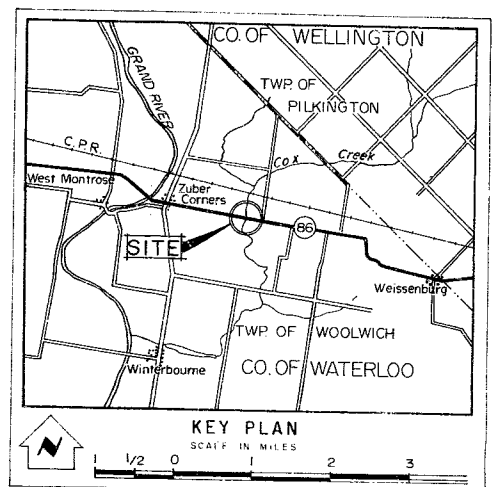
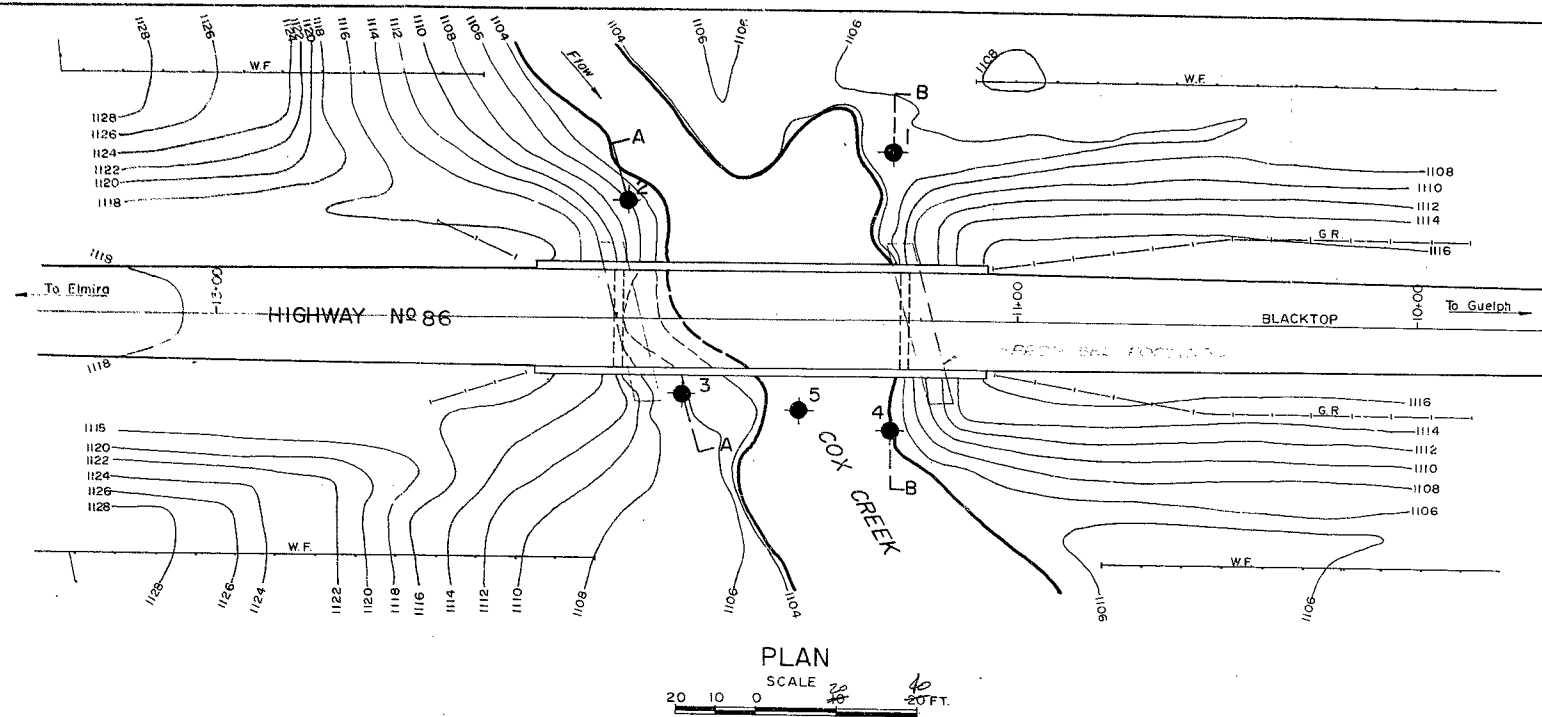


#69-F-220C

W.P. 135-66-00

H.W.Y. #86

COX CREEK BRIDGE

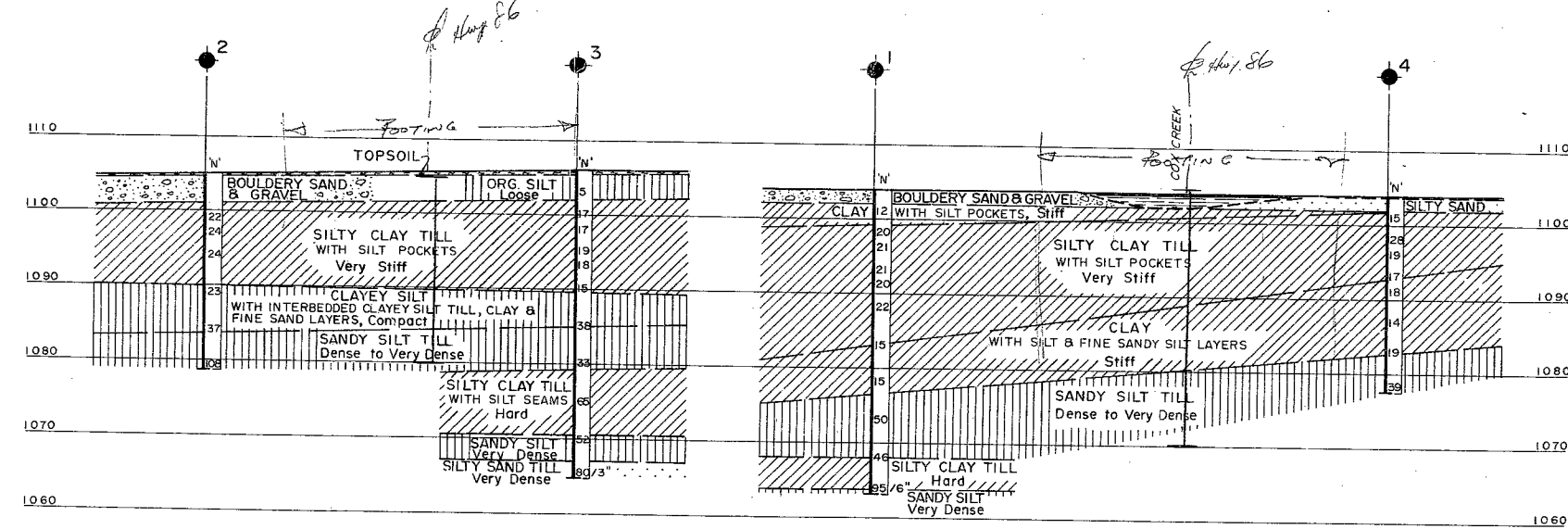


LEGEND

- Bore Hole
- ⊕ Cone Penetration Hole
- ⊕ Bore & Cone Penetration Hole
- Water Levels established at time of field investigation JUNE 1969

