

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 40P10-21

DIST. 3 REGION Southwestern

W.P. No. 281-66-04

CONT. No. ~~74-60~~ 74-60

W. O. No. 70-F-081

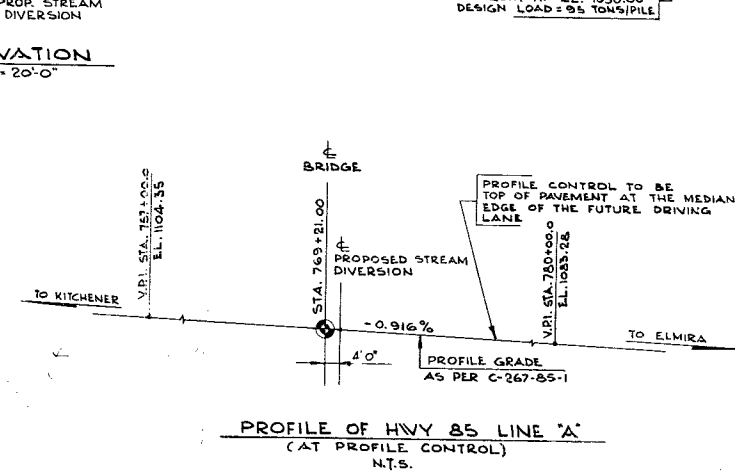
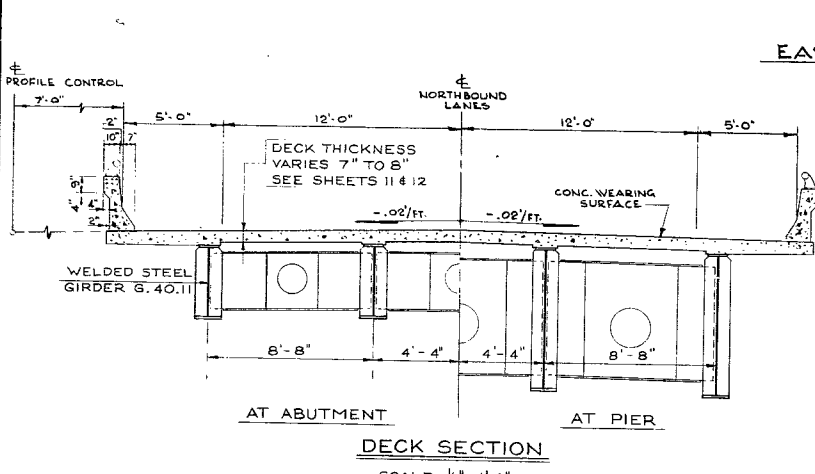
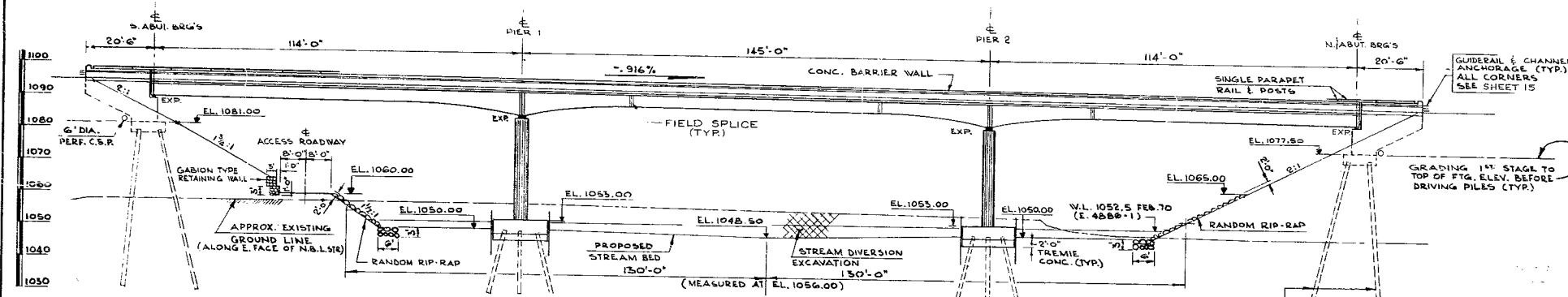
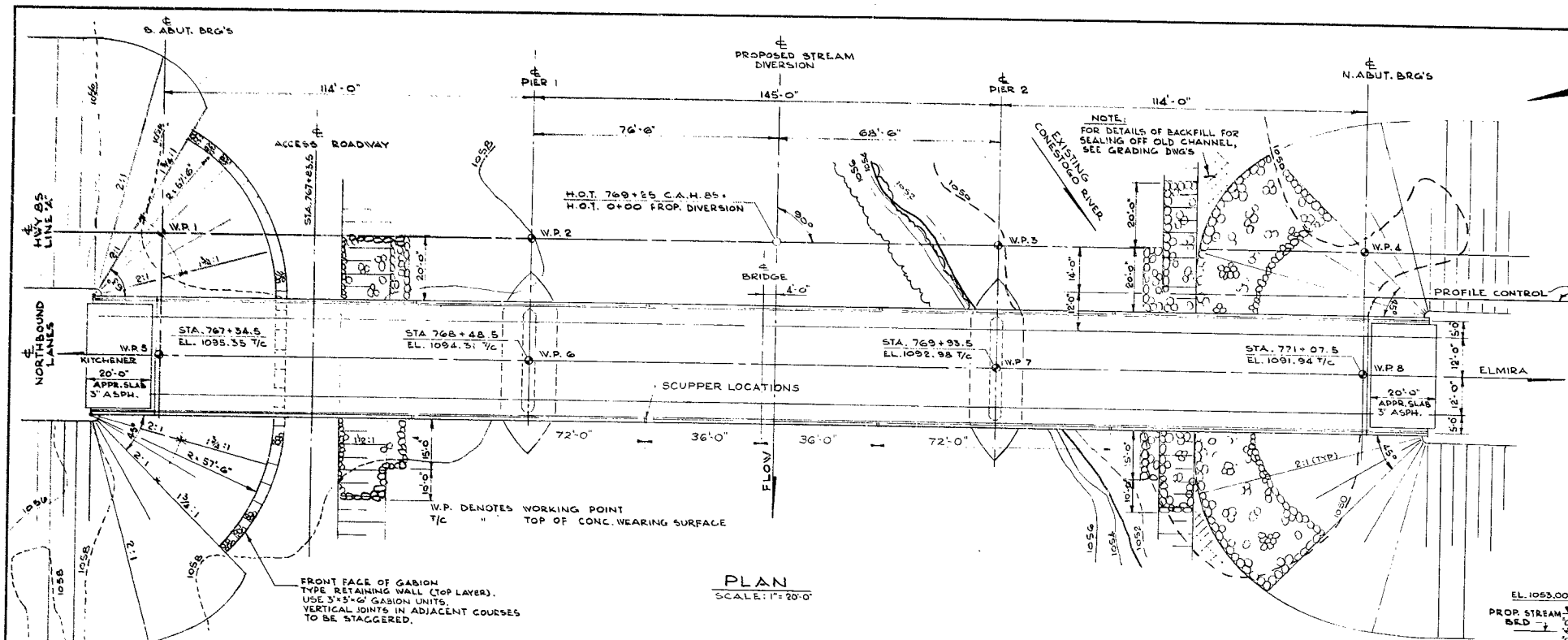
STR. SITE No. 33-286

HWY. No. 85N

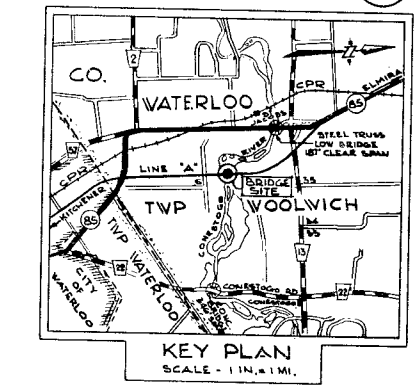
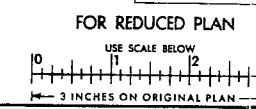
LOCATION Conestoga R. NB Lane
Bridge

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 2

REMARKS: DOCUMENTS TO BE UNFOLDED
BEFORE MICROFILM



- LIST OF DRAWINGS
- SHEET No. 1 - GENERAL LAYOUT
- 2 - BORE HOLE LOCATIONS & SOIL STRATA
- 3 - FOOTING LAYOUT
- 4 - FOOTING REINFORCEMENT
- 5 - SOUTH ABUTMENT & WINGWALLS
- 6 - NORTH ABUTMENT & WINGWALLS
- 7 - PIER DETAILS & REINFORCEMENT
- 8 - STRUCTURAL STEEL I
- 9 - STRUCTURAL STEEL II
- 10 - STRUCTURAL STEEL III
- 11 - DECK DETAILS I
- 12 - DECK DETAILS II
- 13 - DECK DETAILS III
- 14 - 20' APPROACH SLAB FOR BARRIER WALL
- 15 - CONCRETE BARRIER WALL
- 16 - DETAILS OF 8" HIGH STEEL PARADET RAILING
- 17 - STANDARD DETAILS



NOTES:

CLASS OF CONCRETE

DECK AND BARRIER WALLS — 4000 p.s.i.

REMAINDER — 3000 p.s.i.

CLEAR COVER ON REINFORCING STEEL

FOOTINGS, ABUTMENTS AND PIERS 3'

TOP OF DECK 2" NORMAL (SEE DWG. 11)

BOT. OF DECK 1"

BARRIER 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 CONCRETE IN THE DECK HAS BEEN PLACED.

