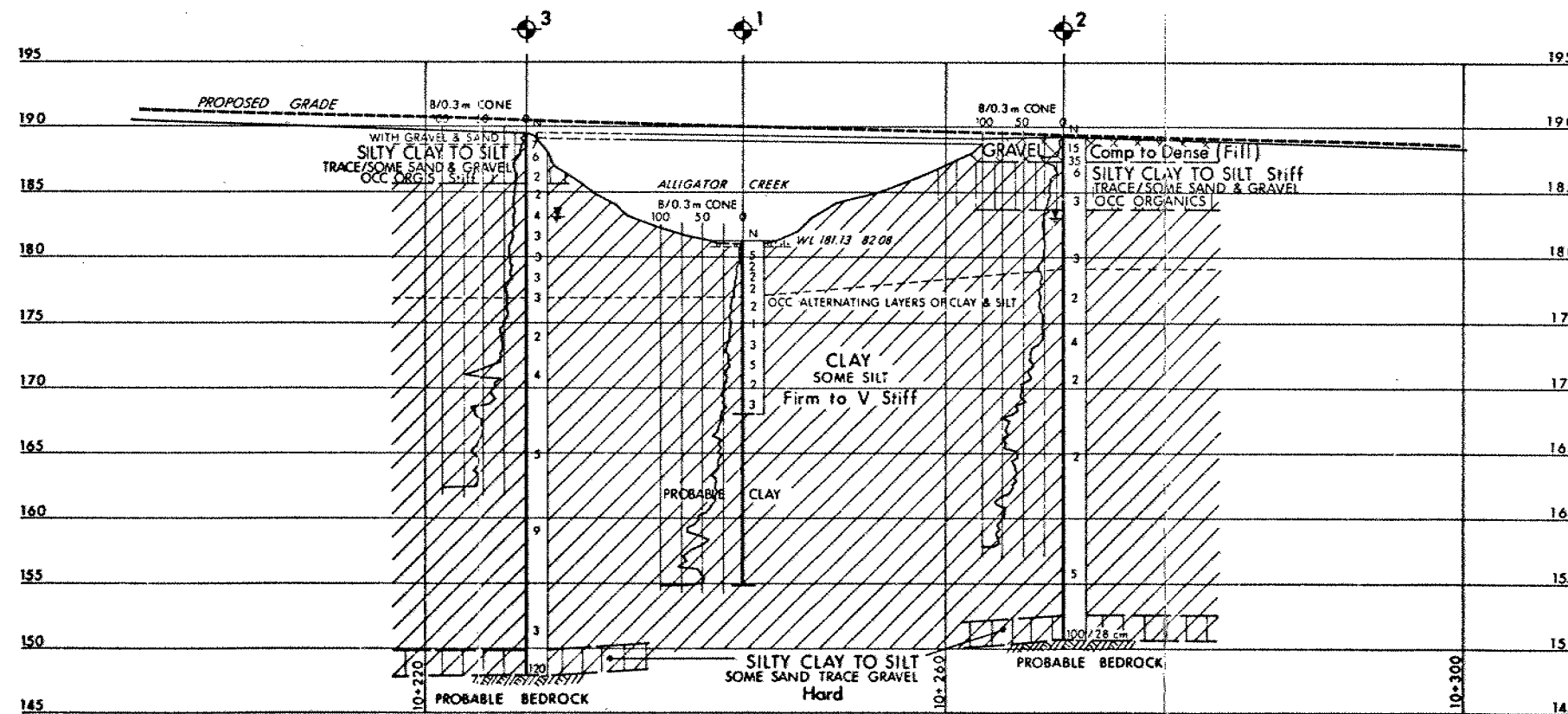
ALLIGATOR CREEK  
BORE HOLE LOCATIONS & SOIL STRATA



SHEET

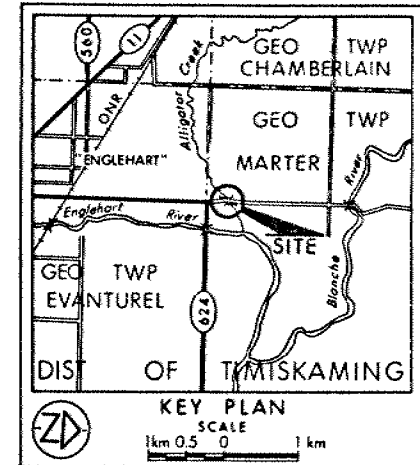


PLAN  
SCALE  
5m 0 5m



PROFILE - LINE 'B' FIRST ST

SCALE  
5m 0 5m



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 08
- NOTE: Groundwater level estimated due to impermeable nature of soil

