

ENGINEERING MATERIALS OFFICE
FOUNDATION DESIGN SECTION

WP 71-85-00 DIST 31
HWY 4 STR SITE 05-04

Dodd's Creek Bridge Widening

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A. Ho (2)
E. Magni
A.E. Irving
B. Lamb
J. Richard (2)
I. Husain
F. Bacchus (Cover Only)
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GEOCRES 40I14-128

DATE JUL 21 1998

FOUNDATION INVESTIGATION REPORT

For

Dodd's Creek Bridge Widening

W.P. 71 - 85 - 00; Site 05 - 04

Highway 4, District 31, London

INTRODUCTION

This report contains the results of a foundation investigation carried out at the crossing of Highway 4 and Dodd's Creek. The investigation for the existing structure was conducted by a Geotechnical Consultant under W.P. 54 - 66. The fieldwork for this investigation was carried out between September 9 and 14, 1966, and consisted of four sampled boreholes and Dynamic Cone Penetration Test adjacent to these holes.

Boreholes were advanced to a maximum depth of 15.7 meters (i.e., El. 224.5) below the ground level then. Wash boring method using NX casing was employed to advance these holes.

SITE DESCRIPTION

The site is located approximately 3.4 km north of Highway 3 at the crossing of Highway 4 and Dodd's Creek in the Township of Southwold, County of Elgin.

Dodd's Creek flows sluggishly from east to west in a shallow depression. The topography of the area surrounding the site is gradually sloping from south to north. A succession of ridges and valleys lies in the County of Elgin. The ridges are moraines of calcareous clay or silty clay while in the valley it is common to find alluvium of gravel, sand or silt. Physiographically the area is located in the region known as the "Mount Elgin Ridges."

The major soil type found in this area is cohesive glacial till. Glacial till deposit underlies the site to considerable depth with some minor shallow alluvial deposits in the depression along which the creek flows.

SUBSURFACE CONDITIONS

General

Generally uniform subsoil conditions were found to prevail over the project area. The underlying subsoil at this site consists of 2.1 m to 2.4 m firm clayey fill underlain by very stiff to hard heterogeneous mixture of clayey silt, sand and gravel (glacial till) which extends to the depth probed, i.e., El. 224.5. However, in the creek bed 0.7 m to 0.9 m silty sand with varying proportions of clay was encountered. For classification purposes, the soils encountered at this site can be divided into three different zones.

- a) Clayey Silt, Some Sand, Occasional Gravel (Fill)
- b) Silty Sand, Some Clay
- c) Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till)

The subsurface conditions encountered during the course of the investigation, together with the field and laboratory test results are shown on the Record of Borehole Log Sheets contained in the appendix of this report. A stratigraphical section is shown on Drawing No. 718500 - A. This drawing also shows the location and elevation of the borings at the time of drilling. Description of the strata encountered are given below.

Clayey Silt, Some Sand, Occasional Gravel (Fill)

This fill was placed to raise the finished grade of Highway 4 was encountered in boreholes 1 and 2, and consists of clayey silt with varying proportions of sand and gravel sized particles. Thickness

of this fill varies from 2.1 m to 2.4 m and extends to elevations 237.7 to 237.8. The Standard Penetration Test results vary from 5 to 6 blows/0.3 m. Based on these values, it may be classified as firm consistency.

Silty Sand, Some Clay

This silty sand deposit with varying proportions of clay was encountered in boreholes 3 and 4 only. The thickness of this alluvial deposit is only 0.7 m to 0.9 m, and extends to elevations 237.1 to 237.3. This stratum is in very loose to loose state of denseness.

Heterogeneous Mixture of Clayey Silt, Sand and Gravel (Glacial Till)

The upper boundary of this glacial till deposit was encountered between elevations 237.8 and 237.1. The natural moisture content varies from 14% to 19% with an average value of 16.6%. Atterberg Limits determined for the representative samples are shown on Figure 1. The results of the Gradation Test are shown on Figure 2 in an envelope form. The results indicate 6% to 17% gravel, 10% to 29% sand, 27% to 49% silt and 27% to 36% clay. Standard Penetration Test results (26 blows/0.3 m to 100 blows/0.3 m) indicate very stiff to hard consistency. The full extent of this deposit was not proven below elevation 224.5.

Groundwater Conditions

Piezometers were installed in boreholes 1 and 2, and sealed near the top of the glacial till layer, i.e., El. 237.5. Groundwater measurements were taken in the Piezometers until five days after the completion of drilling. The stabilized groundwater was observed at or near the creek water level, i.e., El. 238.7.

DISCUSSION AND RECOMMENDATIONS

General

It is proposed to widen the existing bridge at the crossing of Highway 4 and Dodd's Creek by about 2 meters on both sides to accommodate an additional lane. The widening part of the bridge will be similar to that of the existing structure with a clear span of 10.7 meters.

The existing bridge is a rigid frame structure and was built in 1967. The clear span between the face of the abutments is approximately 10.7 meters. Structural Drawings D6608 and D6608-A indicate that the abutments are supported on 0.91 m wide footing placed at elevation 235.6.

The structure as well as side slopes appears in good condition and no major distresses are evident. However, three vertical cracks were noticed on the south abutment wall. These cracks are extending from foundation to about 0.5 m to 0.7 m below the soffit. Drainage holes near the base of the wall are appears to be clogged and water from the approach fill has been noticed to seep through these cracks.

Structure Foundation

The soil around the existing footings may have been disturbed during the construction of the bridge. In view of this and to match the founding level of the existing footings, it is recommended that the footings be placed at elevation 235.6. The following bearing resistance may be assumed for the design of the footings.

Factored Bearing Resistance at U. L. S	=	450 kPa
Bearing Resistance at S. L. S	=	250 kPa

The bearing resistance at SLS recommended above is based on the assumption that the footings will

not be placed at a level higher than the elevation indicated above. Total settlement for the allowable bearing resistance (SLS) is not expected to exceed 25 mm.

Sliding resistance may be estimated based on an effective angle of internal friction neglecting the effective shear strength of the founding soil. An unfactored coefficient of friction value of $\tan 30^\circ$ may be assumed for the estimate. Spread footings should have a minimum of 1.2 m earth covers to protect against the frost penetration.

Lateral Earth Pressure

Earth pressure should be computed as per Section 6.7.4.5 of the O.H.B.D.C., and the coefficient of earth pressure at rest shall be used for rigid and unyielding walls. The granular "A" or "B" backfill should be in accordance with the Special Provision No. 109F03. 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 (kN/m ³)	$\gamma = 22.8$	$\gamma = 21.2$

Approach Embankment

No major instability problems are anticipated for the approach embankments constructed with two horizontal to one vertical side slope. The fill should consist of well compacted acceptable material. Topsoil as well as any spongy or soft area observed within the base width of the widening area should be removed before placing the fill. The benching for the widening shall be carried out in accordance with OPSD 208.01.

In order to prevent any erosion or undercutting of the approach fill, it should be protected by placing 0.6 m thick rip-rap. The rip-rap should consist of 150 mm to 200 mm size boulders and be placed

to a height of 1.0 m above the high water level. This should extend to cover the fill area on both sides of the road.

Other Considerations

There will be some differential settlement between the new and the existing structures. In view of this, it is advisable to provide either a “slip” or “isolation” joint between these structures to accommodate any differential settlement.

The wing walls on all four sides may provide protection for the excavation of footings. If the walls cannot be relied upon for the protection, a Roadway Protection System may be provided in the vicinity of the approach area on both sides of the abutments. The following soil parameters may be used for the design of the protection system.

	<u>Embankment Fill</u>	<u>Glacial Till</u>
Undrained Shear Strength	$C_u = 40 \text{ kPa}$	$C_u = 120 \text{ kPa}$
Bulk Unit Weight (kN/m^3)	$\gamma = 18$	$\gamma = 21$

The cohesive nature of the soil encountered at this site may deteriorate quickly upon exposure. In view of this, the base of the excavation at the founding level should be covered with 150 mm thick lean concrete pads within four hours of exposure.

The footings will have to be constructed below the creek water level which may fluctuate. In view of the impervious nature of the soil at the founding level, no major dewatering problems are anticipated during the construction. Any minor seepage or surface runoff into the excavation may be readily handled by pumping from the sump. Care shall be exercised during construction to prevent any flow of water from the creek into the excavation.

MISCELLANEOUS

The fieldwork for this investigation was supervised throughout by a member of engineering staff from Golder and Associates Ltd. The equipment used was owned and operated by F. E. Johnston Drilling Co. Ltd. This report was prepared by M. Vasavithasan, Foundation Engineer and reviewed by Tae C. Kim, Senior Foundation Engineer.