FOR DETAILS OF DECK CONSTRUCTION SEE THE SPECIAL PROVISIONS OF THE SPECIFICATIONS.

DECK DESIGNED FOR FUTURE 3" ASPHALT WEARING SURFACE. DECK ASPHALT NOT IN THIS CONTRACT.

SEE SPECIAL PROVISIONS FOR DETAILS OF INSTRUMENTATION TO BE INSTALLED, AND TEST PROGRAMME REQUIREMENTS.

40P10-21

GEODETIC DATUM

N 4° V IN W ROOT OF 2 1/2" BEECH

150' RT 761±15

REVISIONS		DATE		BY		DESCRIPTION	

DEPARTMENT OF HIGHWAYS ONTARIO

BRIDGE OFFICE

CONESTOGO RIVER BRIDGE

(NORTHBOUND LANES)

KING'S HIGHWAY No. C.A.H. 85 DIST. No. 3

CO. OF WATERLOO

TWP. OF WOOLWICH LOT 6, 35 CON. G.C.T.

GENERAL LAYOUT

APPROVED: _____

DESIGN M.H. CHECK R.A.D.

DRAWING R.A.U. CHECK M.H.

DATE Nov. 73 LOADING O.B.F.

CONTRACT No. _____

SITE No. 33 - 286 SHEET 1

DOCUMENT MICROFILMING IDENTIFICATION

G.I.-30 SEPT. 1976

GEOCRES No. 40P10-21

DIST. 3 REGION Southwestern

W.P. No. 281-66-04

CONT. No. ~~36-45~~ 74-60

W. O. No. 70-F-081

STR. SITE No. 33-286

HWY. No. 85N

LOCATION Conestogo R. NB Lanes
Bridge

=====

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 2

REMARKS: DOCUMENTS TO BE ~~PD~~ UNFOLDED
BEFORE MICROFILM

MEMORANDUM

To: Mr. A.G. Stermac,
Principal Foundation Eng.,
Downsview.

From: Bridge Planning,
Southwestern Region.

ATTENTION:

DATE: August 20, 1970.

OUR FILE REF.

IN REPLY TO

SUBJECT:

RE: W.P. 281-66-04, Bridge Site - 33-286,
Conestogo River Bridge (Northbound Lanes),
Hwy. 85N,
District 3, Stratford.

Would you kindly arrange to have a foundation investigation conducted at the above location.

I have enclosed two copies of the bridge site plan number E-4886-1 with the probable footing locations marked in red.

Since we are in a relatively high fill area, would you also please comment on fill stability.

S. JANTS

SJ/lj
Encl.

FOR: S. JANTS,
Bridge Planning Technician,
A.P. WATT,
Reg. Bridge Planning Eng.,
Southwestern Region.

cc: S. McCombie.
A. Crowley.

Dec out 28/1970

FIELD RECONNAISSANCE REPORT
REQUIRED BY FOUNDATION SECTION
FOR

FF-69
SEPT. 1968

W.P. NO. 281-6604 HIGHWAY NO. 85 DISTRICT 3 SITE PLAN NO. E-4886-1 PROFILE NO. C-267-14
RIVER CROSSING ☒ GRADE SEPERATION ☐ R.R.X. ☐ OTHER (SPECIFY) _____
ALTERNATE SCHEME (IF ANY) _____

EXISTING SITE CONDITIONS

DESCRIPTION:

TOPOGRAPHY: HILLY ☐ ROLLING ☐ VALLEY ☒ GULLIED ☐ FLAT ☐
VEGETATION: TREES ☐ BRUSH ☒ GRASS ☒ SWAMP ☐ FARM CROPS ☐ CLEARED ☐
SNOW COVER: 0"-6" ☐ 6"-12" ☐ >12" ☐
ROCK OUTCROP (SPECIFY LOCATIONS) _____

UNDERGROUND UTILITIES: UTILITY COMPANY TELEPHONE NO. FOR DEFINITE LOCATION

CALL 744-0331
Asx For Don Smith
1 Bell Canada - Kitchener 742-3521 Cable Locate
2 Ont. Hydro - Guelph Zenith 58330 or
3 Electrical - Guelph 822-5071 Service Dept.
4 _____
5 _____

EXISTING STRUCTURE(S):

N/A

FOUNDATIONS: SPREAD FOUNDATIONS ☐ SIZE _____ ELEVATION(S) _____
PILES ☐ TYPE _____ LENGTH(S) _____
DESIGN LOAD _____ T.S.F. _____ TONS/PILE _____
CONDITION OF STRUCTURE _____

APPROACHES: CUT ☐ FILL ☐ SIDE SLOPES _____
BERMS YES ☐ NO ☐

OTHER OBSERVATIONS (USE BACK OF SHEET TO DESCRIBE ANY FAILURES IN AREA, PAST PERFORMANCE OF EXISTING APPROACHES & STRUCTURE, ETC.)

ACCESSIBILITY

IS STRUCTURE LOCATED ON D.H.O. RIGHT OF WAY? YES ☐ NO ☐ IF NO,
HAS PERMISSION BEEN OBTAINED TO ENTER PROPERTY? YES ☐ NO ☐ IF NO,
PROPERTY OWNER(S):

NAME

ADDRESS

TELEPHONE NO.

1 _____
2 _____
3 _____
4 _____

WHO WILL OBTAIN NECESSARY PERMISSION? Foundation Section
HAS SITE BEEN SURVEYED & STAKED? YES ☐ NO ☒ IF YES, DATE OF MOST RECENT SURVEY _____
WILL CLEARING BE NECESSARY TO ENTER SITE AREA? YES ☐ NO ☒
IS SITE ACCESSIBLE TO WHEELED VEHICLES? YES ☒ NO ☐

IF RIVER CROSSING:

WILL A RAFT BE NECESSARY? YES ☐ NO ☐ IF YES, GIVE MAX. DEPTH OF WATER _____ FT.
CURRENT: SWIFT ☐ MODERATE ☒ SLOW ☐

DRILLING OPERATIONS

NEAREST SOURCE OF WATER (GIVE HAULING DISTANCE, IF KNOWN) Site
ADDITIONAL INVESTIGATION REQUIRED FOR THE FOLLOWING PURPOSES:
ALTERNATE SCHEME: YES ☐ NO ☒ IF YES, SPECIFY _____
HYDROLOGIC REASONS: YES ☐ NO ☒ IF YES, SPECIFY (SCOUR, ETC.) _____

REMARKS

NEAREST AVAILABLE ACCOMODATION: Waterloo
OTHER COMMENTS: _____

DATE 12-8-70
REGIONAL BRIDGE LOCATION ENGINEER S. Jants

VISUAL CLASSIFICATION SHEET

PROJECT <u>70-11081</u> SITE <u>CONESTOGO RIVER</u> BOREHOLE No. <u>1</u> GROUND ELEVATION <u>1050.7</u>																	
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION			PERCENTAGE	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL		
		LARGEST GRAIN SIZE	SHAPE	GRAVEL												SAND	SILT & CLAY
1	3-4.5	1"	SUB ROUND	70	30		NIL	NIL	QUICK	NIL	EARTHY	BROWN	46 WEAK	DENSE	SANDY GRAVEL	GW	
2	6-7.5	4"	"	10	10	80	MED	NIL	SLOW	NIL	"	"	36 STRONG	DENSE	SANDY SILT WITH TRACES OF GRAVEL	ML	
3	9-10.5	4"	"	10	10	80	HIGH	NIL	NIL	MED	"	"	120 HARD		CLAYEY SILT SAND WITH TRACES OF SAND & GRAVEL	CL-ML	
4	12.0-13.5	1/4"	SUB ANGULAR	15	15	70	HIGH	"	"	"	"	CRGY BROWN	120 HARD		CLAYEY SILT, SAND & GRAVEL	CL	

NOTES:- VISUAL CLASSIFICATION MUST BY CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-11081 SITE CONESTOGO RIVER BOREHOLE No. 2 GROUND ELEVATION 1050.4

SAMPLE No.	DEPTH IN FEET	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	3-4.5	2"	SUB ANGULAR	70	30		NIL	NIL	Quick	NIL	EARTHY	GREY	STRONG	37 DENSE	SANDY GRAVEL	GW
2	6-7.5	1/2'	"	"	"		"	"	"	"	"	BROWN	"	78 V. DENSE	SANDY GRAVEL	GW
3	9-10.5	1"	SUB ANGULAR	40	20	40	HIGH	"	NIL	MED- LOW	"	BROWN	"	100 HARD	CLAYEY SILT, SAND & GRAVEL	CL
4	12-13.5	1/2"	"	40	30	30	HIGH	"	"	LOW	"	"	"	100 HARD	"	CL

NOTES:- VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-11081 SITE CONESTOGO RIVER BOREHOLE No. 3 GROUND ELEVATION 1056.4

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION						DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE													
				GRAVEL	SAND	SILT & CLAY											
1	3-4.5															JAR EMPTY	
2	6-7.5	2"	SUB ROUND	70	30		NIL	NIL	QUICK	NIL	EARTHY	DARK BROWN & BLACK	MED	U DENSE		SANDY GRAVEL	GW
3	9-10.5															JAR EMPTY	
4	12-13.5	1"	ANGULAR	70	30		NIL	NIL	QUICK	NIL	EARTHY	LIGHT BROWN	MED	U DENSE		SANDY GRAVEL	GW
5	13.5-15	1"	SUB ROUND	30	30	40	MED	"	NIL	LOW	"	BROWN	STRONG	HARD		SANDY SILT & GRAVEL WITH TRACES OF CLAY (GLACIAL TILL)	ML
6	15-16.5	1"	ROUND	30	30	40	"	"	"	"	"	"	"	"	"	"	ML