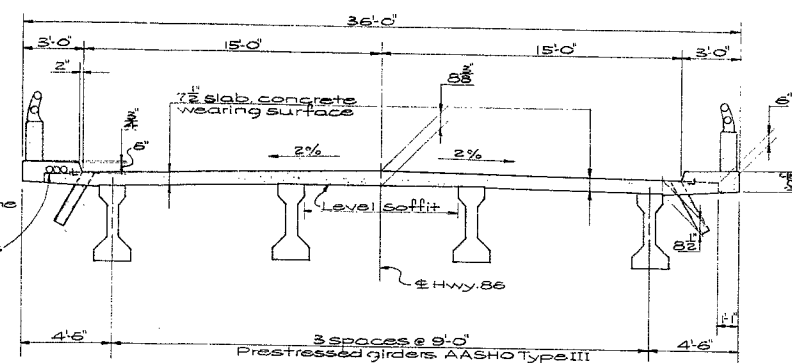
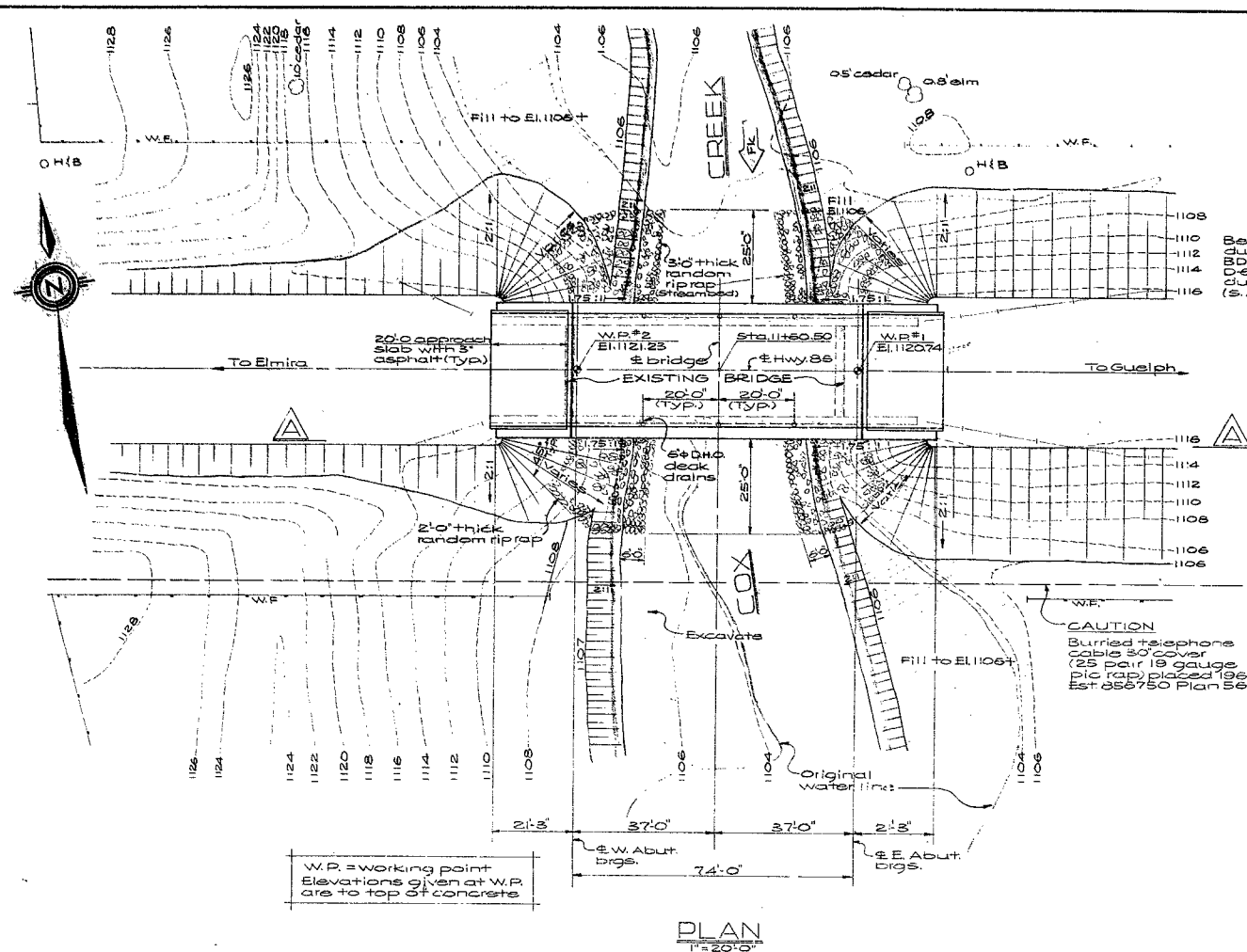
NO.	ELEVATION	STATION	OFFSET
1	1104.1	11+32	42' RT.
2	1105.0	11+97	29' RT.
3	1106.1	11+83	19' LT.
4	1104.0	11+32	27' LT.
5	1102.6	11+54	23' LT.

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.



PRINT RECORD		
NO.	FOR	DATE

PETO ASSOCIATES LIMITED			
DEPARTMENT OF HIGHWAYS - ONTARIO			
MATERIALS & RESEARCH DIVISION - FOUNDATION SECTION			
COX CREEK BRIDGE			
KING'S HIGHWAY NO. 86		DIST. NO. 3	
CO. WATERLOO		TWP. WOOLWICH	
LOT 1 & 126		CON. 1 & GCT.	
BORE HOLE LOCATIONS & SOIL STRATA			
SUBMD. K.L.C.	CHECKED K.L.C.	W.P. NO. 135-66-00	M.B.T. DRAWING NO.
DRAWN K.K.	CHECKED J.H.	JOB NO. 69 F118	BRIDGE DRAWING NO.
DATE JUNE 1969	SITE NO.	CONT. NO.	
APPROVED			

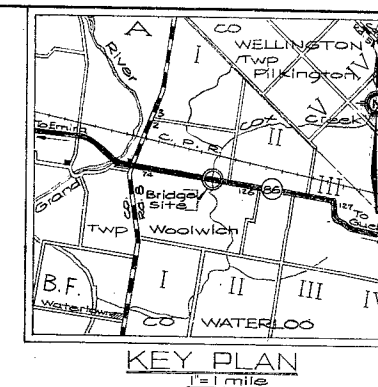


LIST OF DRAWINGS

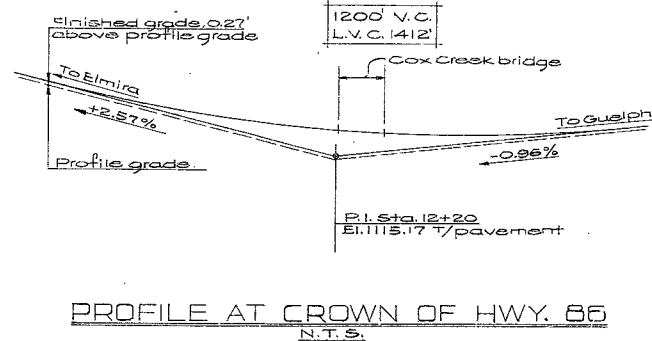
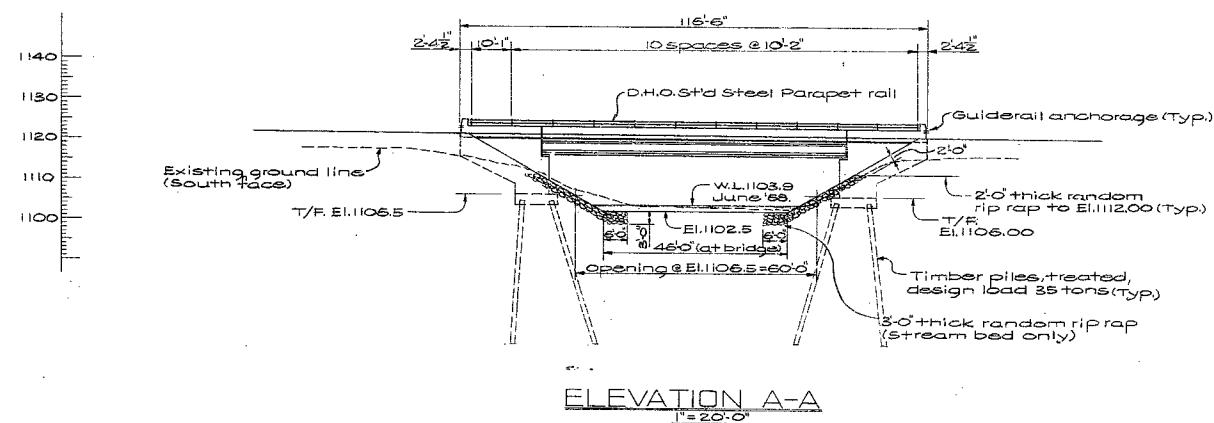
- D-6706-1 General Layout
- " 2 Bare Hole Locations { Soil Strata
- " 3 Footing Layout
- " 4 Abutments
- " 5 Prestressed Girders { Bearings
- " 6 Deck
- " 7 Parapet Wall Details
- " 8 Standard Steel Parapet Rail
- " 9 Approach Slabs
- " 10 Standard Details I
- " 11 " " II

NOTES

- Class of Concrete**
 Prestressed girders 5,000 P.S.I.
 Deck, curbs { Parapet walls 4,000 P.S.I.
 Remainder 3,000 P.S.I.
- Clear Cover on Reinforcing Steel**
 Footings { abutments 3"
 Deck 1 1/2", top; 1" bot. curbs 2"
 Parapet walls 1 1/2"
- Construction Notes**
 The Contractor is responsible for finishing the bearing seats dead level to the specified elevations with a tolerance of 1/8".
 No concrete shall be placed above the abutment bearing seats until the concrete in the deck has been placed.

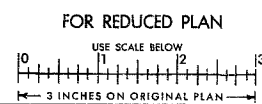


G.B.M. No. 617 F. 1103.187
 C.P. Ry. bridge over Grand River 1.4 miles northeast of post office, tablet in west face of east concrete abutment on south side of bridge, 11 inches from south face, 2 feet 4 inches below bridge seat & 3 feet below track level.