M. Vasavithasan

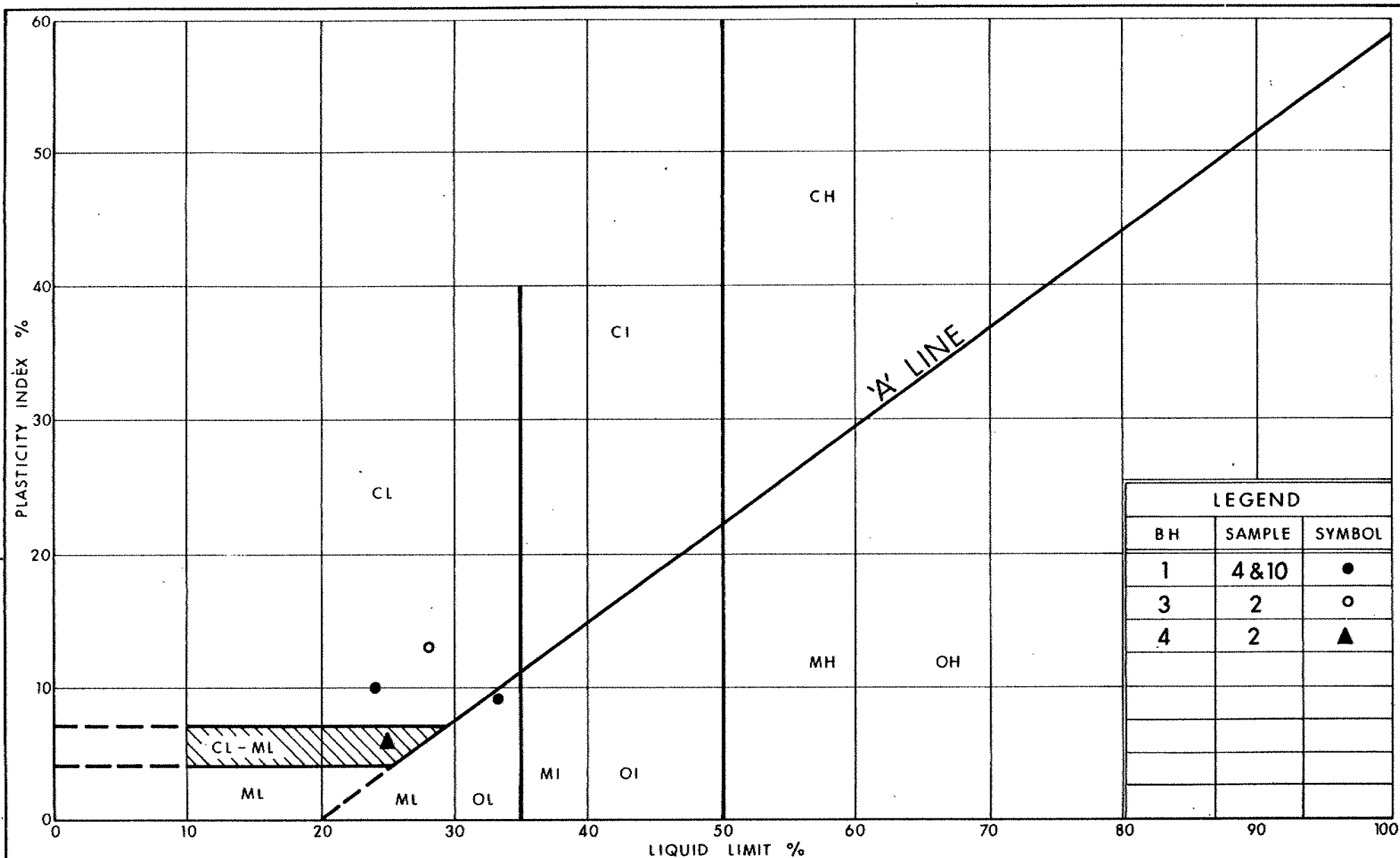
M. Vasavithasan, P.Eng.
Foundation Engineer



Tae C. Kim

Tae C. Kim, P.Eng.
Senior Foundation Engineer

APPENDIX



Ministry of
Transportation

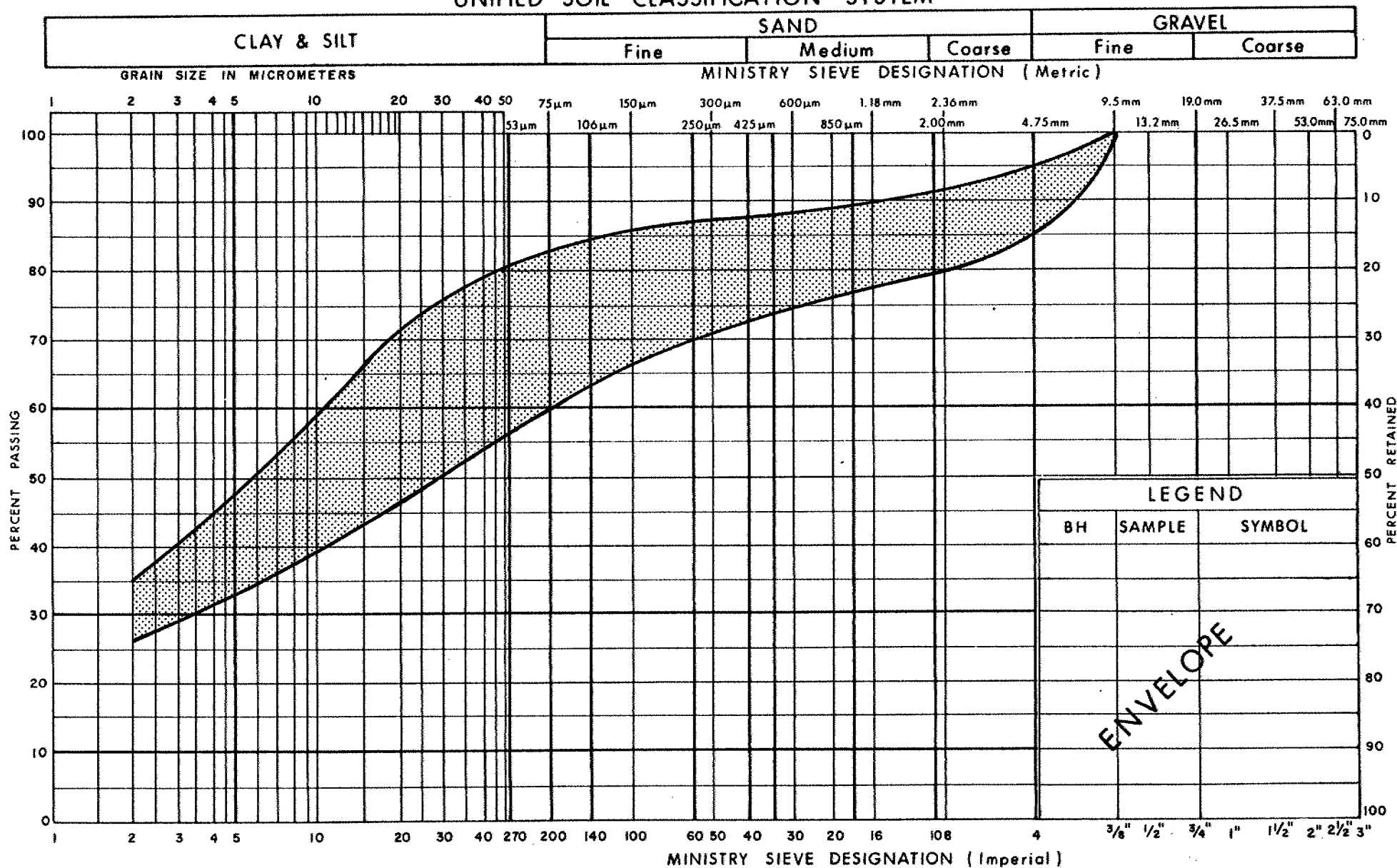
Ontario

PLASTICITY CHART
HETEROGENEOUS MIXTURE OF
CLAYEY SILT, SAND & GRAVEL (Glacial Till)

FIG No 1.

W P 71-85-00

UNIFIED SOIL CLASSIFICATION SYSTEM

Ministry of
Transportation

GRAIN SIZE DISTRIBUTION
HETEROGENEOUS MIXTURE OF
CLAYEY SILT, SAND & GRAVEL (Glacial Till)

FIG No 2

W P 71-85-00

RECORD OF BOREHOLE No 1

1 OF 2

METRIC

W.P. 71-85-00 LOCATION Sta 17+431.3, o/s 12.3m Lt of C/L Hwy 4 ORIGINATED BY JWW
 DIST 31 HWY 4 BOREHOLE TYPE NX CASING & CONE TEST COMPILED BY DT
 DATUM GEODETIC DATE SEP 9 & 12 1966 CHECKED BY MV

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 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH kPa						
240.2	GROUND LEVEL							20 40 60 80 100						
0.0	TOPSOIL		1	SS	6		240							
	CLAYEY SILT, Some Sand, Occasional Gravel Firm (Fill)		2	SS	5		239							
237.8							238							
2.4			3	SS	23		237							
			4	SS	51		236							
			5	SS	59		235							
			6	SS	51		234							
			7	SS	100		233							
			8	SS	37		232							
			9	SS	44		231							
			10	SS	67		230							
							229							
							228							
							227							
							226							
225.2							225							

Continued

Continued

+3, x5: Numbers refer to
Sensitivity

20
15-5 (%) STRAIN AT FAILURE
10

METRIC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80			100
225.2	Continued	11	SS	66										
15.0														
224.5														
15.7	End of Borehole													