NOTES:- VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT <u>70-11081</u>		SITE <u>CONESTOGO RIVER</u>		BOREHOLE No. <u>4</u>		GROUND ELEVATION <u>1049.4</u>										
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	4.3-5.8	2"	Sub Angular	70	30		Nil	Nil	Quick	Nil	Earthy	Grey	Med	35 Dense	SANDY GRAVEL	GW
2	6-7.5	1"	Sub Angular	70	30		"	"	"	"	"	"	"	14 Compact	SANDY GRAVEL	GW
3	9-11													58	JAR EMPTY	
4	12-13.5	1"	Sub Round	30	30	40	Med	Nil	Nil	—	Earthy	Brown	He Strong	94 Hard	SANDY SILT & GRAVEL WITH TRACES OF CLAY	ML

NOTES:— VISUAL CLASSIFICATION MUST BY CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-11081 SITE CONESTOGO RIVER BOREHOLE No. 5 GROUND ELEVATION 1058.9

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	3-4.5	1 1/2"	SUB Angular	60	40		NIL	NIL	QUICK	NIL	EARTHY	BROWN	STRONG	47 DENSE	SANDY GRAVEL	GW
2	6-7.5	1"	"	40	60		"	"	"	"	"	DARK BROWN	"	100 V. DENSE	SLIGHTLY ORGANIC GRAVELLY SAND	GW
3	9-10.5	2"	"	70	25	5	"	"	"	"	"	GREY	"	167 V. DENSE	SANDY GRAVEL WITH TRACES OF SILT	
4	12-13.5													141	VAR EMPTY	
5	13.5-15													35	NO RECOVERY	
6	15-16.5	1"	SUB Angular	20	30	50	HIGH	NIL	NIL	LOW	EARTHY	BROWN	STRONG	121 HARD	CLAYEY SILT SAND & GRAVEL (GLACIAL TILL)	CL

NOTES:- VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-11081 SITE CONESTOGA A. VER BOREHOLE No. 6 GROUND ELEVATION 1058.1

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	3-4.5				40	60	LOW	NIL	QUICK	NIL	EARTHY	BROWN	WEAK	7 LOOSE	SLIGHTLY ORGANIC SANDY SILT	ML
2	6-7.5	2"	SUB ANGULAR	70	25	5	NIL	NIL	"	"	"	LIGHT BROWN	STRONG	56 U. Dense	GA SANDY GRAVEL WITH TRACES OF SILT	GW
3	9-10.5													100	NO RECOVERY	
4	12.5-14.5	1/4"	SUB ANGULAR	20	30	50	MED	NIL	NIL	MED	EARTHY	BROWN	STRONG	30 40 U STIFF	CLAYEY SILT, SAND & GRAVEL (GLACIAL TILL)	CL
5	14.5-16.5	1/2"	"	25	25	50	"	"	"	"	"	"	"	66 HARD	"	CL
6	16.5-18.5	1/2"	"	20	20	60	"	"	"	"	"	"	"	127 HARD	"	CL

NOTES:- VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT <u>70-11081</u> SITE <u>CONESTOGO RIVER</u> BOREHOLE No. <u>7</u> GROUND ELEVATION <u>1055.6</u>																
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION			DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL		
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL											SAND	SILT & CLAY
1	3-4.5	2"	SUB ANGULAR	70	30	NIL	NIL	QUICK	NIL	EARTHY	BROWN	STRONG	87 U. DENSE	SANDY GRAVEL	GW	
2	6-7.5	1"	ANGULAR	55	35	10	NIL	NIL	"			109	JAR EMPTY			
3	7-10.5	1"	ANGULAR	55	35	10	NIL	NIL	QUICK	NIL	EARTHY	BROWN	STRONG	82 U. DENSE	COARSE GRAVELLY SAND WITH TRACES OF SILT	SC
4	10.5-11	1/4"	SUB ANGULAR	20	40	40	HIGH	NIL	NIL	LOW	"	"	2 1/8" HARD	CLAYEY SILT, SAND & GRAVEL (GLACIAL TILL)	CL	
5	11-12.5	"	"	20	30	50	"	"	"	MED	"	"	6 HARD	"	CL	
6	15-16.5	1/2"	SUB ANGULAR	40	25	35	"	"	"	"	"	"	91 HARD	"	CL	

NOTES:- VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-11081 SITE CONESTOGO RIVER BOREHOLE No. 8 GROUND ELEVATION 1055.7

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION						DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE													
				GRAVEL	SAND	SILT & CLAY											
1	3-4.5	1"	SUB ANGULAR	50	45	5	NIL	NIL	Quick	NIL	EARTHY	BROWN	WEAK	27 Compact	SANDY GRAVEL WITH TRACES OF SILT	GW	
2	6-7.5	2"	SUB ROUND	70	25	5	"	"	"	"	"	LIGHT BROWN	STRONG	51 U. DENSE	SANDY GRAVEL WITH TRACES OF SILT	GW	
3	9-10.5	2"	"	"	"	"	"	"	"	"	"	"	"	37 DENSE	"	GW	
4	12-13.5													37	NOT ENOUGH SAMPLE		
5	15-16.5	3/4"	ANGULAR	30	20	50	HIGH	NIL	LOW NIL	MED	EARTHY	BROWN	STRONG	100 HARD	CLAYEY SILT, SAND & GRAVEL	CL	

NOTES:— VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:—

Mr. F. E. Loscombe,
Regional Superintendent of Engineering Surveys,
London Region.

Mr. W. R. Agnew,
Field Supervisor.

O. Schur

8 September, 1970

RE: W.P. 281-66-01, Hwy. 85 New,
Twp. Woolwich, Co. Waterloo,
District No. 3, Stratford.

This is to inform you that a request from A. Barsvary, Senior Foundations Engineer, on 31st August, 1970, has been completed on Tuesday 1st September, 1970 by G. Telford and party.

Alignment - As the centreline had been staked the previous week by Engineering Surveys, only the necessary offset stakes had to be located as per layout plan from Foundations, Head Office.

Elevations - Using Bench Marks shown on profile, ground elevations were taken at all Boreholes located as per plan and request.

No notes are being turned in as these were given to Mr. Barsvary on job site.



WRA/dh

W. R. Agnew
W. R. Agnew,
Field Supervisor.

C.C. - A. Barsvary
File - W.P. 281-66-01



MEMORANDUM

40P10-21

GEOCREs No.

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: October 23, 1970

OUR FILE REF.

IN REPLY TO

NOV 2 1970

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
The Proposed Conestogo River Bridge
Of Highway #85

District No. 3 (Stratford)
W.O. 70-11081 -- W.P. 281-66-04

Cont. 74-60

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Attached, we are forwarding to you our detailed foundation investigation report on the subsoil conditions existing at the above structure site.

We believe that the factual data and recommendations contained therein, will prove adequate for your design requirements. Should additional information be required, please feel free to contact our Office.

AGS/KCCF
Attach.

Alfred Stermac
A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

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

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-

FOUNDATION INVESTIGATION REPORT
For
The Proposed Conestogo River Bridge
Of Highway #85
District No. 3 (Stratford)
W.O. 70-11081 -- W.P. 281-66-04

1. INTRODUCTION:

A foundation investigation was carried out at the location of the proposed crossing of Hwy. #85 over the Conestogo River. The investigation was requested by Mr. A. P. Watt, Regional Bridge Planning Engineer, Southwestern Region, in a memo dated August 20, 1970.

The present proposal calls for the construction of the northbound lane structure only; the investigation, however, was extended to the future southbound structure as well for economical and engineering reasons. The subsequent field investigations and laboratory testings were supervised by this Section, the results of which are compiled in the forthcoming paragraphs.

2. DESCRIPTION OF THE SITE:

At the proposed crossing the Conestogo River is roughly 200 ft. wide, with a rather slow current. The average depth of the water is 2 - 4 ft. At the south side of the proposed crossing the river eroded a large segment of the surrounding terrain, forming a valley of about 50 - 60 ft. depth. The north bank of the river is much flatter, rising only farther back with gentle slopes. The river valley is partially covered with thick bush and shrubs; the vicinity is extensively cultivated, and mainly used for crops.

Geologically the area belongs to the "Waterloo Hills" physiographic region. The region is made up of sandy hills, some of them ridges of sandy till and other kames with outwash sand occupying the intervening hollows. The Conestogo River and the till plain lying along and north of it, disconnect the northern end from the main body of this area.

3. FIELD AND LABORATORY INVESTIGATIONS:

Some 8 boreholes were drilled at the locations of the proposed footings during the field investigation. The holes were carried out using a conventional diamond rig adapted for soil sampling purposes. Three of the borings, having been located on the water, were advanced from a portable raft. In addition, one dynamic cone penetration test was performed adjacent to borehole #8. Soil samples were taken by means of split-spoon samplers at regular intervals. Dynamic cone and standard penetration tests were done in accordance with the conventional methods.

Soil samples were identified and recorded upon recovery as well as in the laboratory. Further laboratory tests were carried out on representative samples in order to determine natural moisture contents, Atterberg limits and grain-size distributions of the soils. The results of field and laboratory tests are compiled on the attached borelog sheets, while the estimated stratigraphical sections are shown on Drawing #70-11081A in the Appendix, together with the locations and elevations of the boreholes.