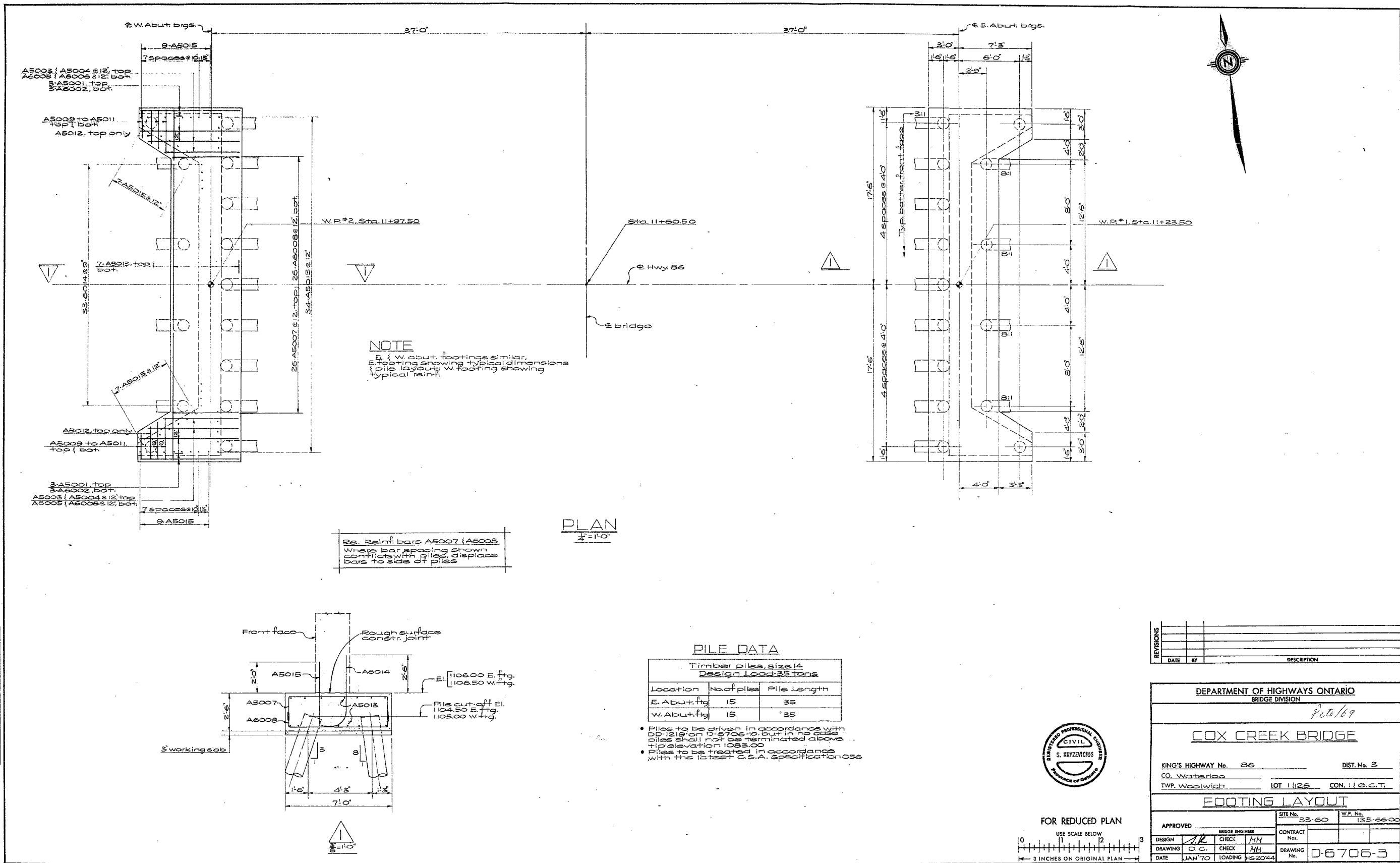


REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
69 P. 20			
COX CREEK BRIDGE 7.9 miles west of Hwy. 7			
KING'S HIGHWAY No. 86		DIST. No. 3	
CO. Waterloo		TWP. Woolwich	
LOT 1 & 126		CON. 1 & G.C.T.	
GENERAL LAYOUT			
APPROVED		SITE No. 33-60 W.P. No. 135-6600	
DESIGN	CHECK	CONTRACT	No.
DRAWING	CHECK	DRAWING	No.
DATE	JAN '70	LOADING	HS 20d.3
DRAWING No. 0-6706-1			



PRINT RECORD	No.	FOR	DATE

[illegible][illegible]

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
P.C. 6/69			
<u>COX CREEK BRIDGE</u>			
KING'S HIGHWAY No. 36		DIST. No. 3	
CO. Waterloo			
TWP. Woolwich		LOT 1426 CON. 116 C.T.	
<u>FOOTING LAYOUT</u>			
APPROVED		SITE No. 33-60 W.P. No. 135-66	
BRIDGE ENGINEER		CONTRACT	
DESIGN <i>AK</i>	CHECK <i>MM</i>	No.	
DRAWING <i>D.C.</i>	CHECK <i>MM</i>		
DATE JAN '70	LOADING 45,200/4	DRAWING No. D-6706-3	

MEMORANDUM

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Office,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Office,
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

DATE: July 2, 1969

OUR FILE REF.

IN REPLY TO

JUL 2 1969

SUBJECT:

Re: FOUNDATION INVESTIGATION REPORT
By: Peto Associates Limited --
Cox Creek Bridge, Highway 86
Elmira, Ont. -- District No. 3
W.P. 135-66-00 33-60

69-F-220C

Attached, please find the above mentioned report prepared and submitted by the Consultant, Peto Associates Ltd.

We have reviewed the report and believe that it contains sufficient information for you to proceed with the design.

It appears to us that the allowable bearing pressure could be raised to 3.0 T/sq.ft. if a structure insensitive to settlements is chosen. Settlements up to 2 inches can be expected in this case.

Due to the presence of permeable seams, a dewatering scheme will be necessary for constructing spread footings. Adequate frost and scour protection should be provided.

Should you wish to discuss any aspects of the report, please feel free to contact this Office.

AGS/MdeF
Attach.

cc: Messrs. B. R. Davis (2)✓
H. A. Tregaskes
D. W. Farren
W. Zonnenberg
H. C. Dernier
A. P. Watt
J. Roy
B. A. Singh
Foundations Files
Gen. Files

A. G. Stermac
A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

D.H.O.
TORONTO
RECEIVED
JUL 4 1969
BRIDGE
OFFICE

PETO ASSOCIATES LIMITED

FOUNDATION INVESTIGATION
COX CREEK BRIDGE HIGHWAY 86
ELMIRA, ONTARIO

for
69-F-220C
DEPARTMENT OF HIGHWAYS, ONTARIO
D.P. 195-66-00

Distribution:
11 cc Client
1 cc File

JOB NO. 69-F118

JUNE, 1969



PETO ASSOCIATES LTD.
CONSULTING SOIL ENGINEERS
1287 Caledonia Rd. Toronto 19, Ontario - Phone: (416) 789-1126

JOB NO. 69-P118

June 26, 1969.

Department of Highways, Ontario,
Foundation Section,
Downsview, Ontario.

Attention: Mr. A. Stermac.

Dear Sir:

Re: Foundation Investigation
Cox Creek Bridge Highway 86
Elmira, Ontario.

It is our pleasure to enclose, herewith, the report on the subsoil investigation carried out in connection with the erection of a new bridge to replace an existing one at the site where Highway 86 crosses Cox Creek in Elmira, Ontario.

The soil conditions are generally good. Spread footings are recommended as the supporting medium to be set at about 6.0 ft. below the ground surface and corresponding to elevation 1098.0. At this elevation, the footing will sit on the glacial deposit in a stiff condition, where the maximum net allowable bearing capacity of 4.0 Kips per sq. ft. is suggested.

Beneath the founding material of silty clay till, the soils are either stiff laminated clay and silt or dense clayey silt, both underlain by a deposit of very dense sandy silt till, this in turn rests on either extremely hard silty to hard silty clay and fine sand.

Close sheetings should be provided to cut off the creek water from flowing into the footing trench. They should be driven to a depth of about 2.0 ft. below the bottom of the cut.

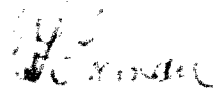


If the footing width can be kept equal or less than 6.0 ft.; the total settlement estimated by assuming a uniformly distributed contact pressure of 4.0 Kips per sq. ft. will be less than 1.0 inch. This implies unfavourable differential settlements will not be expected.