NOTE:
* FORMERLY BH-1 OF WP 54-66

SEP 17 1966
* GROUND WATER CONDITIONS

PIEZO. NO.	GROUND WATER ELEVATION (Metres)
1	1.5

+3, x5: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 2

1 OF 1

METRIC

W.P. 71-85-00 LOCATION Sta 17+451.5, o/s 12.2m Rt of C/L of Hwy 4 ORIGINATED BY JWW
 DIST 31 HWY 4 BOREHOLE TYPE BX CASING & CONE TEST COMPILED BY DT
 DATUM GEODETIC DATE SEP 12 1966 CHECKED BY MV

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT 7 kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100	w _p	w	w _L		
239.8	GROUND LEVEL													
0.0	CLAYEY SILT Some Sand, Occasional Gravel Firm (Fill)		1	SS	6		239							
237.7			2	SS	5		238							
2.1	Heterogeneous Mixture of CLAYEY SILT, SAND and GRAVEL, Very Stiff to Hard (Glacial Till)		3	SS	30		237							8 10 47 35
			4	SS	55		236							
			5	SS	41		235							
			6	SS	29		234							
			7	SS	49		233							
			8	SS	39		232							
228.7							231							17 29 27 27
							230							
11.1	End of Borehole						229							
NOTE: *FORMERLY BH-2 OF WP 54-66														
SEP 17 1966 * GROUND WATER CONDITIONS														
PIEZO. NO.		GROUND WATER ELEVATION (Metres)												
1		1.1												

RECORD OF BOREHOLE No 3

1 OF 1

METRIC

W.P. 71-85-00 LOCATION Sta 17+439.3, e/s 11.6m Rt of C/L of Hwy 4 ORIGINATED BY JWW
 DIST 31 HWY 4 BOREHOLE TYPE BX CASING & CONE TEST COMPILED BY DT
 DATUM GEODETIC DATE SEP 13 1966 CHECKED BY MV

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100	w _p	w	w _L		
238.5	Creek Water Level													
0.0	WATER													
237.8	Creek Bed													
0.7	SILTY SAND, Some Clay, Loose													
237.1														
1.4	Heterogeneous Mixture of CLAYEY SILT,SAND and GRAVEL Hard (Glacial Till)		1	SS	31									
			2	SS	49									
			3	SS	61									
233.5														
5.0	End of Borehole													
	NOTE: *FORMERLY BH-3 OF WP 54-66													

RECORD OF BOREHOLE No 4

1 OF 1

METRIC

W.P. 71-85-00 LOCATION Sta 17+443.2, e/s 12.3m Lt of C/L Hwy 4 ORIGINATED BY JWW
 DIST 31 HWY 4 BOREHOLE TYPE BX CASING & CONE TEST COMPILED BY DT
 DATUM GEODETIC DATE SEP 14 1966 CHECKED BY MV

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					
238.5	Creek Water Level																
238.2	Creek Bed WATER																
0.3	SILTY SAND, Some Clay Loose						238										
237.3							237										
1.2			1	SS	26		236										
	Heterogeneous Mixture of CLAYEY SILT, SAND and GRAVEL, Very Stiff to Hard (Glacial Till)		2	SS	100		235										14 12 42 32
							234										
233.2			3	SS	42												
5.3	End of Borehole																
	NOTE: *FORMERLY BH-4 OF WP 54-66																

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:

R Q D (%)	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	1, %	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						

METRIC

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

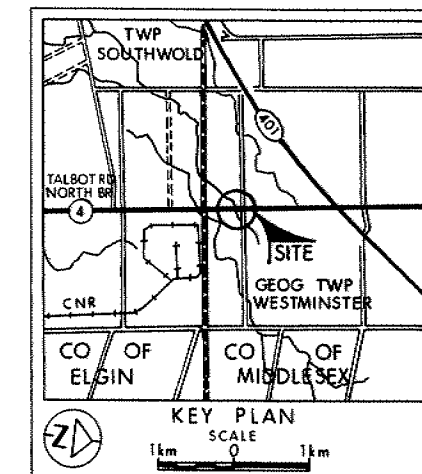
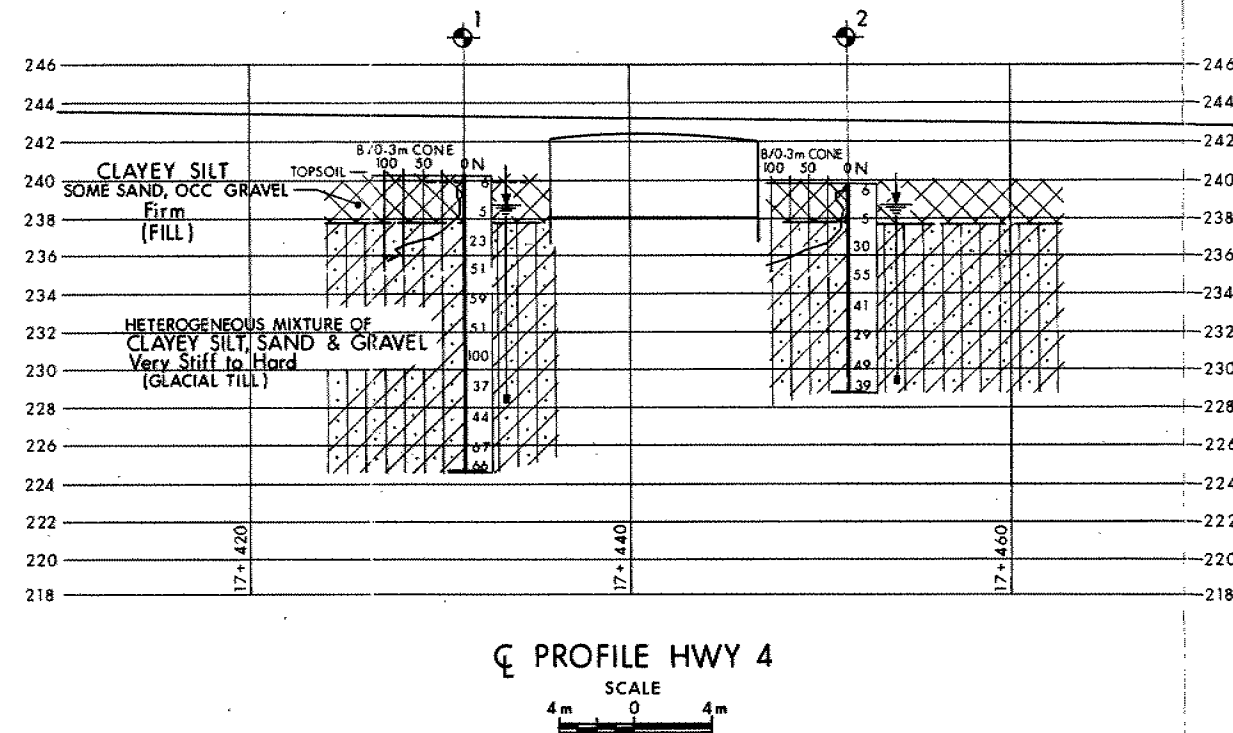
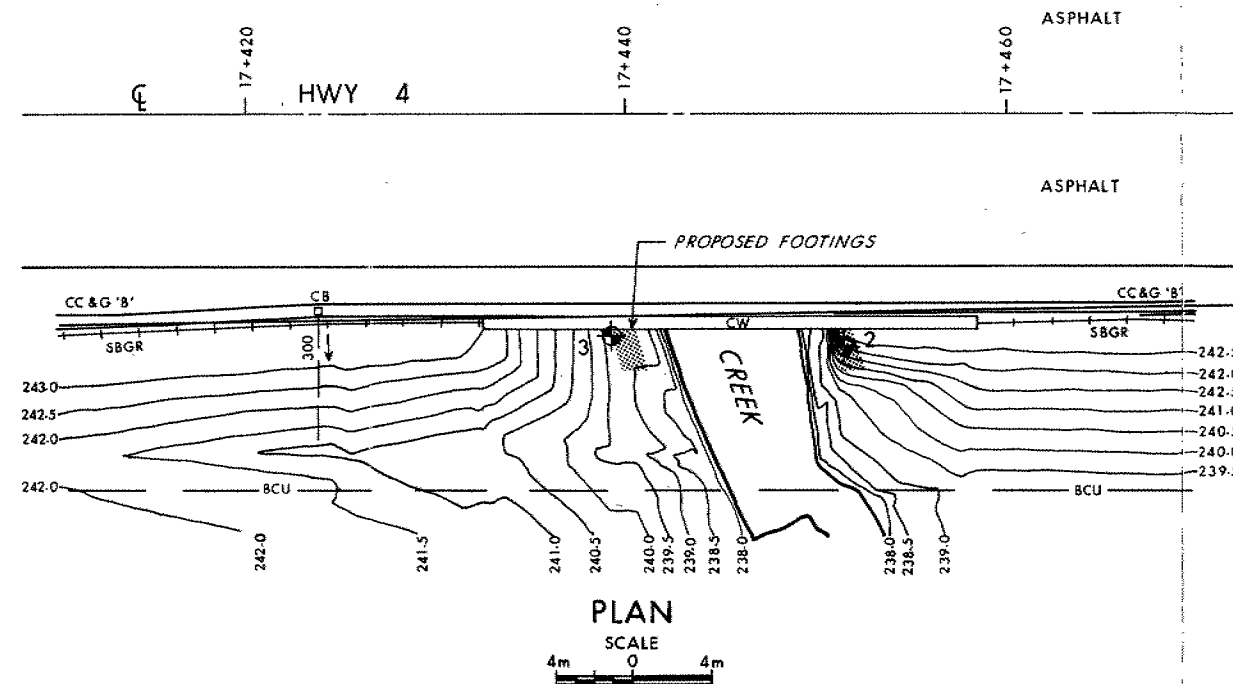
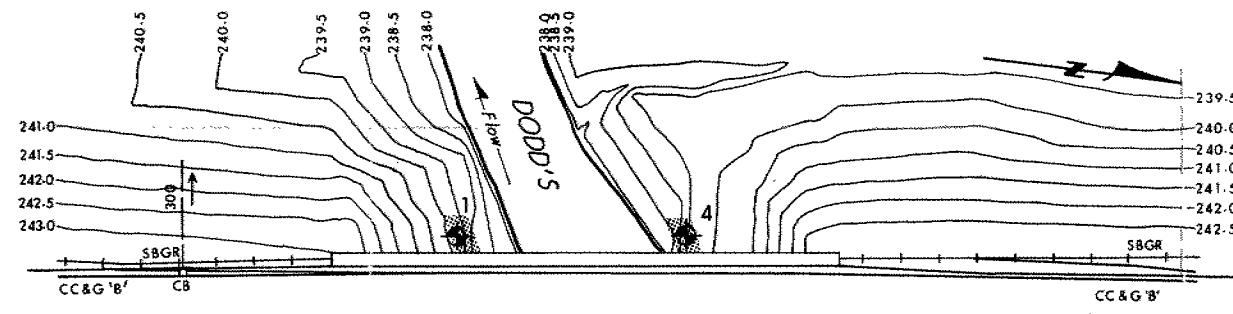
CONT No
WP No 71-85-00