4. SOIL CONDITIONS:

4.1) General:

Two distinctive soil strata were observed in the boreholes. The uppermost 6 - 14 ft. layer was identified to be a coarse, sandy gravel, occasionally with some silt and organic substances, underlain by clayey silt to silt with some sand and gravel (glacial till). Due to the hard consistency of the glacial deposit and the presence of a fairly high artesian pressure at around 20 ft. below ground level, the borings were terminated at rather shallow depths. A brief description of the deposits is as follows:

4.2) Sandy Gravel:

From ground level extending down to el. 1045 ft. - 1046 ft. a sandy gravel deposit was encountered, containing some boulders. The surficial 2 - 6 ft. layer of this material was found to be

4. SOIL CONDITIONS: (cont'd.) ...

4.2) Sandy Gravel: (cont'd.) ...

contaminated with organic substances, which rendered the otherwise non-cohesive soils quite plastic. The relative density of the sandy gravel was measured by means of the Standard Penetration Test. Penetration 'N' values ranged from 3 blows per ft. to much above 100 blows per ft., indicating relative densities of very loose to very dense. As a rule, the organic portion of the material exhibited the lowest densities. A typical grain-size analysis yielded some 50 - 60% gravel and 10% silt and clay particles, the remaining 30 - 40% being sands. The granular deposit is brown in colour; where organic matter is present, it changes to dark brown and black.

4.3) Clayey Silt with Sand and Gravel:

Underlying the granular stratum, clayey silts with some sand and gravel and occasional boulders were observed. The generally hard consistency and the heterogeneous, unsorted nature of the soils are indicative of the glacial origin of the deposit and, as such, it is heavily overconsolidated. The material has very low plasticity, plastic limits averaging around 12% and liquid limits around 17 - 18% (CL - ML). The natural moisture contents lie below the plastic limits. On account of the hard consistency of the deposit, no undisturbed soil samples could be recovered. Based on the very high penetration resistances ('N' values ranging from 30 blows per ft. to 100 blows for a few inches penetration), it is estimated that the average undrained shear strength of the material is over 5,000 PSF. All the boreholes were terminated within this layer between el. 1042 ft. and 1031 ft.

5. GROUNDWATER CONDITIONS:

The groundwater level in the borings was established to be around el. 1052 ft. - 1053 ft., corresponding roughly to the river water level. Within the sandy gravel deposit, the water ostensibly communicates freely, since this layer is considered to be quite permeable. In B.H.'s #4 and 8 an artesian water pressure

5. GROUNDWATER CONDITIONS: (cont'd.) ...

was hit at el. 1035 ft. - 1038 ft. In order to measure the artesian head, the casings were extended above the ground surface, so that the water could rise to reach equilibrium. The artesian level was observed to be 7.5 ft. above ground level (el. 1063 ft.). The excess hydrostatic pressure, due to this artesian condition, is equal to 4.5 PSI over and above the normal hydrostatic pressure, taking the existing groundwater level at el. 1052 ft.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to construct a three-span bridge over the diverted Conestogo River for the future Hwy. #85. Although only the northbound structure is proposed at the present time, recommendations given below, are valid for both the north- and southbound structures as well. The Conestogo River is planned to be diverted some 200 - 250 ft. southward. In order to span the river valley, approach fills of 42 - 45 ft. heights will be necessary.

Subsoils were found to consist of a 10 - 14 ft. thick layer of sandy gravel, the upper 2 - 6 ft. of which were contaminated by organic matter. The sandy gravels are followed by hard clayey silt with some sand and gravel (glacial till).

6.2) Footings:

6.2.1) Abutments -

The abutments are planned to be spill-through type. Footings of such abutments may most economically be supported on piles, driven through the fills. The use of steel H-piles is recommended driven down to approx. el. 1040 ft., where practical refusal might be reached. In the case of driving 12 BP @ 53 steel H-piles, safe loads of 70 tons per pile may be used for design purposes, provided piles are driven to practical refusal. Pile caps should be placed within the approach fills with a minimum cover of four ft. for frost protection. No bouldery material should be used for the fills at the location of the proposed abutments.

6. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

6.2) Footings: (cont'd.) ...

6.2.2) Piers -

At the locations of the proposed piers, the strength of the subsoil was found to be sufficient to support the structure on spread footings at shallow depths. Considerable engineering and construction problems are foreseen, however, for the spread footings due to groundwater conditions. The uppermost sand and gravel layers are susceptible to conditions of unbalanced hydrostatic heads. Since excavations for the spread footings would extend well below the groundwater level, 'quick' conditions at the bottom of the excavations certainly would occur, unless a dewatering scheme is employed. By lowering the footings into the glacial till, 'quick' conditions at the bottom of the excavations might be avoided, but on account of the artesian water pressure around el. 1035 - 1038 ft., a 'blow-out' could endanger the stability of the excavations.

Piled foundations do not appear to be a practical proposal either, since a dewatering scheme for the pile cap excavations would be necessary. In addition, the depth, where practical refusal may be reached, would not allow adequate pile length for embedment.

As a consequence, it is recommended that the piers be supported on a row, or rows of pile bents, encased in concrete for aesthetic or structural reasons. 12 SP 3 7⁴ steel H-piles should be used for the bents, driven to practical refusal, the depths of which are estimated to be around el. 1035 ft. Design loads of 80 tons per pile are assumed on above piles when driven to refusal.

Pile bents should be protected against scour if this is a problem. Such protection can be achieved by rip-rap, covering an area of approx. 10 ft. around the pile bent perimeters.

6. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

6.3) Embankment Stability:

As mentioned earlier, approach fills will be some 42 - 45 ft. high. Stability analyses, in terms of total stresses for the embankments, were carried out by means of an electronic computer. The computations yielded satisfactory safety factors for the 45-ft. high fills, constructed with 2 horizontal to 1 vertical slopes.

All surficial organic material under the embankments must be excavated and replaced by acceptable, well compacted soils. The horizontal and vertical extent of the organic deposit should be determined by the Regional Soil Section.

7. MISCELLANEOUS:

The field work, carried out during the period September 2 - 22, 1970, was supervised by Mr. W. Hendry, Student Technician.

Equipment used was owned and operated by Dominion Soil Investigation Ltd.

This report was written by Mr. A. K. Barsvary, Senior Foundation Engineer, and reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

October, 1970

APPENDIX I

FOUNDATION SECTION

JOB <u>70-11081</u>	LOCATION <u>Sta. 771 + 02 30' Rt. of ϕ</u>	ORIGINATED BY <u>RH</u>
W.P. <u>281-66-04</u>	BORING DATE <u>Sept. 21, 1970</u>	COMPILED BY <u>AKB</u>
DATUM <u>Geodetic</u>	BOREHOLE TYPE <u>Washboring, BX Casing</u>	CHECKED BY <u><i>[Signature]</i></u>

[illegible]

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 70-11031 LOCATION Sta. 762 + 78 38' Lt. of E ORIGINATED BY RH
 W.P. 281-66-04 BORING DATE Sept. 18, 1970 COMPILED BY AKB
 DATUM Goodetic BOREHOLE TYPE Washboring, BK Casing CHECKED BY /

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE				w_p — w — w_L WATER CONTENT % 10 20 30				
1052.0	Water Level					1050									GR.SA.SI.CL
1049.4	River Water														
2.6	Sandy Gravel		1	SS	35										
1044.0	Dense to Compact Grey		2	SS	14										
8.0	Clayey silt with sand & gravel		3	SS	58	1040									
1038.5	(Till) Hard		4	SS	94										
13.5	End of Borehole														

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 70-11081 LOCATION Sta. 768 + 28 26.5' Rt. of 8 ORIGINATED BY RH
 W.P. 281-66-04 BORING DATE Sep. 9-10, 1970 COMPILED BY AKB
 DATUM Geodetic BOREHOLE TYPE Washboring, BX Casing CHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					w_p — w — w_L WATER CONTENT % 10 20 30				
1058.9	Ground Level															
00																
	Organic		1	SS	47											
	Sandy Black & Brown		2	SS	100	1050										
	Gravel Grey		3	SS	167											
1044.9	Very Dense		4	SS	111											
14.0	Clayey silt with sand		5	SS	35											
1042.4	gravel (Till)		6	SS	121											
16.5	End of Borehole															

69 29 (2)

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 6

FOUNDATION SECTION

JOB	70-11081	LOCATION	Sta. 768 + 28 50' Lt. of g	ORIGINATED BY	RH
W.P.	281-66-04	BORING DATE	Sept. 10-11, 1970	COMPILED BY	AKB
DATUM	Geodetic	BOREHOLE TYPE	Washboring, BX Casing	CHECKED BY	<i>[Signature]</i>

[illegible]

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 7

FOUNDATION SECTION


JOB 70-11081 LOCATION Sta. 767 + 03 ~~53~~ Rt. of ~~g~~ ORIGINATED BY RH
 W.P. 281-66-04 BORING DATE Sept. 8, 1970 COMPILED BY AKB
 DATUM Geodetic BOREHOLE TYPE Washboring, BX Casing CHECKED BY *[Signature]*

[illegible]

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 8

FOUNDATION SECTION

JOB	70-11081	LOCATION	Sta. 767 + 03 26.5' Lt. of ϕ	ORIGINATED BY	PH
W.P.	281-66-04	BORING DATE	Sept. 2, 1970	COMPILED BY	AKB
DATUM	Geodetic	BOREHOLE TYPE	Washboring, BX Casing	CHECKED BY	

[illegible]

ABBREVIATIONS USED IN THIS REPORT

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>c 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		