We believe the report to be complete, however, we shall be pleased to discuss any further points you may wish to raise.

Yours very truly,

PETO ASSOCIATES LTD.



C. F. Freeman, P. Eng.,
Chief Engineer.

CFF/jc

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3. GENERAL	
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6. OBSERVATIONS AND RECOMMENDATIONS	5 & 6

TABLE 1 QUICK UNDRAINED TRIAXIAL TEST DATA

BOREHOLE LOGS

SITE PLAN AND PROFILES

1. AUTHORITY

The work described in the report was authorized by letter dated May 30th 1969 from Mr. A. Rutka, Materials & Testing Engineer, Department of Highways, Ontario.

2. PROPOSAL AND SITE

It was proposed to investigate the subsoil conditions for the erection of a new bridge to replace an existing bridge at the site where Highway 86 crosses Cox Creek near Elmira, in the Township of Woolwich, Ontario.

The existing bridge is a concrete Bowstring Bridge and in a fair condition. It is believed to be constructed on spread footings.

The proposed abutments will be located at approximately the same chainage as the existing abutment walls.

The site is flat and grassy with the road on an embankment. Boulders up to 3 ft. in diameter are seen scattering on the site. At the time of this investigation, creek water with a depth varying between 1.5 and 3.0 ft. was flowing slowly to the south. The river bed consists mainly of gravel and cobbles.

3. GENERAL

Five boreholes were programmed and they were located at the locations as shown on the accompanying site plan. Two boreholes were taken down to a depth of about 40.0 ft. below the ground surface and two were taken down to a depth of 25.0 ft.

In order to acquire information on the scouring problem, the fifth hole was put down in the center of the creek and in line with boreholes #3 and #4. The hole was taken down to a depth of 13.0 ft. below water level.

3. GENERAL - Cont'd

The elevations used in the report were referred to the geodetic datum of elevation 1107.65 established as the top level of a nail fixed in the west root of a tree (15 Elm) about 107.0 ft. right (or north) of station 11+31.

Standard sampling was performed in accordance with A.S.T.M. D-1586 and D-1587 as necessary.

The field test results, classification, stratification as well as moisture content determinations are given on the record of boreholes included with the report.

Two quick undrained triaxial tests, together with four Atterberg Limit tests were performed on the selected undisturbed samples in order to estimate the strength of the underlying materials and their stress history.

The quick undrained triaxial tests and associated Volumetric data are given on Table (I), whilst the results of Atterberg Limit tests are given on Table(II).

Two generalized soil profiles along the proposed abutments are given with the site plan.

4. SOIL CONDITIONS

The following descriptions serve the purpose to amplify the conditions illustrated in the generalized soil profiles.

Apart from the surficial soils of silt, sand, gravel and boulder with the thickness varying from 2.0 ft. in boreholes #1 and #4 to 4.0 ft. in boreholes #2 and #3; the materials underlying the site covered by the boreholes mainly consist of glacial materials, but of a heterogeneous nature.

4. SOIL CONDITIONS - Cont'd

Below the surficial soils, a deposit of grey silty clay till is found to a depth of about 17.0 ft. below the existing grade.

The penetration values generally are in the order of 20 blows per ft. depth which accordingly put this deposit in the very stiff category.

The feature of this deposit is the fact that with increasing depth, the amount of gravel decreases so rapidly that in some instances, the material may be classified as silty clay. In addition, silt seams and silt pockets are present near the bottom of this deposit.

Below the deposit of silty clay, the soil conditions vary between the boreholes representing the two abutments.

In boreholes #1 and #4 on the east abutment, the soils are composed of laminated grey clay and silt layers, with interbedded very fine sand and silt being encountered in borehole #1. The penetration values average 16 blows per ft. depth, which put this material in a stiff condition. The thickness of this layer is 6.5 ft. in borehole 1 and 10 ft. in borehole #4.

The laminated layers in borehole #1 are of about equal thickness of about 0.2 ins. each layer, while those in the upper 8.0 ft. of borehole #4 where trace amount of gravels is found, are too thin to be given any value.

In boreholes #2 and #3, on the west abutment, the soils stratigraphy varies from that found under the east abutment. The soils encountered were grey clayey silt containing interbedded clayey silt till, clay and fine sand layers in borehole #2, and grey silt containing interbedded clay layers in borehole #3. However, the penetration values are higher, varying between 23 and 38 blows per ft. depth. The thickness is 6.5 ft. in borehole #2 and 4.5 ft. in borehole #3.

4. SOIL CONDITIONS - Cont'd

Underlying the soils described above, there is a layer of dense grey sandy silt till having a thickness varying from 5.5 ft. to an unknown value, with the layer extending beyond the termination of the testhole as in testholes 2 and 4.

In borehole #2, the till contains more clay fraction.

Below the sandy silt till layer, the conditions again vary greatly between boreholes #1 and #3.

In borehole #1, a layer about 4.0 ft. thick of hard grey very silty clay till is found to a depth of about 40.0 ft. below the ground surface, and it was underlain by a deposit of very dense fine sandy silt, which extends to the end of the borehole.

In borehole #3, a layer about 9.0 ft. thick of hard grey fissured silty clay with silt pockets is underlain by a layer about 3.5 ft. thick of saturated grey sandy silt containing trace amounts of gravel; this in turn rests on a deposit of extremely dense grey silty sand till, extending to the limit of the borehole.

In borehole #5, below the 1 ft. 6 ins. of water, there is a layer about 8 ins. thick of sandy gravel, resting on a deposit of very stiff grey silty clay till which extends to the end of the borehole.

5. GROUND WATER

At the time of this investigation, the creek water level was determined to be at elevation 1104.1 and the depth of the water was found to vary from 1.5 ft. to 3.0 ft.

With the exception of borehole #3, creek water was observed to seep into the testholes during the drilling operation. In borehole #3, the ground water table was established at 3 ft. 4 ins. below the ground surface which is at about the same level as the creek water.

5. GROUND WATER - Cont'd

The silt seams found in the till or clay deposits may serve as the passages for the creek water to seep into the test holes.

Two soluble sulphate tests were performed on water samples, one taken in borehole #3, the other from the creek. They yield the results as follows:

	<u>pH</u>	<u>SO₃ Parts/million parts</u>
Water in borehole #3	8.0	20
Creek water	8.0	14.

These indicate non-aggressive characteristics in regard to attack on concrete.

6. OBSERVATIONS AND RECOMMENDATIONS

This investigation has shown that the soil conditions at the bridge site are generally good. The stratum of grey silty clay which was encountered in all the testholes at depths between 2 ft. 0 ins. and 5 ft. 0 ins. below the existing grade has an average penetration value of 20 blows per ft. The results from two quick-undrained triaxial tests carried out on undisturbed samples recovered from the area where lower penetration values were recorded show that this clay has a shear strength value of at least 4000 lbs/sq. ft. Based on this, a net bearing capacity of 4 Kips per sq. ft. can be used for footings set at elevation 1096.0. The estimated settlement of a footing 6 ft. 0 ins. wide at this elevation is 1 inch approximately.

If this maximum bearing capacity is too low for our economic footing design, we recommend the use of a piled foundation. The piles which can be either timber or steel tube piles, should be driven to a calculated refusal within the grey sand silt till stratum which occurs between elevations 1083.0 and 1077.0. Calculations indicate that the capacity of a single 12 inch diameter pile driven into the silt till

6. OBSERVATIONS AND RECOMMENDATIONS - Cont'd

is between 25 tons and 30 tons, but this should be checked by field tests. The effect of the pile group must also be taken into consideration.

Excavation through the road fill material, and the natural strata overlying the grey silty clay will require to be sloped back at a 1 vertical to 1 horizontal slope if timber supports are not used. The clay is capable of standing with vertical sides, but local safety regulations must be adhered to at all times.

Close sheeting will be required to prevent seepage from the surficial deposits and this should be driven to a depth of 2 ft. 0 ins. beneath the bottom of the trench. As the upper boundary gravel layer will cause hard driving, we suggest that it is excavated before and piles or sheeting are driven.

Backfilling behind the wall should be carried out with material similar to the embankment fill. The fill should be spread in 6 inch to 8 inch lifts and compacted to at least 95% Standard Proctor density.

As the stiff clay occurs within 3 ft. 0 ins. of the river bed, excessive scour is not anticipated.

PETO ASSOCIATES LTD.