DODD'S CREEK

SHEET

BORE HOLE LOCATIONS & SOIL STRATA



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 96 09

No	ELEVATION	STATION	OFFSET
1	240.2	17+431.3	12.3 m LT
2	239.8	17+451.5	12.2 m RT
3	238.5	17+439.3	11.6 m RT
4	238.5	17+443.2	12.3 m LT

NOTE:
For Subsoil information of
Borehole 3 and 4 refer to
Record of Borehole Sheets

NOTE

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

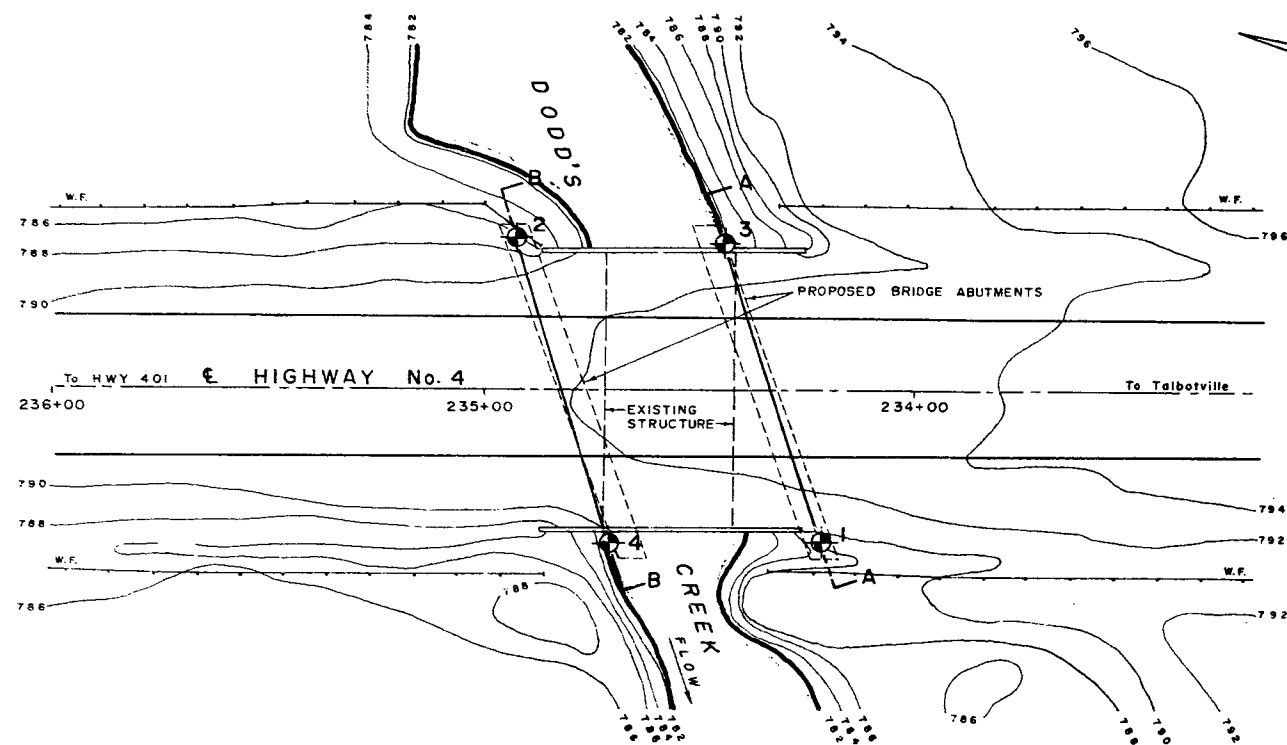
NOTE: The complete foundation investigation and design report for this project and other related documents may be examined at the Engineering Materials Office, Downsview. Information contained in this report and related documents is specifically excluded in accordance with the conditions of Section GC 2.01 of OPS Gen Cond

REV	DATE	BY	DESCRIPTION
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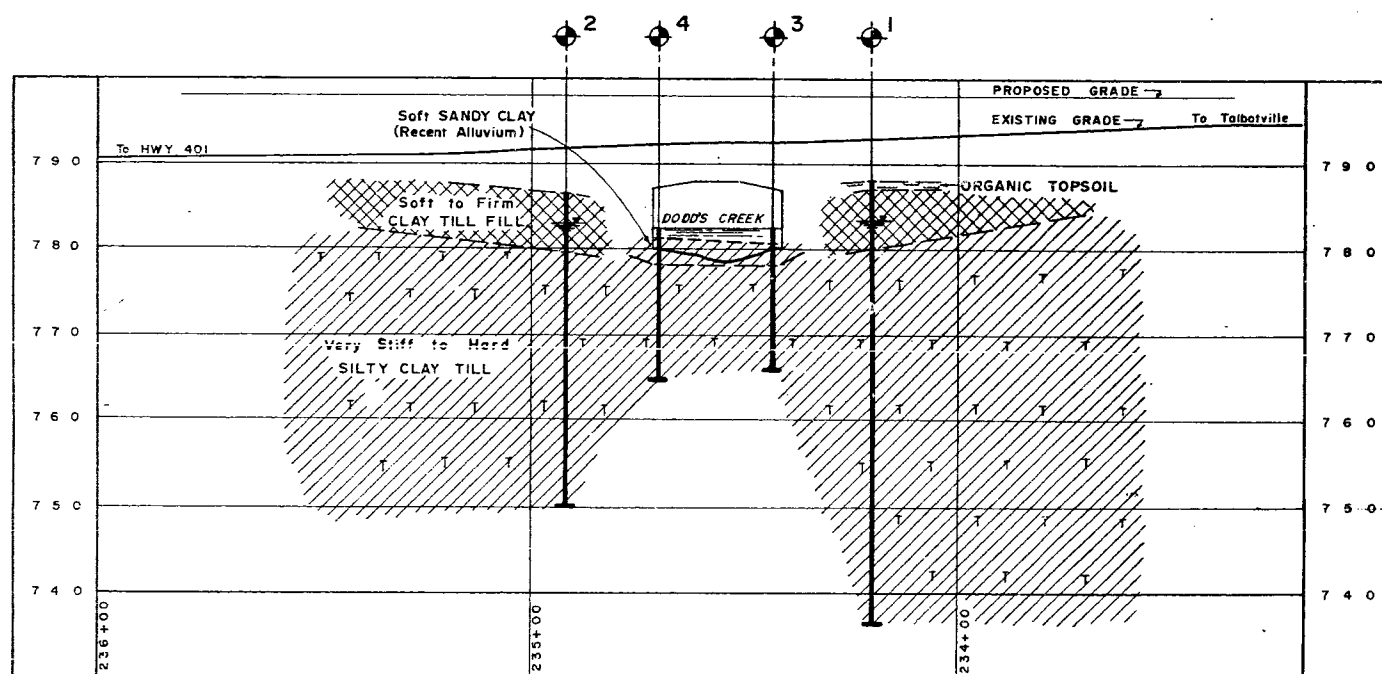
Geocres No 40114-128