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_p	PLASTIC LIMIT
I_p	PLASTICITY INDEX
s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
I_c	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
C_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX = $\frac{\Delta e}{\Delta \log_{10} \sigma}$
T_v	TIME FACTOR = $\frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

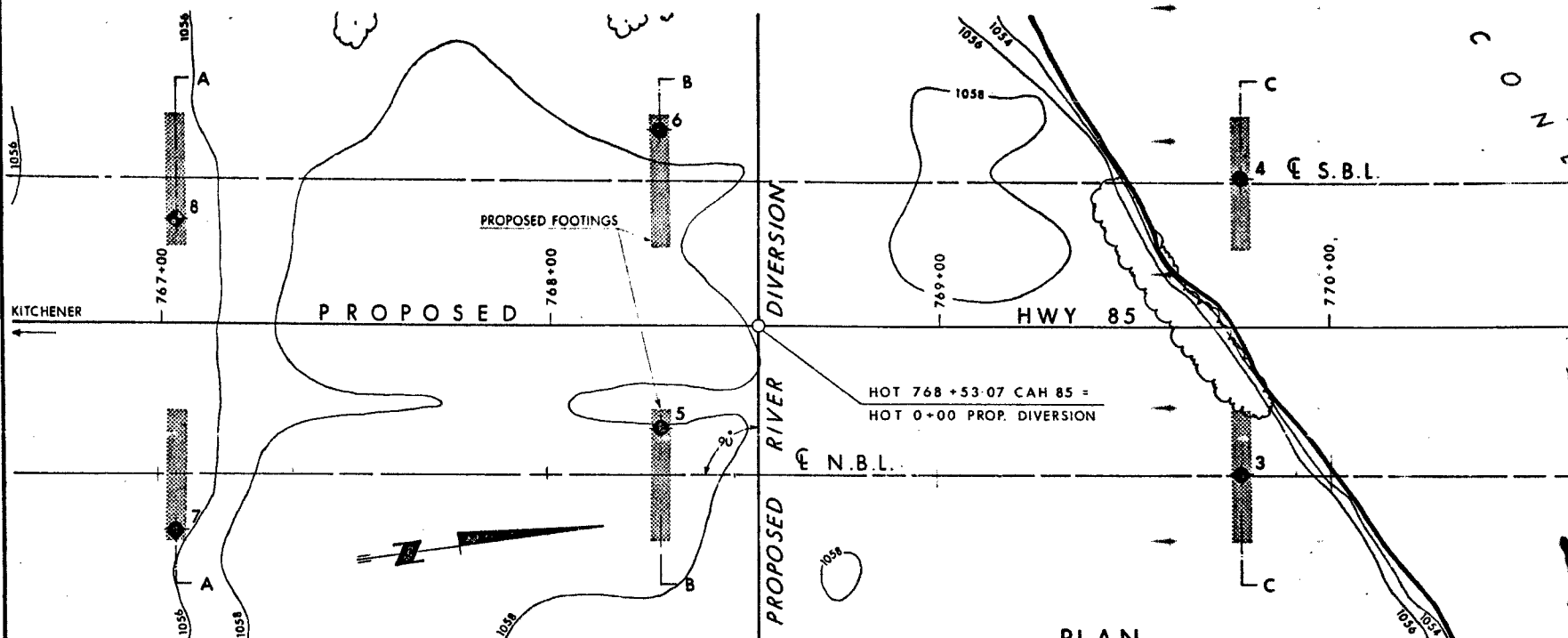
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

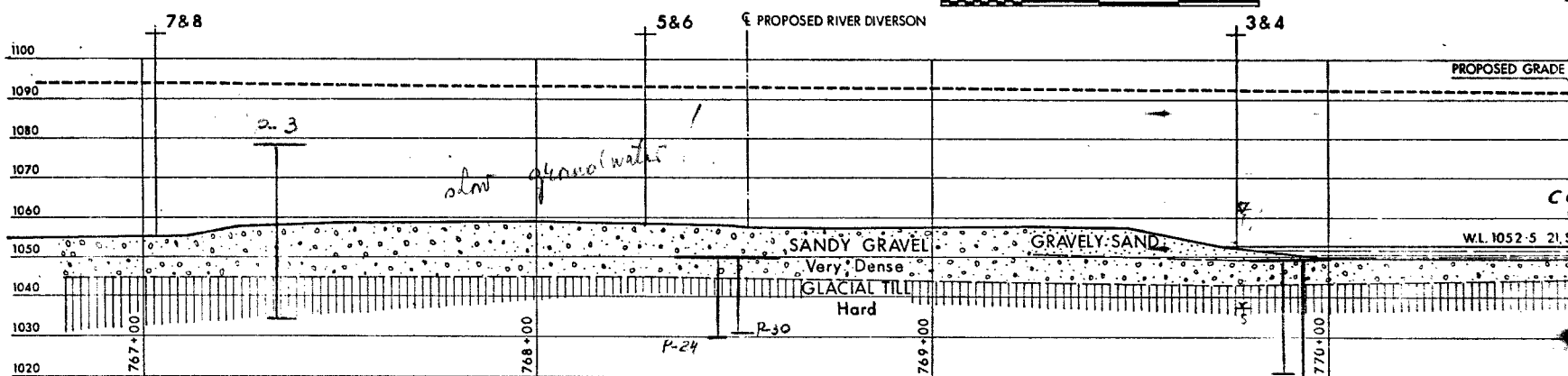
SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



PLAN

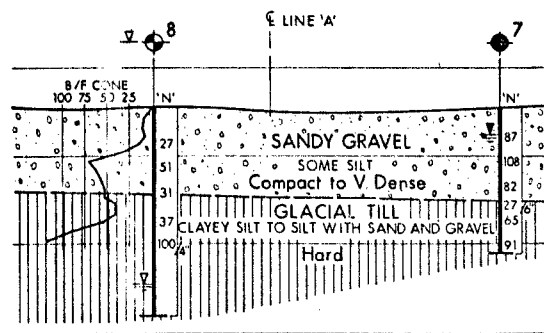
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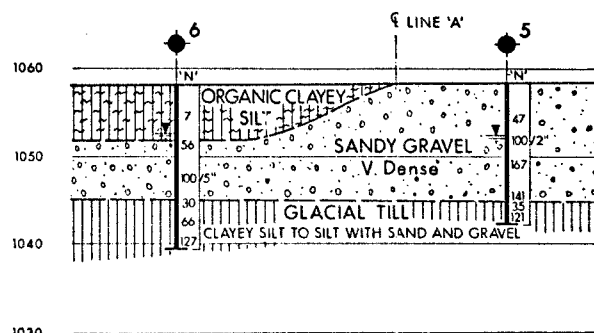
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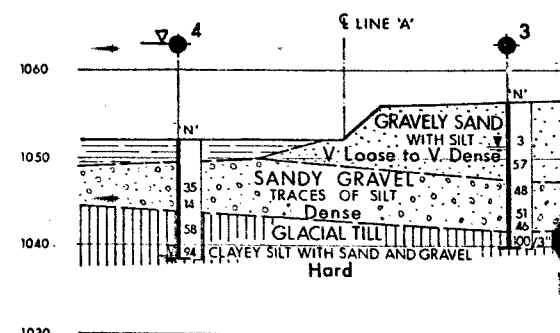
PRINT RECORD
NO. FOR DATE