K. L. Cheng

KLC/jc

K. L. Cheng, P. Eng.

TABLE 1QUICK UNDRAINED TRIAXIAL TEST DATAJOB #69-F118

BH #	SA. #	DEPTH (FEET)	MOISTURE CONTENT %	UNIT WEIGHT		DEGREE OF SATURATION %	VOIDS RATIO	STRAIN AT FAILURE %	CELL PRESSURE p.s.i.	SHEAR STRENGTH LBS/SQ. FT.
				WET	DRY					
1	8	21'6"-23'6"	22.6	128.5	104.8	100	0.603	11	10	4250
4	6	13'0"-15'0"	20.4	131.4	109.2	100	0.540	8	7	4070

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS :-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>	
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4	
SOFT	2 - 4	250 - 500	LOOSE	4 - 10	
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30	
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50	
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50	
HARD	> 30	> 4000			
W.T.P.L.	WETTER THAN PLASTIC LIMIT		D.T.P.L.	DRIER THAN PLASTIC LIMIT	
A.P.L. ABOUT PLASTIC LIMIT					

TYPE OF SAMPLE

SS	SPLIT SPOON	TW	THINWALL OPEN
WS	WASHED SAMPLE	TP	THINWALL PISTON
SB	SCRAPER BUCKET SAMPLE	OS	OESTERBERG SAMPLE
AS	AUSER SAMPLE	FS	FOUL SAMPLE
CS	CHUNK SAMPLE	RC	ROCK CORE
ST	SLOTTED TUBE SAMPLE		
	PH SAMPLE ADVANCED HYDRAULICALLY		
	PM SAMPLE ADVANCED MANUALLY		

SOIL TESTS

CU	UNCONFINED COMPRESSION	LV	LABORATORY VANE
U	UNDRAINED TRIAXIAL	FV	FIELD VANE
CUU	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
CU	DRAINED TRIAXIAL		



PETO ASSOCIATES LTD.

RECORD OF BOREHOLE NO. 1

CONSULTING SOIL ENGINEERS

JOB NO. 69F118

JOB NAME Cox Creek Bridge

TECHNICIAN BG

BORING DATE June 3, 4/69

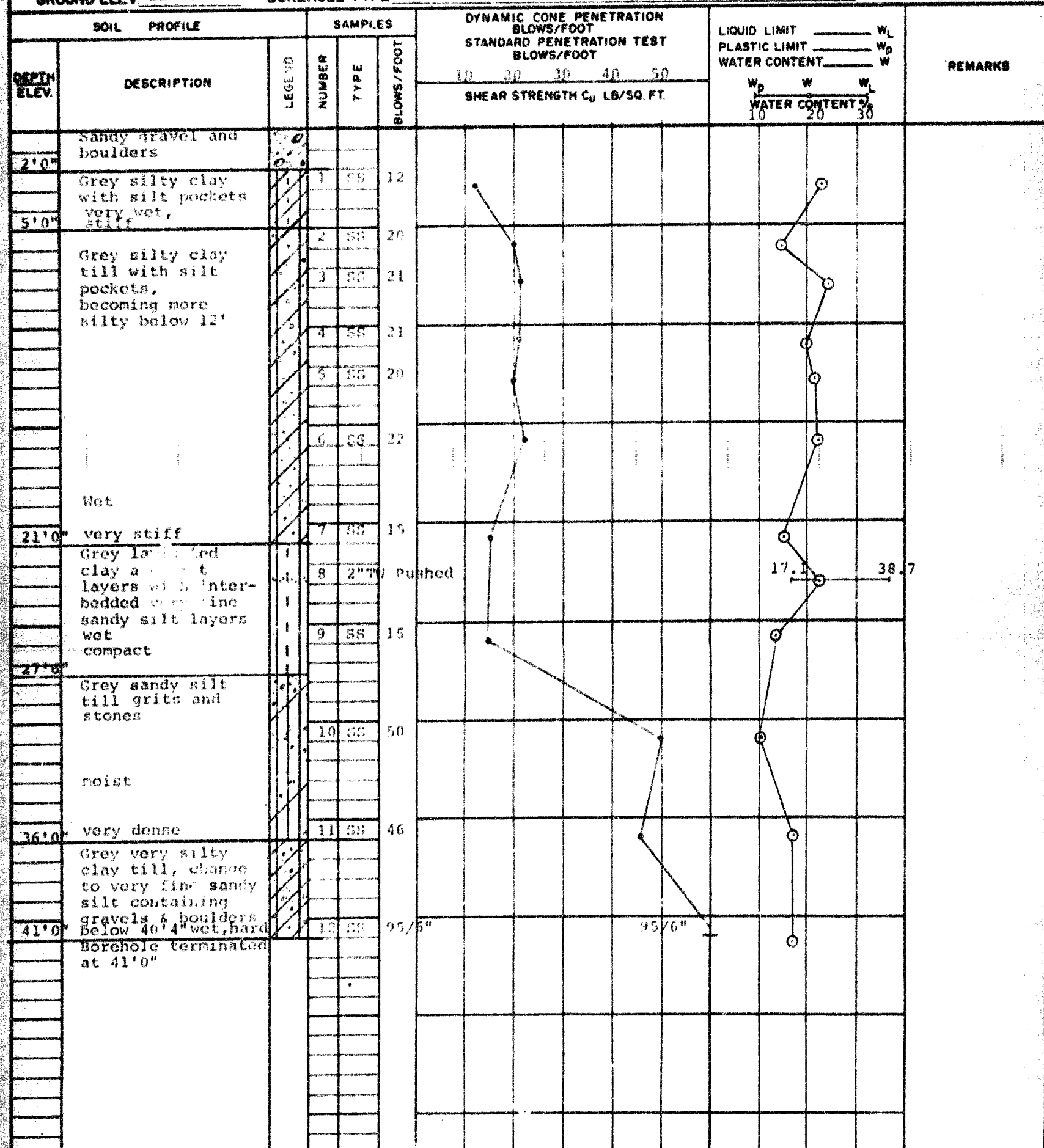
CLIENT Department of Highways, Ontario

ENGINEER JH

GROUND ELEV 1104.1

BOREHOLE TYPE Hollow Stem Augers

TYPED BY JC





PETO ASSOCIATES LTD.

RECORD OF BOREHOLE NO. 2

CONSULTING SOIL ENGINEERS

JOB NO. F9-F118

JOB NAME Cox Creek Bridge

TECHNICIAN BG

BORING DATE June 3/69

CLIENT Department of Highways, Ontario

ENGINEER JH

GROUND ELEV. 1105.0

BOREHOLE TYPE Hollow stem augers

TYPED BY JC

SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION BLOWS/FOOT STANDARD PENETRATION TEST BLOWS/FOOT					LIQUID LIMIT _____ W _L PLASTIC LIMIT _____ W _P WATER CONTENT _____ W			REMARKS
DEPTH ELEV.	DESCRIPTION	LEGEND	NUMBER	TYPE	BLOWS/FOOT	SHEAR STRENGTH C _u LB/SQ. FT.					W _P W W _L WATER CONTENTS 10 20 30			
						10	20	30	40	50				
0'-0"	TOPSOIL													
	Brown silty sand, gravel and boulder													
4'-0"														
	Grey silty clay till grits and stones, odd silt pocket		1	SS	22									
			2	SS	24									
	wet		3	SS	24									
15'-0"	very stiff		4	SS	25									
	Grey clayey silt with interbedded clayey silt till, clay and fine sand seams, wet, very		5	TW										
21'-6"	compact		6	SS	37									
	Grey clayey silt till Moist very dense													
20'-6"			7	SS	108					108				
	Borehole terminated at 20'-6"													



PETO ASSOCIATES LTD.