HWY No 4	SUBM'D BY	CHECKED BY	DATE 1998 06 05	DIST 31
DRAWN DT	CHECKED	APPROVED	SITE 5-62	DWG 718500-A



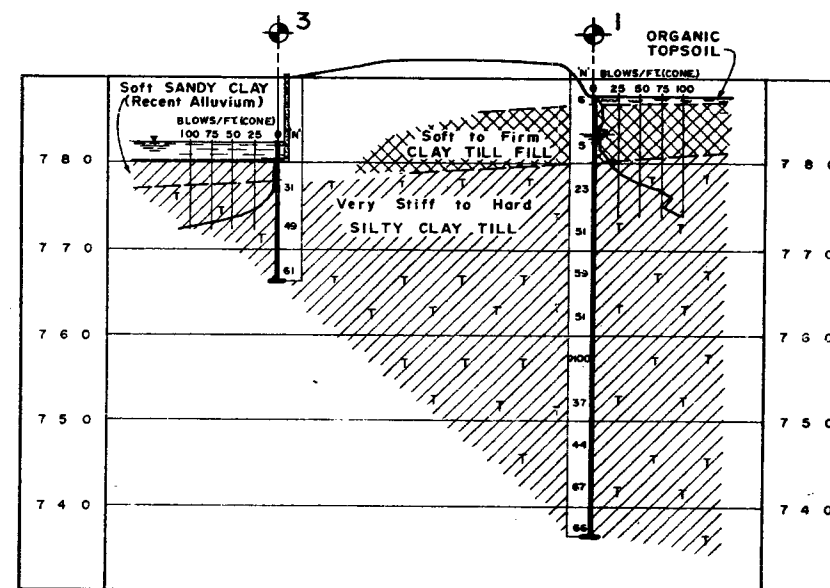


PLAN
SCALE
20 10 0 20 40

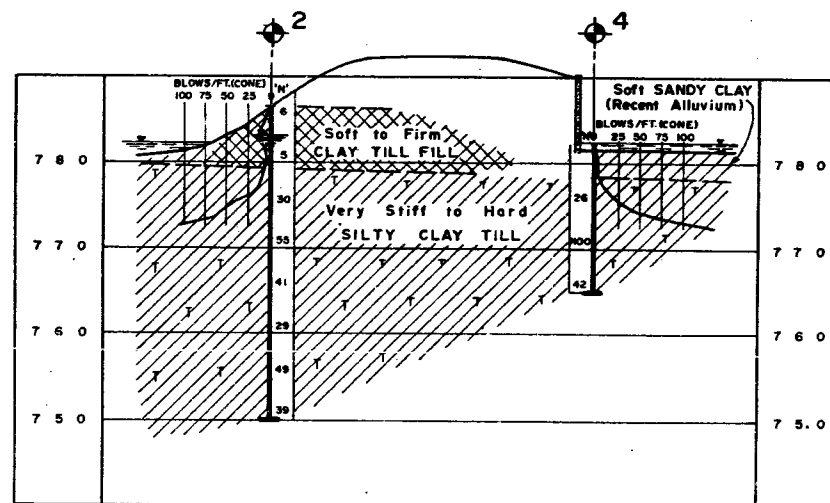


SCHEMATIC SECTION A-A ALONG CENTRELINE OF EXISTING HIGHWAY No. 4

SCALE
20 10 0 20 40
HORIZONTAL
SCALE
10 5 0 10 20
VERTICAL



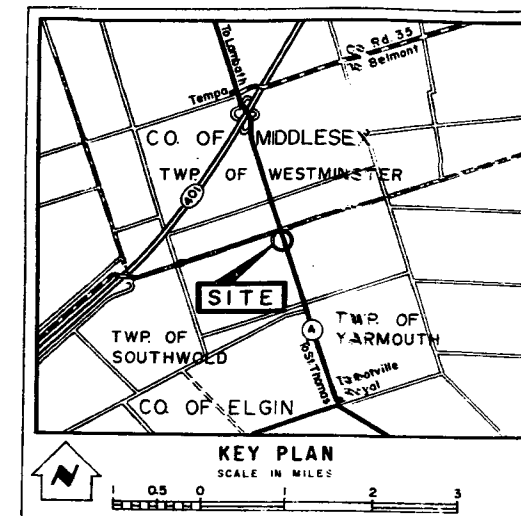
SECTION A-A



SECTION B-B

SCALE
20 10 0 20 40
HORIZONTAL
SCALE
10 5 0 10 20
VERTICAL

- NOTE -
The complete soil investigation report for this structure may be examined at the Bridge Office and Foundation Office, Downsview, and at the London District Office.



LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation (Sept. 17, 1966)		

NO.	ELEVATION	STATION	OFFSET
1	788.0	234+22	35' LT.
2	786.6	234+94	35' RT.
3	782.4	234+46	34' RT.
4	782.4	234+71	36' LT.

- NOTE -
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

DATE	BY	DESCRIPTION

H.Q. GOLDER & ASSOCIATES LIMITED

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

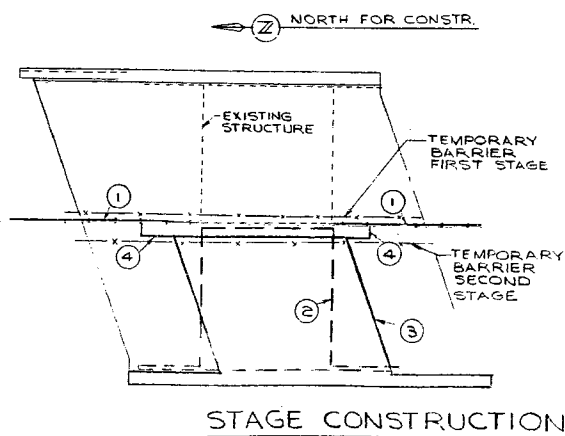
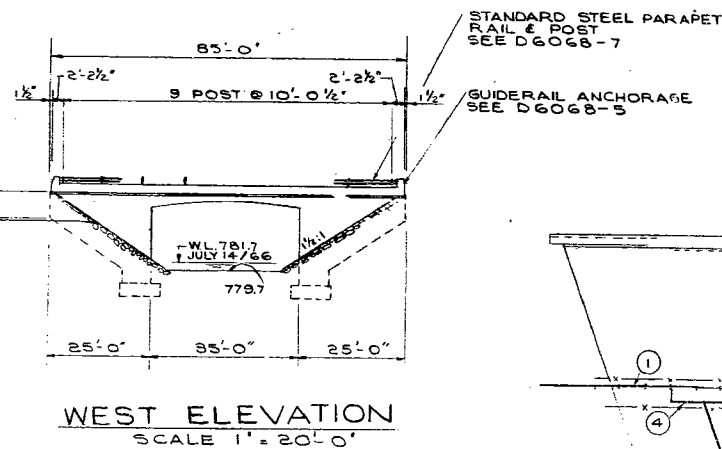
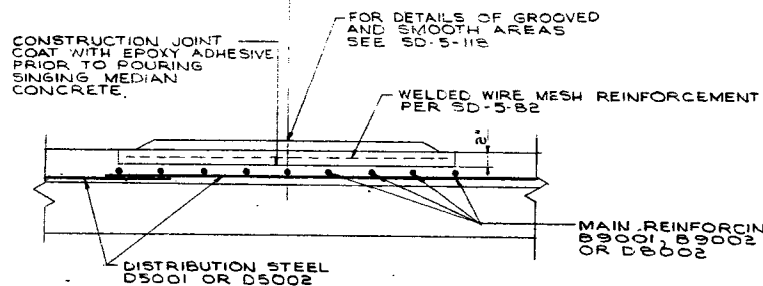
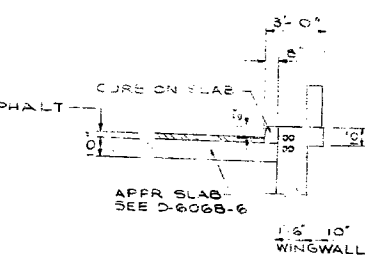
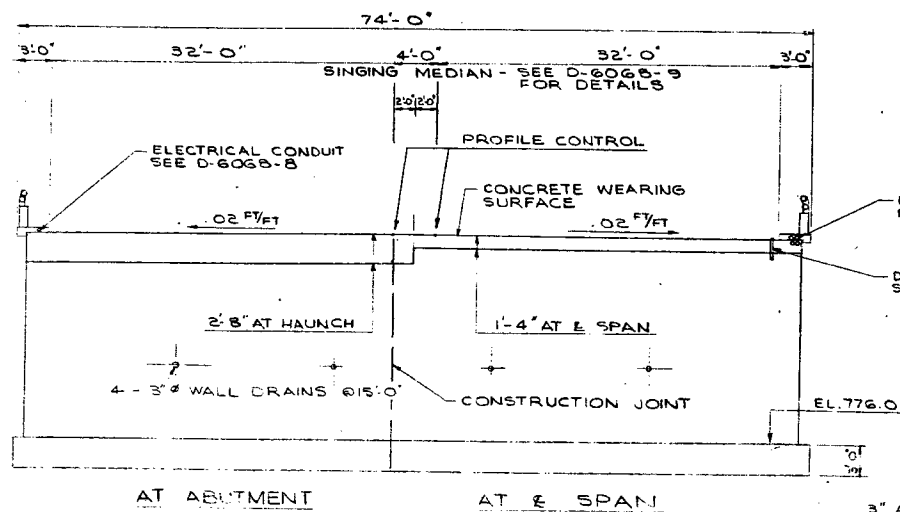
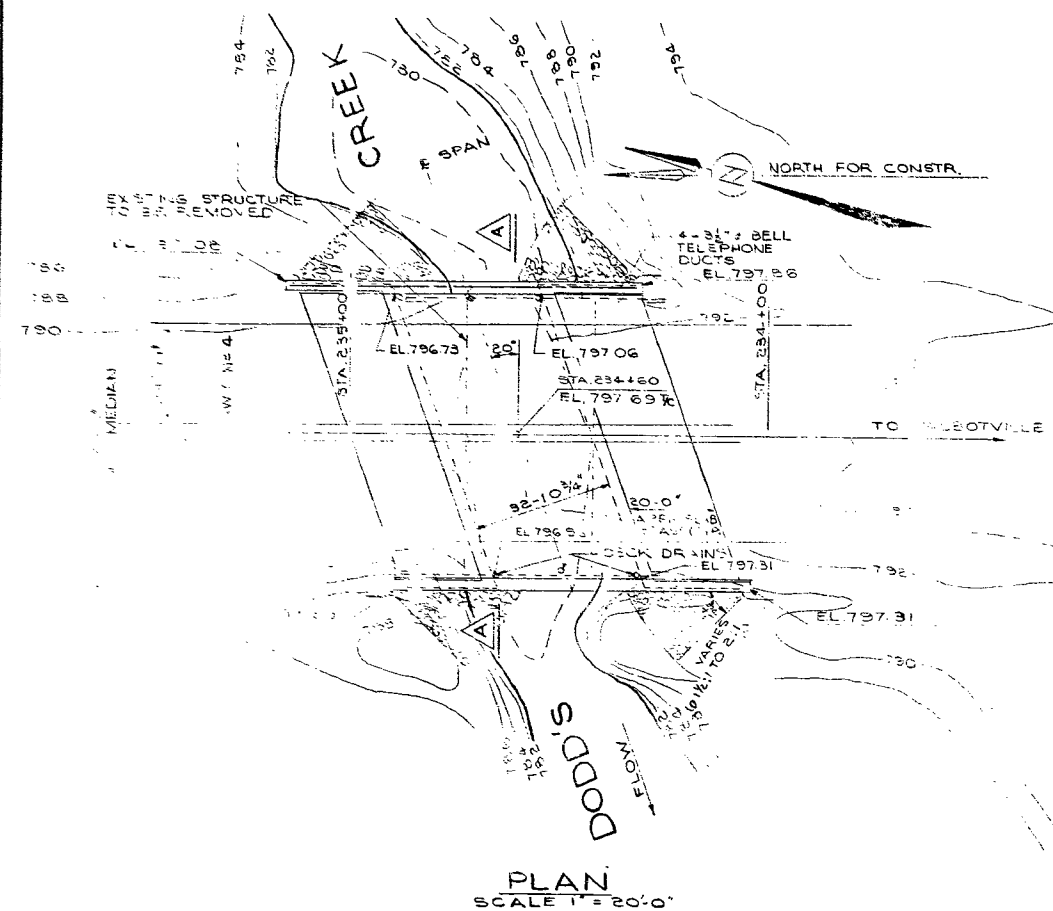
DODD'S CREEK
KING'S HIGHWAY NO. 4 DIST. NO. 2
CO. ELGIN
TWP. SOUTHWOOD LOT 48 & 49 CON. EDW. N.B.T.R.