A - A



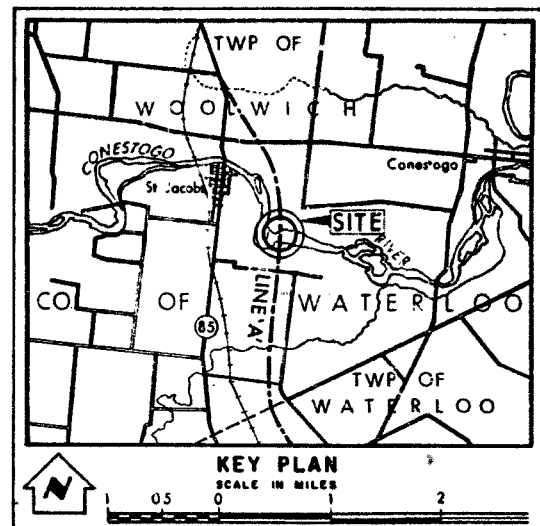
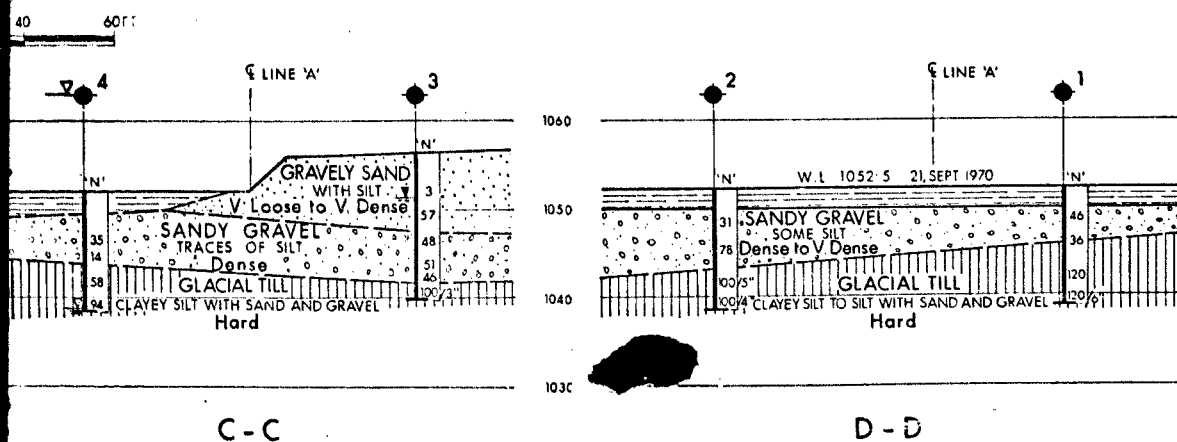
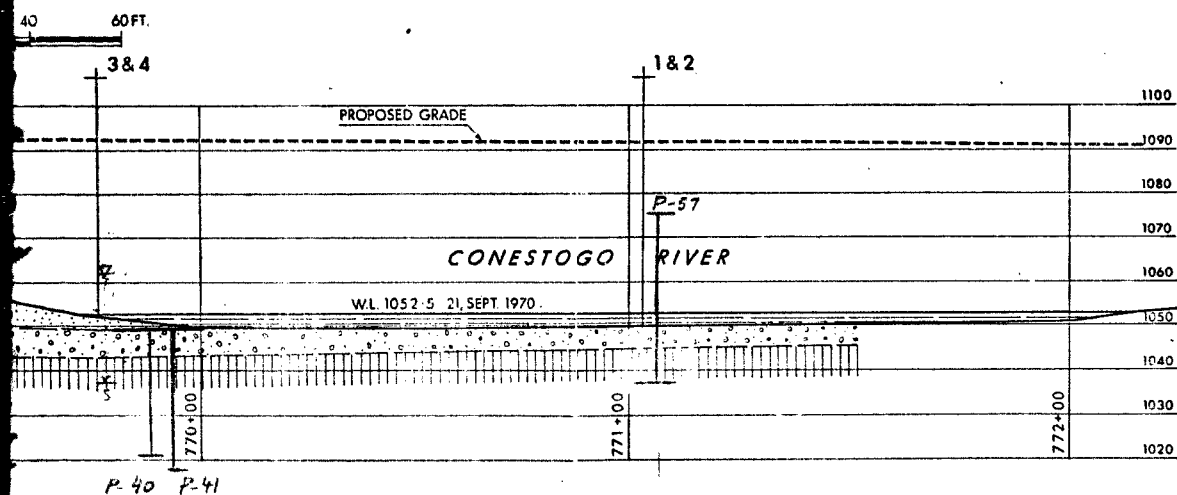
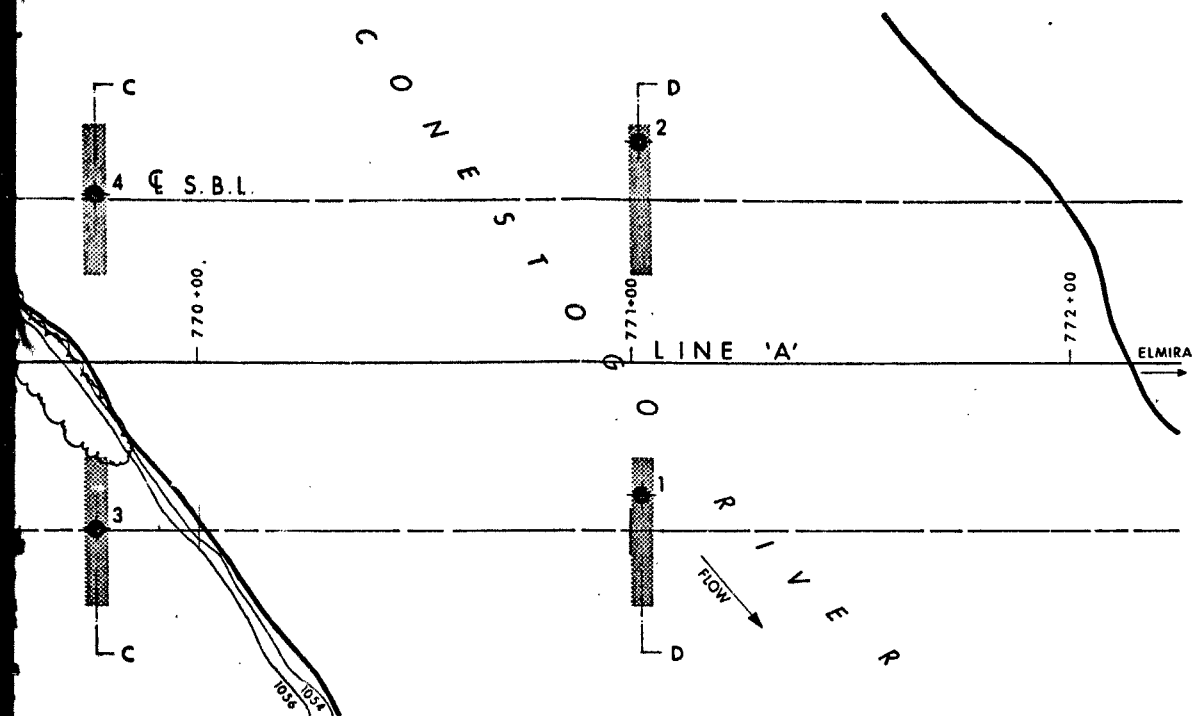
B - B



C - C

SECTIONS

SCALE
HOR: 20 10 0 20 40 60 FT.
VER: 20 5 0 10 20 30 FT.



LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Perched W.L. established at time of field investigation. SEPT. 1970.
- HEAD
- Artesian Water
- ENCOUNTERED

NO.	ELEVATION	STATION	OFFSET
1.	1052.5	771+02	30' RT.
2.	1052.2	771+02	50' LT.
3	1056.4	769+78	38' RT.
4.	1052.0	769+78	38' LT.
5	1058.9	768+28	26.5' RT.
6	1058.1	768+28	50' LT.
7	1055.6	767+03	53' RT.
8	1055.7	767+03	26.5' 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.