RECORD OF BOREHOLE NO. 3

CONSULTING SOIL ENGINEERS

JOB NO. 69-F118

JOB NAME Cox Creek Bridge

TECHNICIAN BG

BORING DATE June 2/69

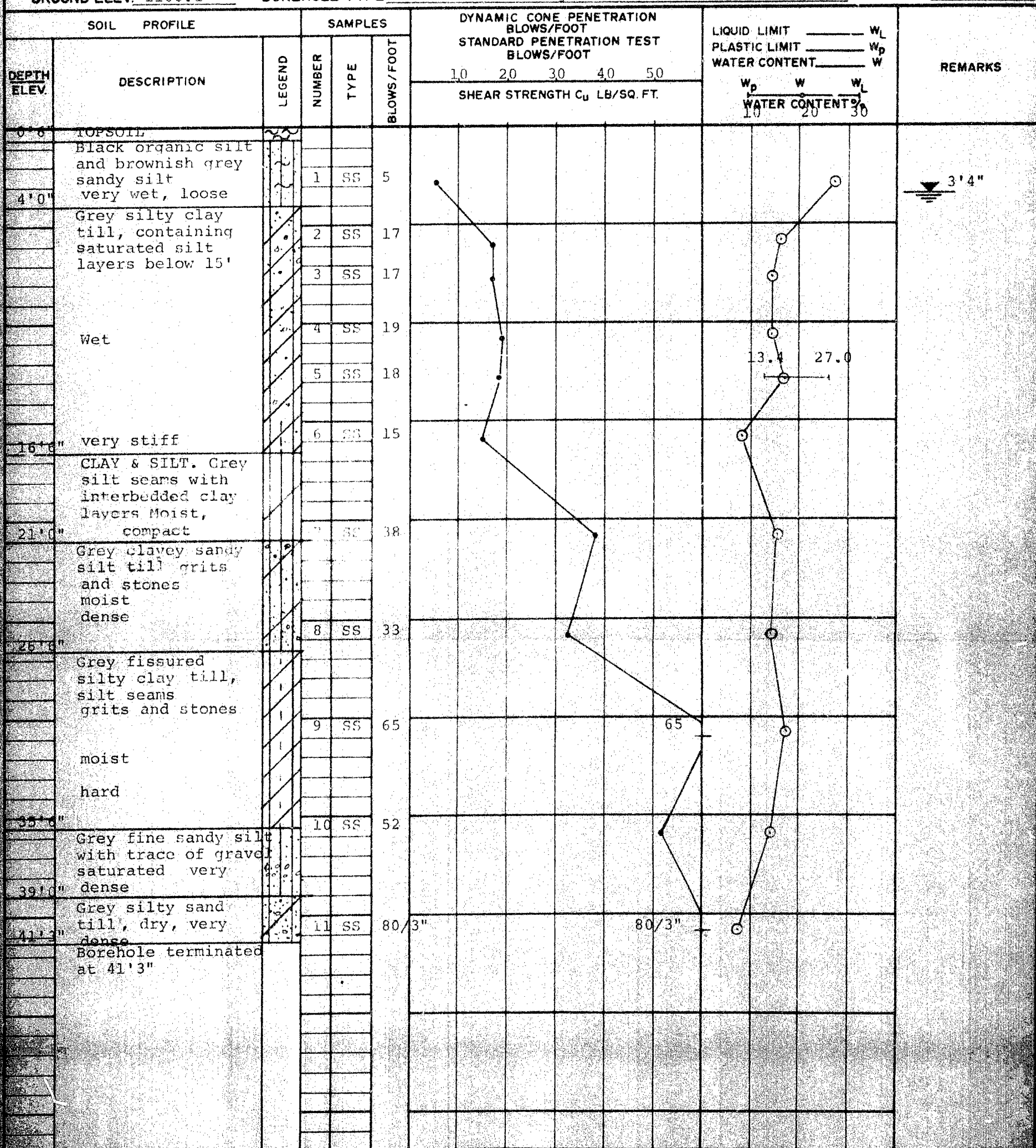
CLIENT Department of Highways, Ontario

ENGINEER JH

GROUND ELEV. 1106.1

BOREHOLE TYPE Hollow Stem Augers

TYPED BY JC





PETO ASSOCIATES LTD.

RECORD OF BOREHOLE NO. 4

CONSULTING SOIL ENGINEERS

JOB NO. 69-F118

JOB NAME Cox Creek Bridge

TECHNICIAN BG

BORING DATE June 3/69

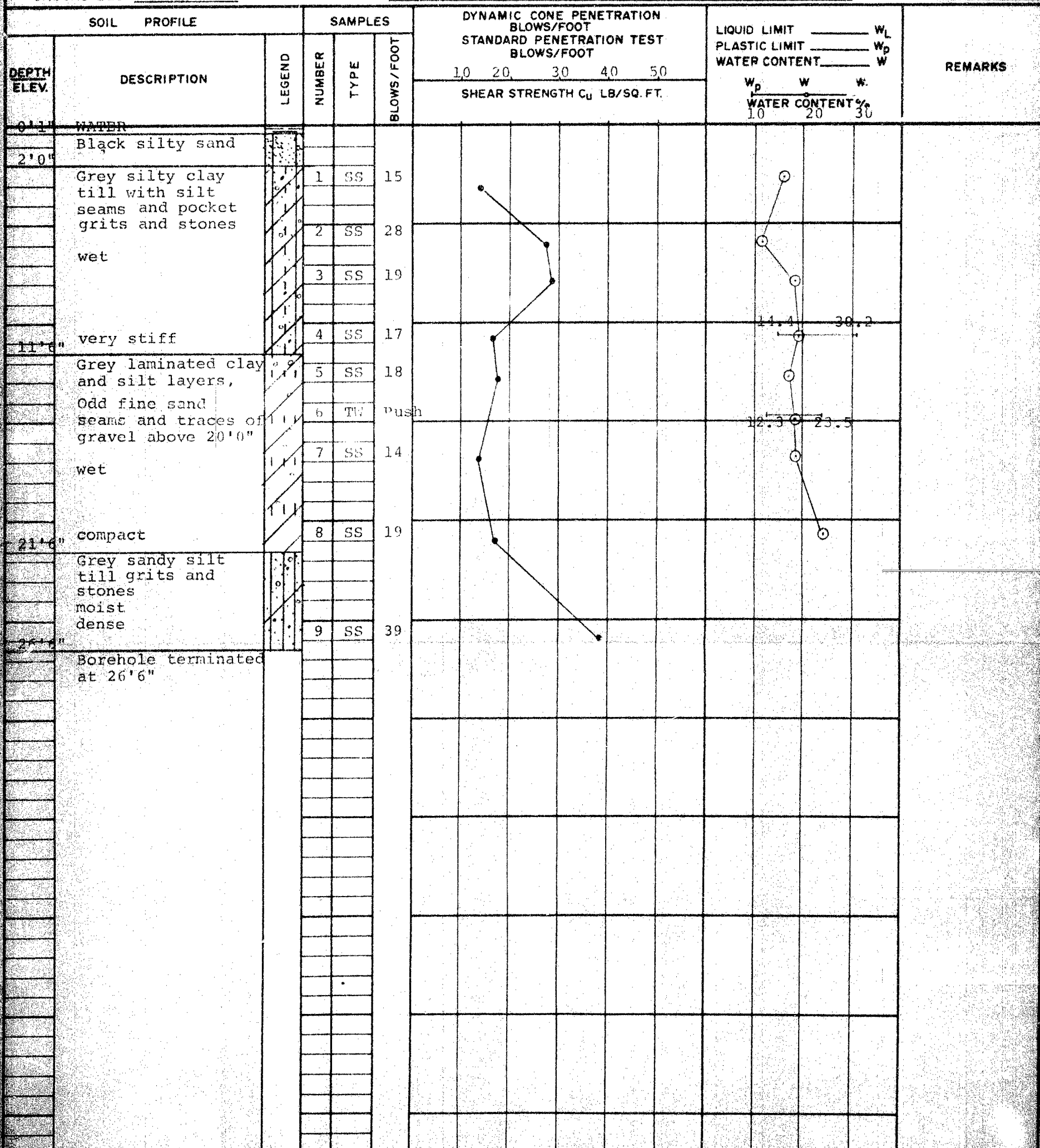
CLIENT Department of Highways, Ontario.

ENGINEER JH

GROUND ELEV. 1104.0

BOREHOLE TYPE Hollow Stem Augers

TYPED BY



JOB NO. 69-F118

JOB NAME Cox Creek Bridge

TECHNICIAN BG

BORING DATE June 3/69

CLIENT Department of Highways, Ontario

ENGINEER JH

GROUND ELEV. 1102.6

BOREHOLE TYPE Hollow Stem Augers

TYPED BY _____ JC

[illegible]

1944

SITE COX CR. BR. HWY 86 ELMIRA

HAMMER TYPE BERNARD B-225 WEIGHT 1.475 T ENERGY 25000

[illegible]

OVER

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION
FOUNDATION SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 3 CONTRACT NO. 70-100 STRUCTURE COY CREEK BRIDGE

CONTRACTOR MORRIS (REPAIRING) DESIGN LOAD OF PILE 35 TON

HAMMER DETAILS: TYPE REPAIRING HAMMER WEIGHT 110 HEIGHT OF FALL OR ENERGY 25000

TYPE OF ANVIL OR CAP REPAIRING HAMMER WEIGHT OF ANVIL OR CAP 1100 LB.