BORING PLAN AND SOIL STRATIGRAPHY SECTIONS

SUBM'D. B.D.	CHECKED	W.P. NO. 54-66	DRAWING NO.
DRAWN J.W.A.	CHECKED	JOB NO. 66513	1
DATE - SEPT. 21, 1966		SITE NO. 5-4	BRIDGE DRAWING NO.
APPROVED		DATE	67-104

REF. NO. E-4388-1

TWP 95-4-2



CONSTRUCTION SEQUENCE

- TRAFFIC ON EAST HALF OF EXISTING STRUCTURE. PLACE SHORING WALL ① TO BE SUFFICIENTLY HIGH TO RETAIN FILL DURING SECOND STAGE CONSTRUCTION. DEMOLISH WEST HALF OF EXISTING STRUCTURE.
- CONSTRUCT WEST PART OF STRUCTURE ② TO EDGE OF MEDIAN (2' LT. OF E-WEST).
- PLACE SHORING WALL ③ BACKFILL COMPLETE PART.
- SWITCH TRAFFIC TO COMPLETED PART OF NEW STRUCTURE. DEMOLISH REMAINING PART OF EXISTING STRUCTURE AND COMPLETE REMAINING PART OF NEW STRUCTURE. AND BACKFILL, REMOVE SHORING.
- CONSTRUCT APPROACH SLABS AND COMPLETE REMAINING WORK.

NOTES:

- CLASS OF CONCRETE
- 30' 28' 5" 7' 11"
- CLEAR COVER
- FOOTINGS
- DECK TO
- CURBS
- PARAPET

LIST OF DETAILS

- GENERAL
- SKETCHES
- SECTION
- FRAME AND PARAPET
- WINGWALL DETAIL
- PARAPET WALL
- APPROACH SLAB
- RAILING DETAILS
- ELECTRICAL DETAILS
- STANDARD DETAILS

NOTE:

PRIOR TO PLACING THE FILL MATERIAL BEHIND THE ABUTMENTS, ALL CRACKING MATERIAL SHOULD BE REMOVED AND BACKFILLED WITH SUITABLE MATERIAL.