REVISIONS	DATE	BY	DESCRIPTION

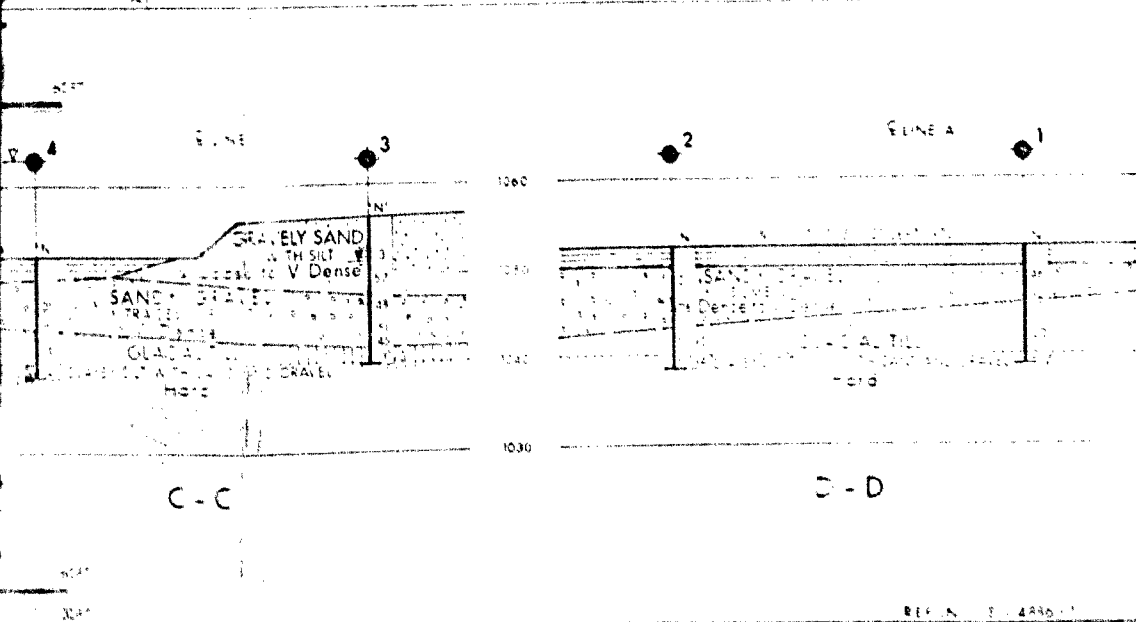
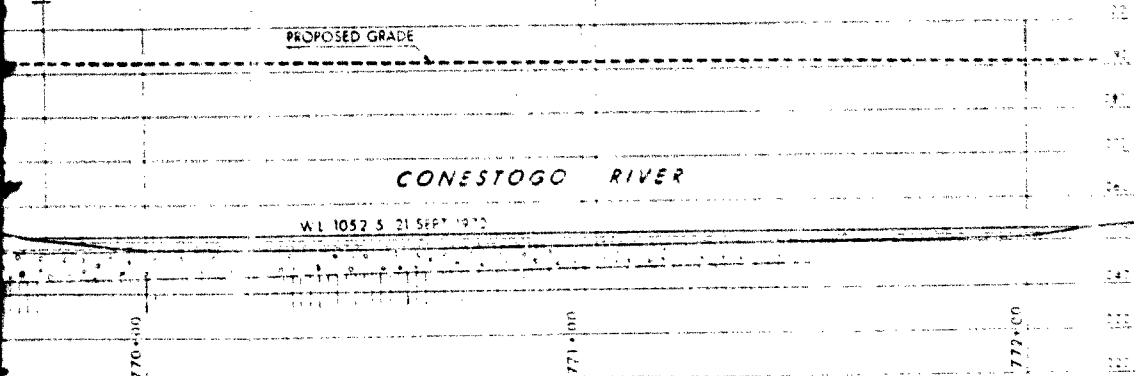
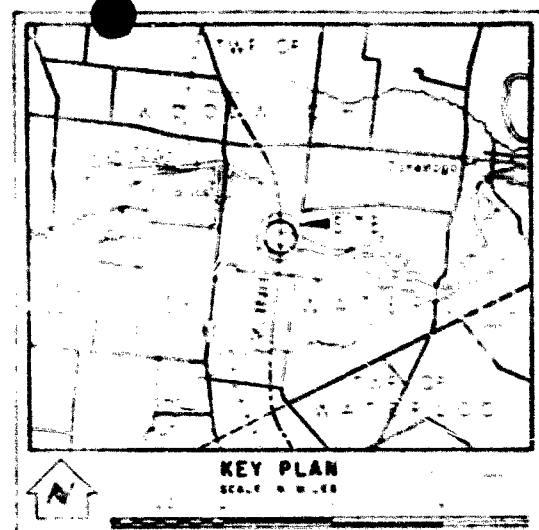
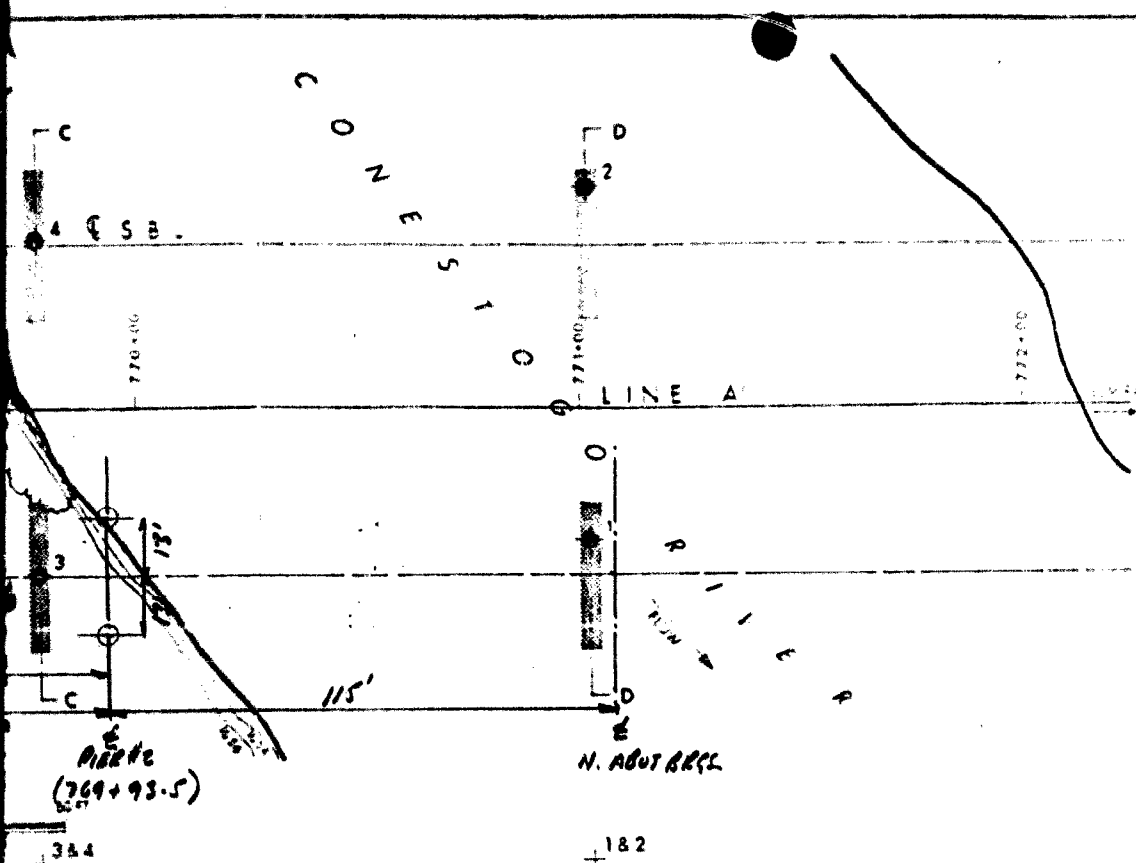
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE - FOUNDATION SECTION

CONESTOGO RIVER

KING'S HIGHWAY NO. 85 LINE 'A' DIST. NO. 3
CO. WATERLOO
TWP. WOOLWICH LOT 6 CON. G.C.T.

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D A B	CHECKED <input checked="" type="checkbox"/>	W.P. NO. 281-66-04	M.B.T. DRAWING NO.
DRAWN G G	CHECKED <input checked="" type="checkbox"/>	JOB NO. 70-11081	70-11081 A
DATE 28 OCT 1970	SITE NO	BRIDGE DRAWING NO.	
APPROVED <i>A. J. B. B.</i>	CONT NO		



LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Perched water table (assumed from field investigation 1970-71)		
	Water table		
	Artificial water		
	Groundwater		
NO.	ELEVATION	STATION	OFFSET
1	100.0	771+00	1.0
2	100.2	771+00	0.2
3	100.4	769+75	0.3
4	100.6	769+75	0.3
5	100.9	768+00	14.0
6	101.0	768+00	0.2
7	101.4	767+00	0.2
8	100.7	767+00	14.0

NOTE
The data on which we have based our calculations are based only on Borehole data and Between Boreholes the boundaries are assumed from geological evidence and may be subject to considerable error.

DEPARTMENT OF HIGHWAYS - ONTARIO
WATERWAYS DIVISION - CONESTOGO SECTION

CONESTOGO RIVER

MADE BY: J. H. B. REEDS DIST. NO. 3
CO. WATERWAYS
TOPOGRA. DIVISION
BORE HOLE LOCATION & SOIL STRATA

FIELD NO. 1081 A
DATE: 1970-10-01
DRAWN BY: J. H. B. REEDS
APPROVED BY: J. H. B. REEDS

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

~~Mr. A.P. Watt,~~

Reg. Bridge Planning Engineer,
London Regional Office,
London, Ontario

Bridge Office,
Downsview

March 26, 1971

Conestogo River Bridge
(Northbound Lanes)
W.P. 281-66-04, Site No. 31-286
Highway 85 (C.A.H.), District 3

70-11081

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-6941-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$336,000, which includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

C.S. Grebski,
Bridge Design Engineer

CSG:rd

Attach.

C.C. B. Davis
A. Stermac (2)
J. Anderson
A. Crowley

Pending results of trial
excavation yet to be completed
at - no comments.

12.4.84
April 23rd 1971

MEMORANDUM

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

From: Structural Office,
Admin. Building.

ATTENTION:

DATE: August 13, 1971.

OUR FILE REF.

IN REPLY TO

SUBJECT: Conestogo River Bridge,
(Northbound Lanes),
W.P. 281-66-04, Site #33-286,
Highway #85 C.A.H., District #3.

70-11-081

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,
Structural Design Engineer.


CSG/mh
ENCL*
cc: Foundation Office.

30. Aug. 71

Subject to the results of final
excavation, no comments

A.L.B.

K.L. Sullivan


15/10/71

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. A.G. Stermac,
Prin. Foundation Engineer,
Foundation Office, Design
Services Branch, Downsview.

FROM: Bridge Planning,
Southwestern Region.

ATTENTION:

DATE: January 18th, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT:

W.P. 281-66-04, Bridge Site 33-286,
Conestoga River Bridge (Northbound Lanes),
Hwy. 85N, District 3 - Stratford.

Further to my memorandum of November 25th, 1971, would you kindly advise me in writing if the approach fill as shown in red on drawing D-6941-1 is stable and thereby confirming that it is feasible to provide for an approximate 16 foot roadway under the south end of the above structure.

I would also like to know if this scheme could be implemented in the future should the Grand River Conservation Authority wish a roadway under the bridge.



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

APW/ss
Encl.

c.c. P. Bryar.
J. Cullen.
J.L. Keen.

AKB

MEMORANDUM

TO: Mr. A. P. Watt,
Regional Bridge Planning Engineer,
Southwestern Region,
London, Ontario.

FROM: Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

ATTENTION:

DATE: January 24, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT: Conestago River Bridge, Hwy. #85 N,
District No. 3, Stratford.
W.O. 70-11081 W.P. 281-65-04

This memo is to confirm our telephone conversation in late November 1971. As we discussed, the proposed approach fill as you indicated on the drawing (D-6941-1) will be stable with the 16 ft. roadway under the south end of above structure.

This scheme can also be implemented in the future if so desired.

AKB/ao
cc: Foundations Files ✓
Documents

For:

A. K. Barsvary
A. K. Barsvary,
Senior Foundation Engineer,
K. G. Selby,
Supervising Foundation Engineer.

70-F-081

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. C.S. Grebski,
Structural Design Engineer,
Structural Office.

FROM: Construction office,
Third Floor, Central Bldg.

ATTENTION:

DATE: October 18, 1973.

OUR FILE REF.

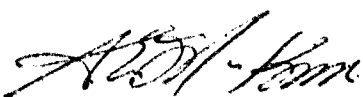
IN REPLY TO

SUBJECT: Conestoga River Bridge - Prototype Test Bridge,
Highway 85, Site 23-286, District 3, W.P. 281-66-4.

This memo will confirm decisions made at a meeting yesterday at which the following were present: J.L. Keen, N. Zoltay, K. Selby, A. McKim.