PILE DETAILS #14 WOOD PILE 41 LONG

PILE NO. 14 LOCATION WEST ABUT DATE DRIVEN SEP 24/70

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
41	1			26			51			76	
	2			27			52			77	
	3			28			53			78	
	4			29			54			79	
	5			30			55			80	
	6			31			56			81	
	7			32			57			82	
	8			33			58			83	
	9	4		34			59			84	
	10	4		35			60			85	
	11	15		36			61			86	
	12	15		37			62			87	
	13	14		38			63			88	
	14	19		39			64			89	
	15	21		40			65			90	
	16	21		41			66			91	
	17	21		42			67			92	
	18	21		43			68			93	
	19	25		44			69			94	
	20	30		45			70			95	
	21	31		46			71			96	
	22	31		47			72			97	
	23	32		48			73			98	
	24	32		49			74			99	
	25	32		50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	1	2	2	2	2	2
MEASURED REBOUND IN INCHES	14	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4
FINAL LENGTH OF PILE	45					
FINAL CUT OFF ELEVATION	1105.0					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
MATERIALS & RESEARCH DIVISION
DEPARTMENT OF HIGHWAYS
PARLIAMENT BUILDINGS
TORONTO, ONTARIO

SIGNED [Signature]

NAME (PRINT) L.H. PAPER

DATE SEP 24/70

ATTACH SKETCH OF PILE NUMBERING SYSTEM

1105.0
25.0
TIP 1080.0

Notes:-

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 $\frac{1}{2}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{1}{2}$ " x $\frac{1}{2}$ " steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

OVER

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION
FOUNDATION SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 3 CONTRACT NO. 70-105 STRUCTURE CRK CRACK BRIDGE
CONTRACTOR McGOWAN (BRANDENBURG) DESIGN LOAD OF PILE 25 TON
HAMMER DETAILS: TYPE PORTLAND CEMENT WEIGHT 1475 HEIGHT OF FALL OR ENERGY 26000
TYPE OF ANVIL OR CAP PORTLAND CEMENT WEIGHT OF ANVIL OR CAP 1100 LB.
PILE DETAILS 41' HARD PILE #44 CRACK
PILE NO. 15 LOCATION CRK BRIDGE DATE DRIVEN SEPT 25/70

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
41	1	1	41	26	41		31			76	
	2	1		27	41		32			77	
	3	1		28	41		33			78	
	4	1		29	41		34			79	
	5	1		30	41		35			80	
	6	1		31	41		36			81	
	7	1		32	41		37			82	
	8	1		33	41		38			83	
	9	1		34	41		39			84	
	10	1		35	41		40			85	
	11	1		36	41		41			86	
	12	1		37	41		42			87	
	13	1		38	41		43			88	
	14	1		39	41		44			89	
	15	1		40	41		45			90	
	16	1		41	41		46			91	
	17	1		42	41		47			92	
	18	1		43	41		48			93	
	19	1		44	41		49			94	
	20	1		45	41		50			95	
	21	1		46	41		51			96	
	22	1		47	41		52			97	
	23	1		48	41		53			98	
	24	1		49	41		54			99	
	25	1		50	41		55			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	5	5	5	6	6	7
MEASURED REBOUND IN INCHES	3/4	3/4	3/4	3/4	3/4	3/4
FINAL LENGTH OF PILE	FINAL CUT OFF ELEVATION 11045					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
MATERIALS & RESEARCH DIVISION
DEPARTMENT OF HIGHWAYS
PARLIAMENT BUILDINGS
TORONTO, ONTARIO

SIGNED L. H. Payne
NAME (PRINT) L. H. PAYNE
DATE SEPT 25/70

ATTACH SKETCH OF PILE NUMBERING SYSTEM

1104.5
31.0
T10 1070.5

Notes:-

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 $\frac{1}{2}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{1}{2}$ " x $\frac{1}{2}$ " steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

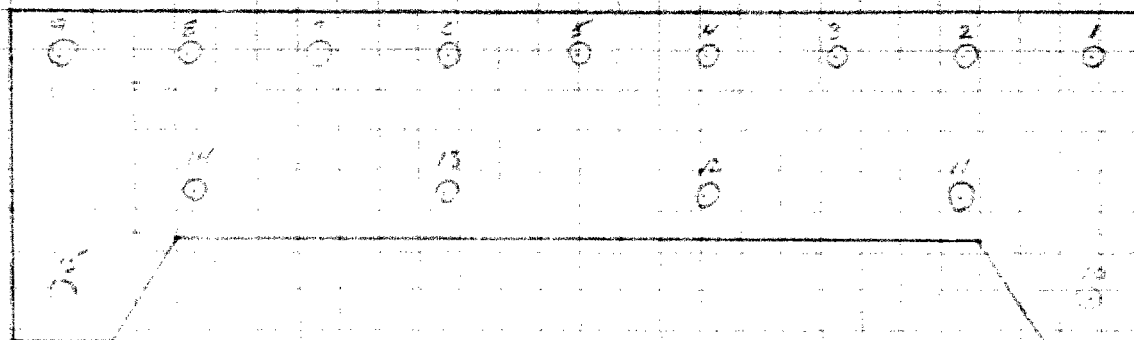
The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

CONT 70-155

SKETCH SHOWING NUMBERING SYSTEM



DEPARTMENT OF HIGHWAYS
ONTARIO

MEMO FROM

A. G. STERMAC

DATE SEP. 16. 1970

TO MR K. G. SELBY

RE:

YOU HAVE REVIEWED THE
DESIGN DRAWING, AND FOUND
NOTHING TO COMMENT ON.

NOW THE CONTRACTOR IS
QUESTIONING, WHETHER TIMBER
PILES CAN BE DRIVEN EFFECTIVELY
WOULD YOU PLEASE DISCUSS THIS
WITH ME PRIOR TO ADVISING
AL HALLIN OF OUR THINKING.

NOTE:

TOISE,

PILES HAVE TO GO DOWN TO EL. 10802
FOR SLOUR PROTECTION.

NOTE

SEP. 25. 1970

RE: COX CREEK BRIDGE
W.P. 135-66-00
STRAFFORD DISTRICT.

CONSULTANT'S PREDICTIONS FOR 25-30" PILES:
REFUSAL AROUND EL. 1083 TO 1077.

PILE CUTOFF EL. 1104.5 & 1105.0

∴ LENGTH OF PILES

1105	1105
1083	1177
<hr/> 22 FT	<hr/> 28 FT

DESIGN CALLS FOR SAFE BEARING OF
35" PILE (TIMBER PILE SIZE 14)

LENGTH 35 FT - TIP EL 1070.0

MINIMUM PENETRATION DEPTH 1083.0
FOR HYDROLOGICAL REASONS.

A CHANGE OF PILE LENGTH FROM 35 FT
TO 41 FT WAS MADE, BEARING UNCHANGED.

DRIVING IN THE FIELD SOMEWHAT DIFFICULT
PILES ARE DRIVEN 25 TO 30 FT I.E TO
TIP ELEVATIONS 1080 AND 1075, RESPECTIVELY.

ALB.

Copy for A.B. Stinson

MEMORANDUM

To: Mr. D.W. Farren
Road Design Engineer
Road Design Branch
DOWNSVIEW

FROM: D.G. McEwen
Hwy. Design Supervisor
Road Design Branch
LONDON REGION

ATTENTION W. Roters, H.O. Proj. Des. Eng.

DATE:

June 15, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT:

Re: W.P. 135-66-00, Hwy. #86
Cox Creek Bridge - 7.9 mi. West of Hwy. #7
District #3 - Stratford

Set 6/67

Please find under separate cover, one set of Original Contract Drawings (with white print) on folder of Contract Documents and Calculations and a mylar print of the Soils profile, all for Head Office Review.

Contract Documents included are:

- D4 Estimate
- Complementary Summary Sheets
- General Special Provisions
- Standard Special Provisions
- Proposed Special Provisions
- Prints of Bridge Office Special Provisions
- Schedule of Materials
- Schedule of Plans and Standards
- Data for Corrugated Steel Pipe

Regional Contract Review

Please refer to the copy of the Regional Contract Review Minutes attached.

Under title (Road Excavation and Borrow) The project as originally estimated, followed M & T recommendations of 18" of GBC over earth fill. The maximum grade raise over the old pavement is approximately 4'.0. However, during the review it was pointed out that the approaches, or a portion of them, (enough to ramp over the new Structure) would have to be built during the winter season in order to be off the temporary detour before spring flooding. This would dictate a granular type of material for the construction of the ramps and since M & T could not guarantee that the earth borrow would qualify as such, you will note that the committee recommended that an item for granular borrow, 2300 cu. yds, be added. Also in the same connection a subsequent reduction of 2300 cu. yds, of earth borrow should be made.

Since the review; in consultation with M & T and with their approval, the project has been altered by providing GBC Class "B" completely above the existing pavement. The new item for Granular Borrow is not, then, necessary.

Under title (Structure - Stream Diversion)

In combination with the Bridge drawings this should be clear enough now.

Under title (Structure - Working Slab)

This quantity, originally missing from the Bridge Office D4 should be 5 cu. yds.


Under title (Scheduling)

A special provision has been included in the documents as directed.

Note to Scrutiny Section

Please insert Standard SD-8-42 where indicated in the Contract Drawings.

Hoping you will find this project prepared satisfactorily.