20' SKEW DATA	
SIN.	0.34202
COS.	0.93969
TAN.	0.36397
SEC.	1.06418

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

DODDS CREEK BRIDGE
2.1 MILES NORTH OF NORTH ST. HWY 12 E

KING'S HIGHWAY No. 4
CO. ELGIN
TWP. SOUTH WOLD LOT 42 E.C. CONVEYANCE

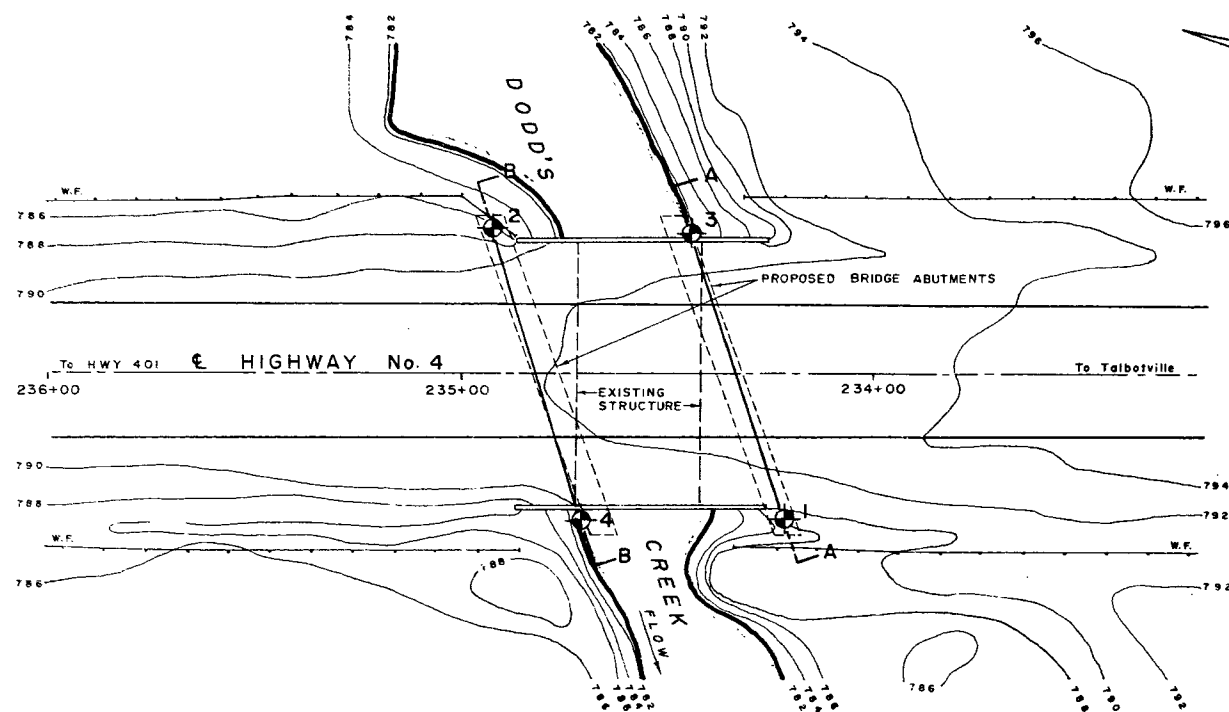
GENERAL

APPROVED: [Signature]
DESIGN: W.T.H. CHECK: DSM
DRAWING: P.A.H. CHECK: DSM
DATE: MAR 67 LOADING: H520-44

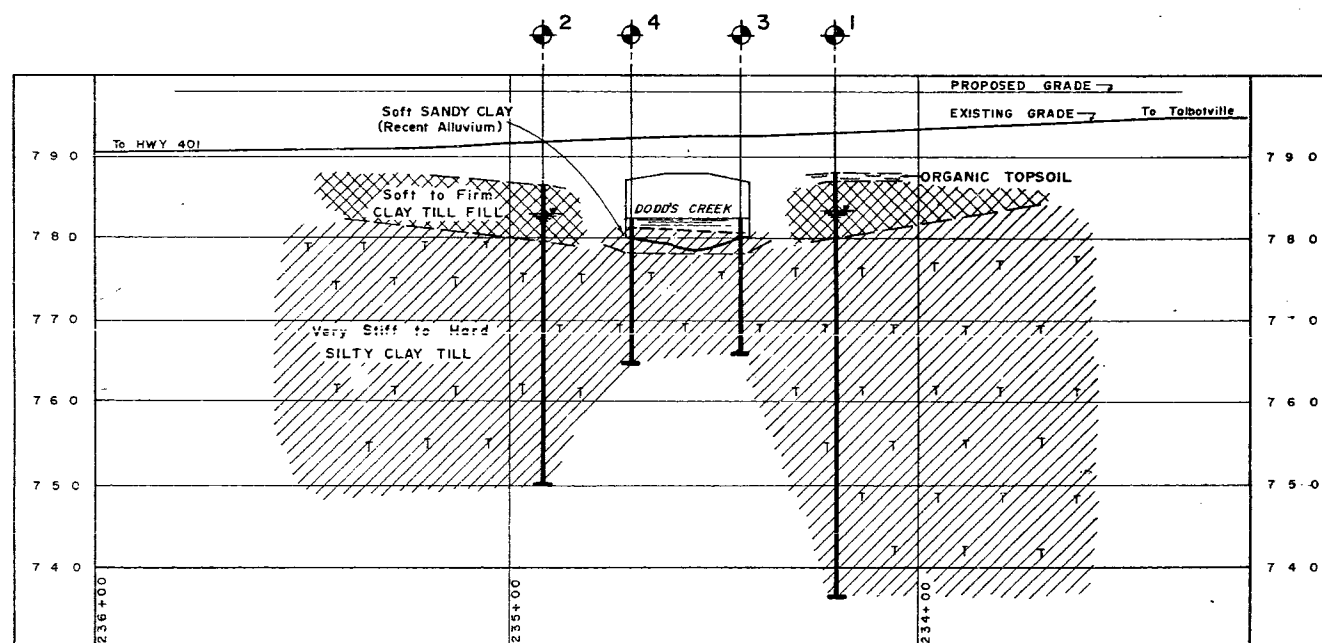
SITE No. 5-2
CONTRACT No. 12-22
CREATIVE No. 6663



PRINT RECORD	NO.	FOR	DATE
1	23, P.	2447	

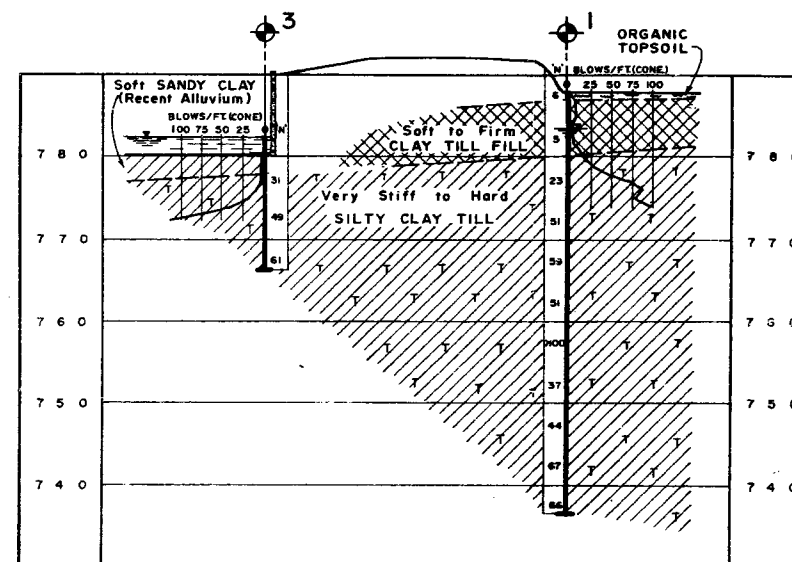


PLAN
SCALE
20 10 0 20 40

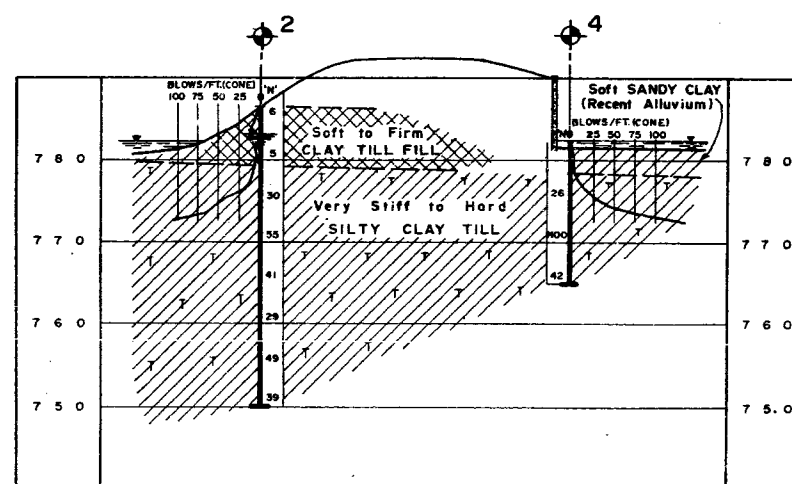


SCHEMATIC SECTION ALONG CENTRELINE OF EXISTING HIGHWAY No. 4

SCALE
HORIZONTAL 20 10 0 20 40
VERTICAL 10 5 0 10 20



SECTION A-A

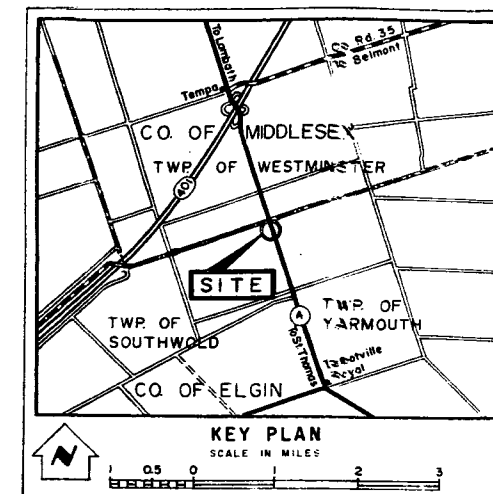


SECTION B-B

SCALE
HORIZONTAL 20 10 0 20 40
VERTICAL 10 5 0 10 20

NOTE

The complete soil investigation report for this structure may be examined at the Bridge Office and Foundation Office, Downsview, and at the London District Office.



LEGEND

- Bore Hole
- ⊕ Cone Penetration Hole
- ⊙ Bore & Cone Penetration Hole
- W Water Levels established at time of field investigation (Sept. 17, 1966)

NO.	ELEVATION	STATION	OFFSET
1	788.0	234+22	35' LT.
2	786.6	234+94	35' RT.
3	782.4	234+46	34' RT.
4	782.4	234+71	36' LT.

NOTE

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

NO.	DATE	BY	DESCRIPTION
1			
2			
3			
4			

H.Q. GOLDER & ASSOCIATES LIMITED

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

DODD'S CREEK

KING'S HIGHWAY NO. 4 DIST. NO. 2
CO. ELGIN
TWP. SOUTHWOLD LOT 42.8.49 CON. E&W N.B.T.R.