No	ELEVATION	STATION	OFFSET
1	181.1	10+244.4	2.4 m LT
2	189.2	10+269.2	1.4 m RT
3	189.5	10+227.8	2.2 m RT

NOTE

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

NOTE: The complete foundation investigation and design report for this project and other related documents may be examined at the Engineering Materials Office, Downsview. Information contained in this report and related documents is specifically excluded in accordance with the conditions of Section 102-2 of Form 100.

REV	DATE	BY	DESCRIPTION
1			

Geocres No 31M-47

MWY No FIRST ST	DATE 82 11 26	DIST 14
SUBMD 00 CHECKED	DATE 82 11 26	SITE 47-121
DRAWN 50 CHECKED	DATE 82 11 26	DWG 76248100R-A

# METRIC

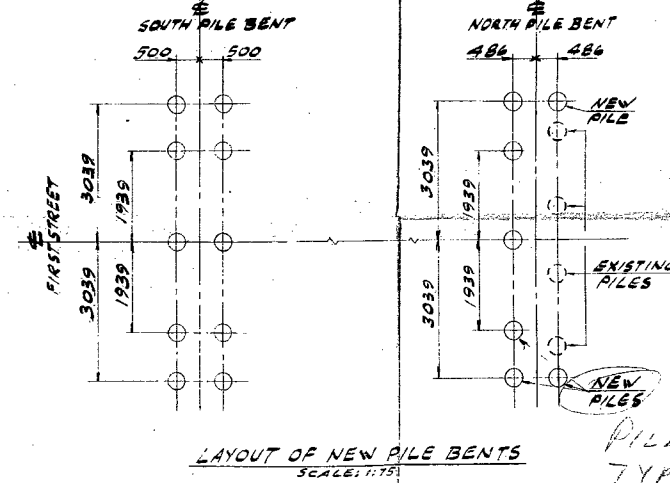
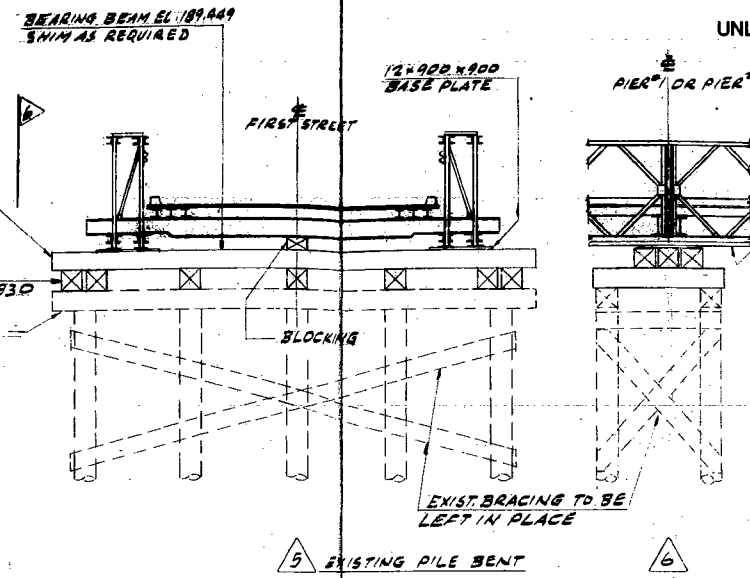
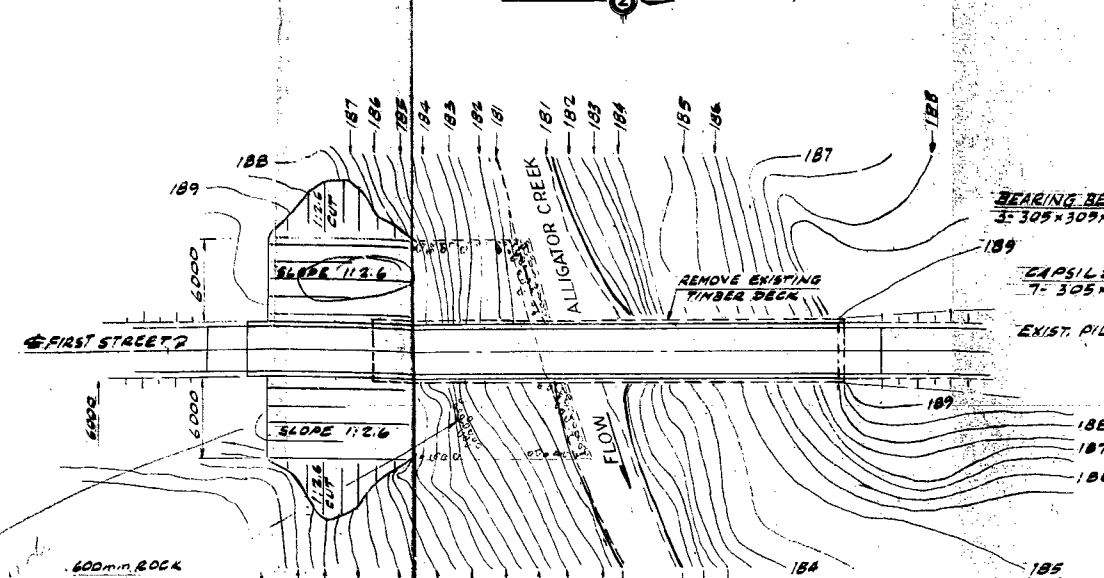
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