D.G. McEwen
Hwy. Design Supervisor

DGM/er.

cc: H.C. Derner
W. Zonnenberg
C. Fraser
A.G. Stermac ✓

REGIONAL CONTRACT REVIEW

District - Stratford.

Date - June 5, 1970.

W.P. #15-66

Contract:

Highway #86

Work of Structure and Approaches.

Location - Cox Creek Bridge, 7.9 miles West of Highway #7.

Committee - R. Jenkins, D. McKwen, G. Gates - Design; A. Watt - Bridges;
G. Davidson - Audit; J. Forrester - M & T; H.C. Dernier,
P.H. Peacock, K. Butson - District.

Road Excavation and Borrow:

Suggest add new Item - Granular Borrow, 2,300 cu.yd.

Reduce Item 4 - Earth Borrow by 2,300 cu.yd.

This is required due to the need to place ramps to carry traffic over new structure during winter months.

Structure:

(a) Removal of Existing Concrete:

The quantity of concrete under Item 32 is very large being 408 cu.yd. in addition to the existing structure. District recommends that explosives be permitted under controlled conditions.

(b) Stream Diversion:

Width of stream diversion in structure area to be clarified on Plan. This is important from a measurement for payment standpoint.

(c) Working Slab:

quantity under Item 38 to be supplied by Bridge Office.

Scheduling:

Proposed letting of this Contract implies winter work with attendant complications. If Contract is called July 29, 1970, earliest award date would presumably be August 19, 1970, with work to commence early in September. It is not practicable in these circumstances to remove the detail in time for the spring run-off. Suggest, therefore, special provision be made to read, "New structure to be open to traffic by March 1, 1971."

Speed Zoning:

District to request this.

Working Days:

Suggest 60.

Engineering:

Recommend 15%.

Contract Prints - Reduced Size:

Suggest 1/4.

Acceleration:

Call Telephone.

H. C. Dernier

H. C. Dernier,

Chairman,

Regional Contract Review

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

From: J.L. Keen,
Bridge Office

ATTENTION:

DATE: March 2, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 135-66-00, Site 33-60
Cox Creek Bridge
7.9 Miles West of Highway 7
Highway 86, District 3 - Stratford

Enclosed with this memo is a copy of a memo from A.P. Watt, Reg. Bridge Planning Engineer, S.W. Region, to Mr. C.S. Grebski, Bridge Design Engineer, Downsview.

Please note the change in chainage through the introduction of a chainage equation. In view that this change will affect your "Borehole Locations and Soil Strata Drawing" for this site, would you kindly advise me if it is your intention to revise the original for this drawing. If you intend to change this drawing would you forward a revised duplicate reproduction.

If you do not intend to make any revisions would you please advise me so that we can proceed with altering our present copy.



J.L. Keen,
Regional Bridge Design Engineer

JLK:rd

Attach.

c.c. A.P. Watt

MEMORANDUM

TO: Mr. O. Greshak,
Bridge Design Engineer,
Bridge Office, DOWNSVIEW.

FROM: Bridge Planning,
Southwestern Region.

ATTENTION:

DATE: February 23rd, 1970.

OUR FILE REF.

IN REPLY TO

SUBJECT:

W.P. 135-66-00, Bridge Site 33-60,
Cox Creek Bridge,
7.9 miles west of Highway 7,
Highway 86,
District 3 - Stratford.

Attached please find the following revised plans:

Bridge Site Plan	-	E-4824-1.
Plan	-	B-267-10
Profile	-	C-267-13

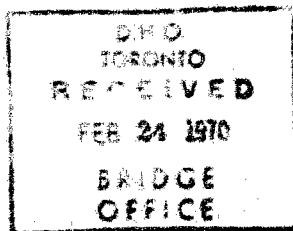
There has been no change in alignment and grade but there has been a change in the chainage across the Cox Creek Bridge.

Please note the chainage equation E.O. 408+72.05 equals H.O.T. 0+00 ahead on the new plan number B-267-10.

The Old Plan B-267-3 had a chainage equation of E.C. 408+72.05 equals H.O.T. 5+25.02 Hwy. 86 Ahead.

As noted above, the structure location will now change to chainage Station 6+35.

Would you kindly destroy the previous site plan, plan and profile issued and make the necessary changes to the bridge drawings B-6706-1 etc.



A.P. Watt

A.P. WATT
Reg. Bridge Planning Engineer,
Southwestern Region.

c.c. S. McCombie.
R. Jenkins.
H.C. Dernier.
A. McConnell.
A. Crowley.

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building

FROM: C.S. Grebski,
Bridge Office

ATTENTION:

DATE: January 26, 1970

Our File Ref.

IN REPLY TO

SUBJECT: Cox Creek Bridge
W.P. 135-66-00, Site 33-60
Highway 86, District No. 3

Seto 169

Attached herewith we are submitting the final
bridge drawings which show the foundation design for
this structure.

Kindly give us your comments at your earliest
convenience.

C.S. Grebski
C.S. Grebski,
Bridge Design Engineer

CSG:rd

Attach.

c.c. Foundation Office

No comments

H.C. Suter
Feb 2nd 1970

ik

MEMORANDUM

To: Mr. E. R. Davis,
Bridge Engineer,
Bridge Office,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Office,
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

DATE: July 2, 1969

Our File Ref.

IN REPLY TO

SUBJECT:

Re: FOUNDATION INVESTIGATION REPORT
By: Peto Associates Limited --
Cox Creek Bridge, Highway 26
Elmira, Ont. -- District No. 3
W.P. 137-66-00

Attached, please find the above mentioned report prepared and submitted by the Consultant, Peto Associates Ltd.

We have reviewed the report and believe that it contains sufficient information for you to proceed with the design.

It appears to us that the allowable bearing pressure could be raised to 3.0 T/sq.ft. if a structure insensitive to settlements is chosen. Settlements up to 2 inches can be expected in this case.

Due to the presence of permeable seams, a dewatering scheme will be necessary for constructing spread footings. Adequate frost and scour protection should be provided.

Should you wish to discuss any aspects of the report, please feel free to contact this Office.

ASB/ier

Attach.

cc: Persons, E. R. Davis (2)

A. A. Tremblay

J. W. Farren

W. Zonnenberg

H. C. Derrler

A. F. Watt

J. Roy

E. A. Singer

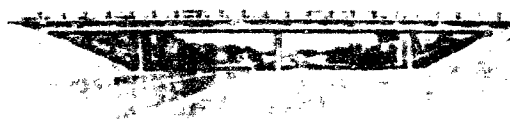
Foundations Files

Gen. Files

Alto

A. G. Sterling

PRINCIPAL FOUNDATION ENGINEER



Hwy. 401 & Keele St.
Downsview, Ontario.
Tel. 243-3282

May 30, 1969

DEPARTMENT OF HIGHWAYS
Materials and Testing Office

B. M. Peto Associates Ltd.,
Consulting Engineers,
1257 Caledonia Road,
Toronto 19, Ontario.

Attention: Mr. J. Hunter

Re: LETTER OF AUTHORITY - FOUNDATION INVESTIGATION
Cox Creek Bridge, 7.9 Miles West of Hwy. No. 7,
Hwy. No. 86 -- District No. 3 (Stratford)
A.P. 139-66-00 -- Bridge Site 33-60

Dear Sirs:

This is to authorize you to carry out the foundation investigation at the above mentioned site.

The plans and other pertinent information were handed to you on May 27, 1969.

Should you encounter any difficulty in organizing or carrying out the investigation, please contact the Foundation Section.

You are requested to submit eleven (11) copies of the report by not later than June 30, 1969.

At all times, a qualified Soils Engineer is to be in charge of the field work. Any change in this arrangement is to be approved ahead of time by the Department.

Since the drawing accompanying the foundation report, etc., is to become a contract drawing, you are requested to prepare it in accordance with the D.H.O. Standards. To enable you to do this, we are supplying you with a sample drawing with all the necessary explanations, together with linen sheet for your drawing. You are also requested to provide us with a Cronaflex copy of the drawing.

E. M. Peto Associates Ltd.,
Consulting Engineers,
1287 Caledonia Rd., Toronto, Ont.
Attn: Mr. J. Hunter

May 30, 1969

Charges for the work performed will be in accordance with your Schedule of Rates, dated September 15, 1968, and invoice(s) to be addressed, in triplicate, to the attention of the undersigned.

Yours very truly,



A. Rutka

MATERIALS & TESTING ENGINEER

AGM/MieP
Encl.

cc: Messrs. A. McCombie
A. P. Watt
C. Sonnenberg
C. L. Tillock
J. Roy
I. Konings
A. Szymanski
D. A. Barr
Mrs. I. Steinberg

Foundations Files
Gen. Files