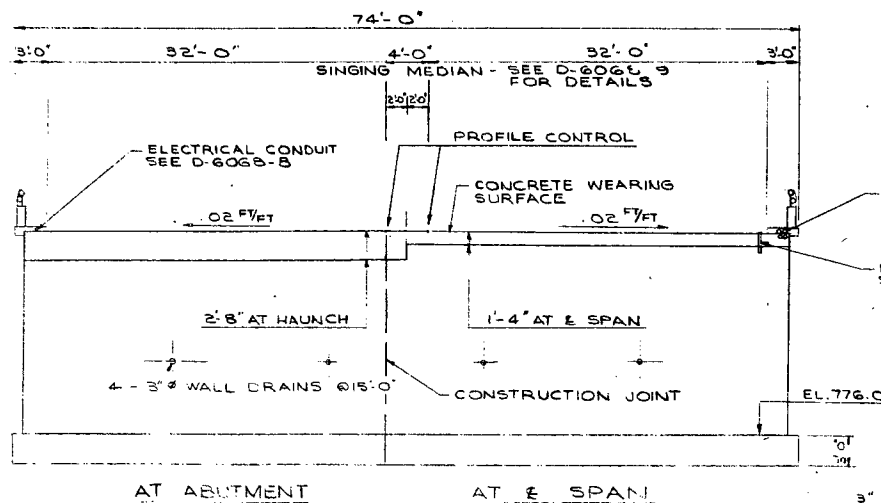
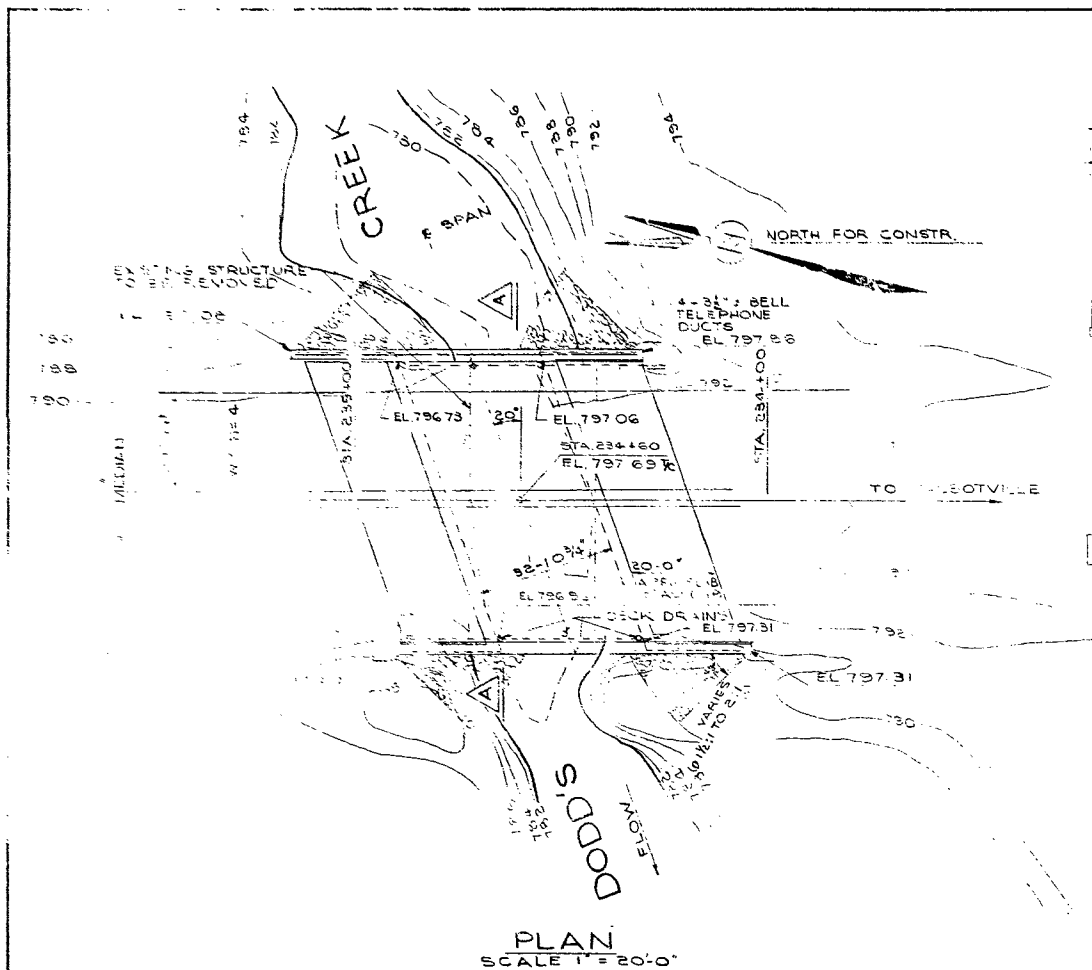
BORING PLAN AND SOIL STRATIGRAPHY SECTIONS

SUBM'D. B.D. CHECKED	W.P. NO. 54-66	DRAWING NO.
DRAWN J.W.A. CHECKED	JOB NO. 66513	1
DATE - SEPT. 21, 1966	SITE NO. 5-4	BRIDGE DRAWING NO.
APPROVED	POINT NO. 67-104	20668-2

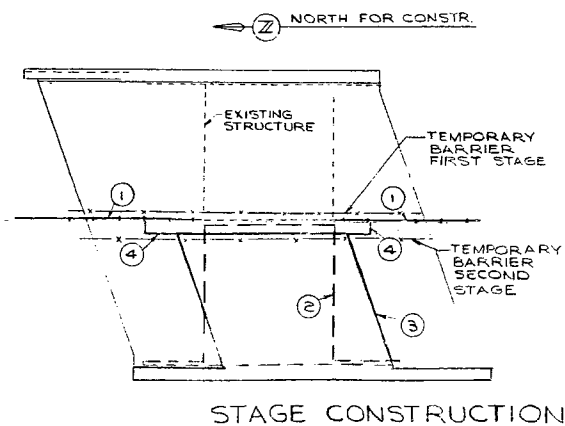
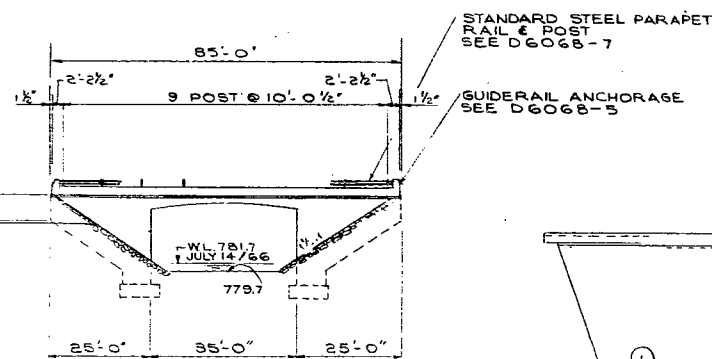
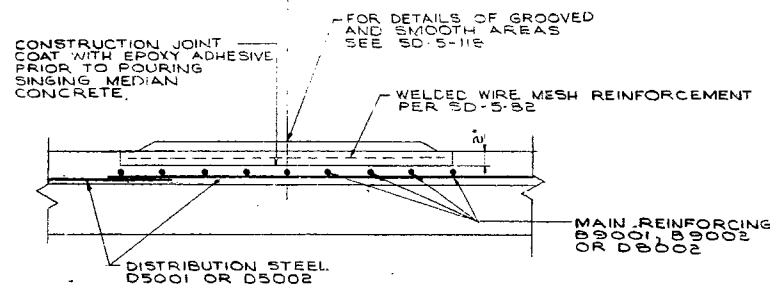
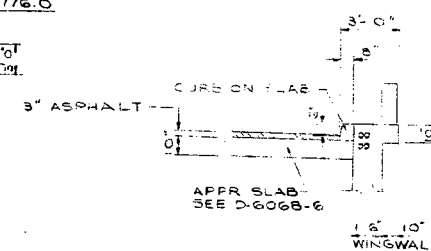
REF. NO. E-4388-1

TWP 95-4-2

PRINT RECORD	NO.	FOR	DATE
	1	AS	2/3/67
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		



CURB ON DECK
SCALE 1/4" = 1'-0"



- CONSTRUCTION SEQUENCE
- TRAFFIC ON EAST HALF OF EXISTING STRUCTURE. PLACE SHORING WALL ① TO BE SUFFICIENTLY HIGH TO RETAIN FILL DURING SECOND STAGE CONSTRUCTION. DEMOLISH WEST HALF OF EXISTING STRUCTURE.
 - CONSTRUCT WEST PART OF STRUCTURE ② TO EDGE OF MEDIAN (2' LT. OF E-WEST).
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 - SWITCH TRAFFIC TO COMPLETED PART OF NEW STRUCTURE. DEMOLISH REMAINING PART OF EXISTING STRUCTURE AND COMPLETE REMAINING PART OF NEW STRUCTURE, AND BACKFILL, REMOVE SHORING.
 - CONSTRUCT APPROACH SLABS AND COMPLETE REMAINING WORK.

- NOTES:
- CLASS OF CONCRETE
 - 3" ASPHALT CURB ON DECK
 - CLEAR COVER
 - FOOTINGS
 - DECK TO
 - CURBS
 - PARAPET
- GENERAL
- WORKING PLAN
 - SECTION
 - FRAME AND FINISH
 - WINGWALL DETAIL
 - PARAPET WALL
 - APPROACH SLAB
 - TRAINING DETAILS
 - ELECTRICAL DETAILS
 - STANDARD DETAILS
- NOTE:
- PRIOR TO PLACING THE FILL MATERIAL BEHIND THE ABUTMENTS, ALL CRACKING MATERIAL SHOULD BE REMOVED AND BACKFILLED WITH SUITABLE MATERIAL.

20° SKEW DATA	
SIN.	0.34202
COS.	0.93969
TAN.	0.36397
SEC.	1.06418

DEPARTMENT OF HIGHWAYS ONTARIO	
BRIDGE DIVISION	
DODDS CREEK BRIDGE	
2.1 MILES NORTH OF NORTH ST. HWY 123	
KING'S HIGHWAY No. 4	DIST. No. 2
CO. ELGIN	
TWP. SOUTHWOLD	LOT 42 E.C.B. CONVEY. N.E.T.
GENERAL	
APPROVED	SITE No. E-2
DESIGN W.T.H. CHECK DSM	CONTRACT No.
DRAWING P.A.H. CHECK DSM	DRAWING No. 26663
DATE MAR/67	LOADING H520-44



1799