DIST. 14

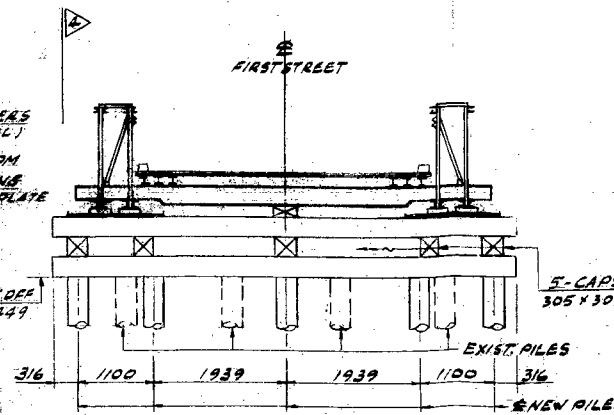
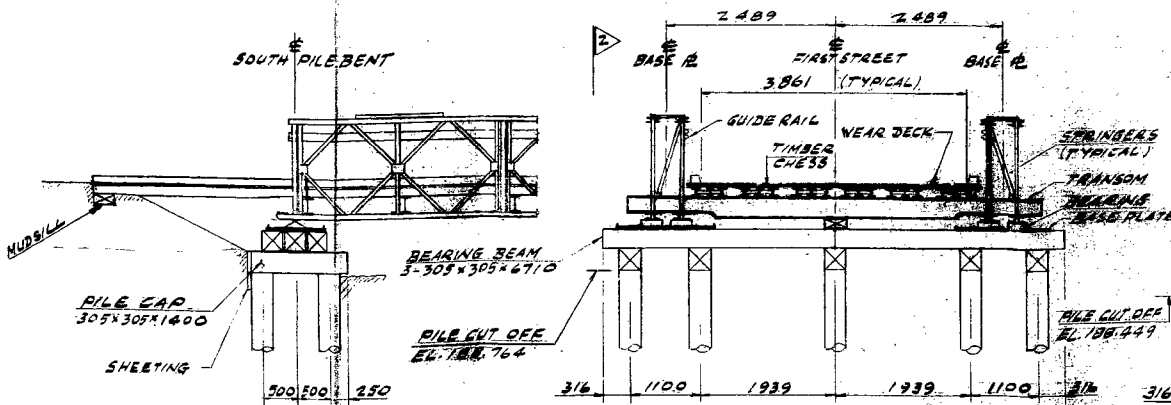
CONT No  
WP No 7624-81-00

ALLIGATOR CREEK BRIDGE  
MARTER TOWNSHIP L.R.B.  
BAILEY BRIDGE

SHEET



Report recommends #36 timber piles driven a min of 15m into undisturbed soil



② what are st piles to ① NEW PILE BENT  
③ How far are they driven?

③ NORTH PILE BENT  
1:50 (SEE LAYOUT OF NEW PILE BENTS)

DRAWING NOT TO BE SCALED  
100 mm ON ORIGINAL DRAWING

REVISIONS	DATE	BY	DESCRIPTION	DATE
DESIGN	CHECK	LOADING		
DRAWING A.V.	CHECK	SITE No 47-121		DWG P2