Since the sheet piling and tremie concrete shown on the plans for the piers are not structurally required, and are only for the purpose of unwatering the footing, it was decided to show this as a suggested unwatering scheme. The items for the sheet piling and tremie concrete will be deleted from the D4, and the item for unwatering left in. A Special Provision for the unwatering item will state that the sheet piling and tremie are a suggested scheme only and the contractor may submit an alternative scheme for the Ministry's approval.

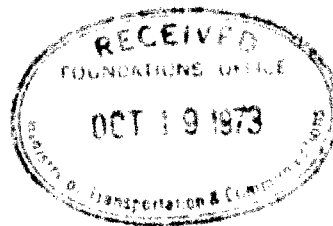
Due to the possibility of encountering artesian water, we recommend the Special Provision also state that notwithstanding Section 9.02.14, if a concrete seal is required it shall be deemed to be included in the lump sum price bid for the unwatering.



A.E. McKim,
Asst. Construction Engineer,
Structures.

AEM/JC

c.c. J.L. Keen
N. Zoltay
K. Selby
R. Dorton
P. Peacock
R. Beaudro



Date May 15, 1974

APPROVED SCHEDULE FOR 1974 - 75

Page 4 of 9

PROGRAM OF CONSTRUCTION

DISTRICT No. 3, STRATFORD

W.P. No.	HWY. No.	Type of work	LOCATION	Date of		Tend. open.	CONT. No.
				Advert.	Award.		
281-66-01 281-66-04 281-66-05 281-66-06	85N	G.D. & Strs.	0.4 Mi. North of King St. North Waterloo N'ly 4.3 Mi. Incl. 2 Structures and 1 S.D. Culvt.	Sept. 18/74 July 3	Oct. 23/74 Aug 7/74	30 18 19	74-60

LISTING OF VERIFIED BIDS

NOTICE OF AWARD OF CONTRACT

TENDER OPENING NO. 19
DATE August 7th 19 74CONTRACT NO. 74-60

DESCRIPTION GRADING, DRAINAGE, STRUCTURES (INCLUDING PRE-STRESSING AND STRUCTURAL
STEEL) SPECIAL DESIGN CULVERTS AND SECURITY FENCE
NECESSARY AVAILABLE RATING IS (S) IN (G) OR (S)

Waterloo - Highway 85N, From 0.2 Miles South East of King Street,
Northerly 4.1 Miles

HIGHWAY 85 New

STRATFORD DISTRICT 3

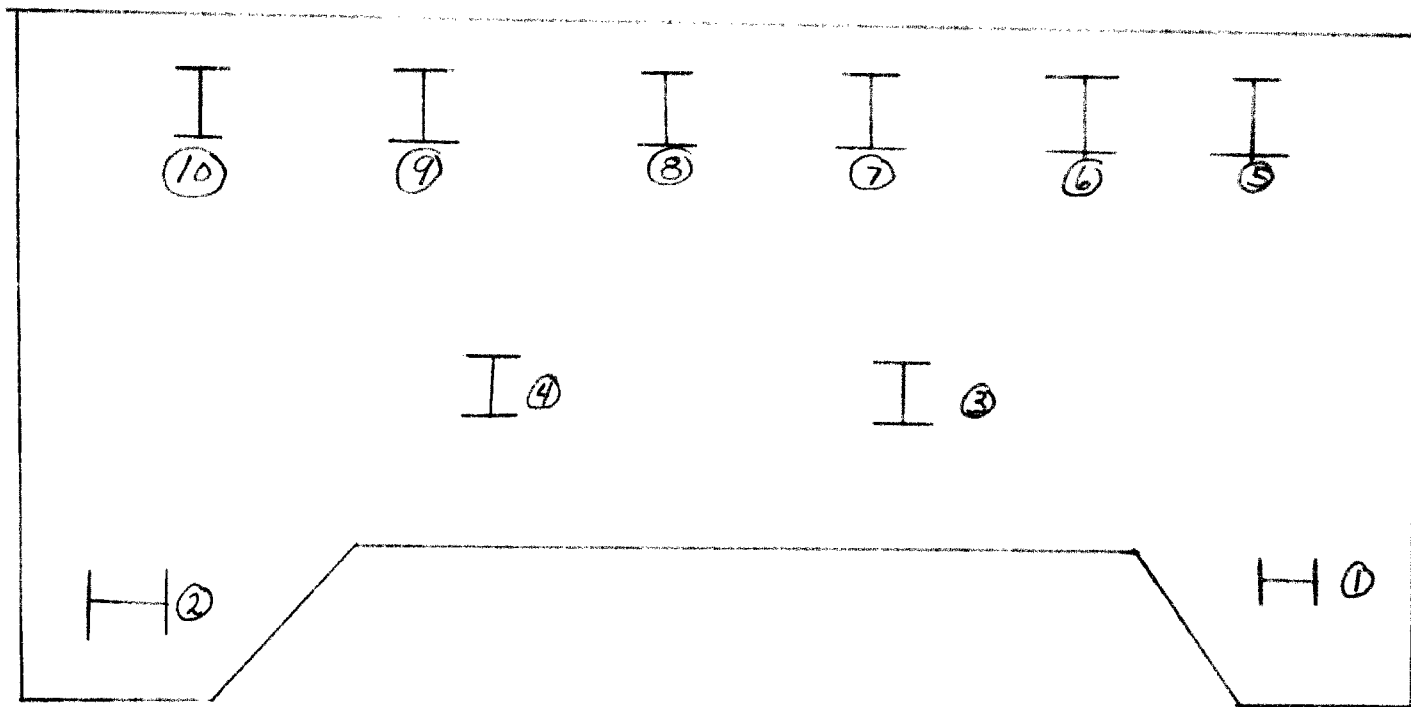
MILEAGE: 4.1

George Wimpey Canada Limited	\$ 2,095,198.09
H. Kerr Construction Limited	2,162,696.60
Bot Holdings Limited	
Bot Construction Limited	
Bot Construction (Canada) Limited	
Clarkson Construction Company Limited	2,225,399.51
The George Campbell Company Limited	
and Campbell Quarries Limited	2,276,486.08
Armbr Materials & Construction Ltd.	2,326,679.00
E. & E. Seegmiller Limited	2,580,216.42

AWARDED TO:

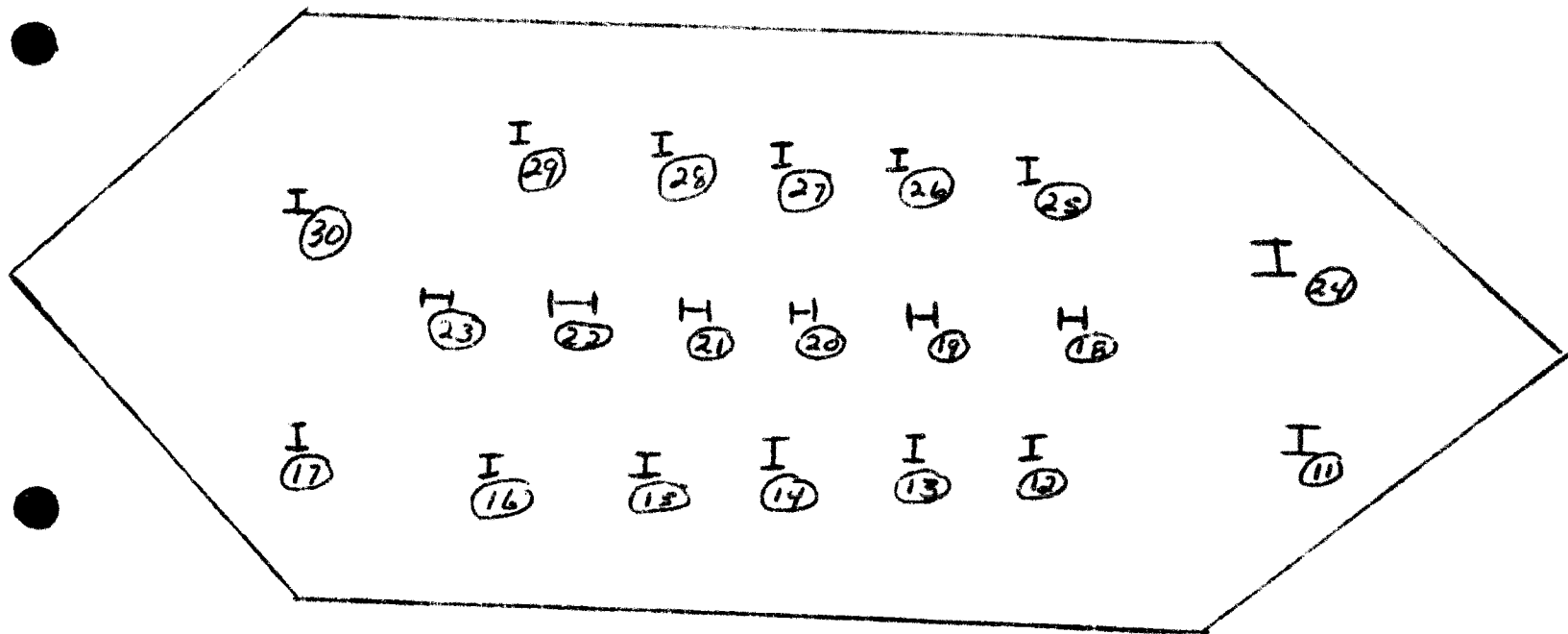
GEORGE WIMPEY CANADA LIMITED,
80 NORTH QUEEN ST.,
TORONTO, ONTARIO M8Z 2C9

DATE August 13th, 19 74.

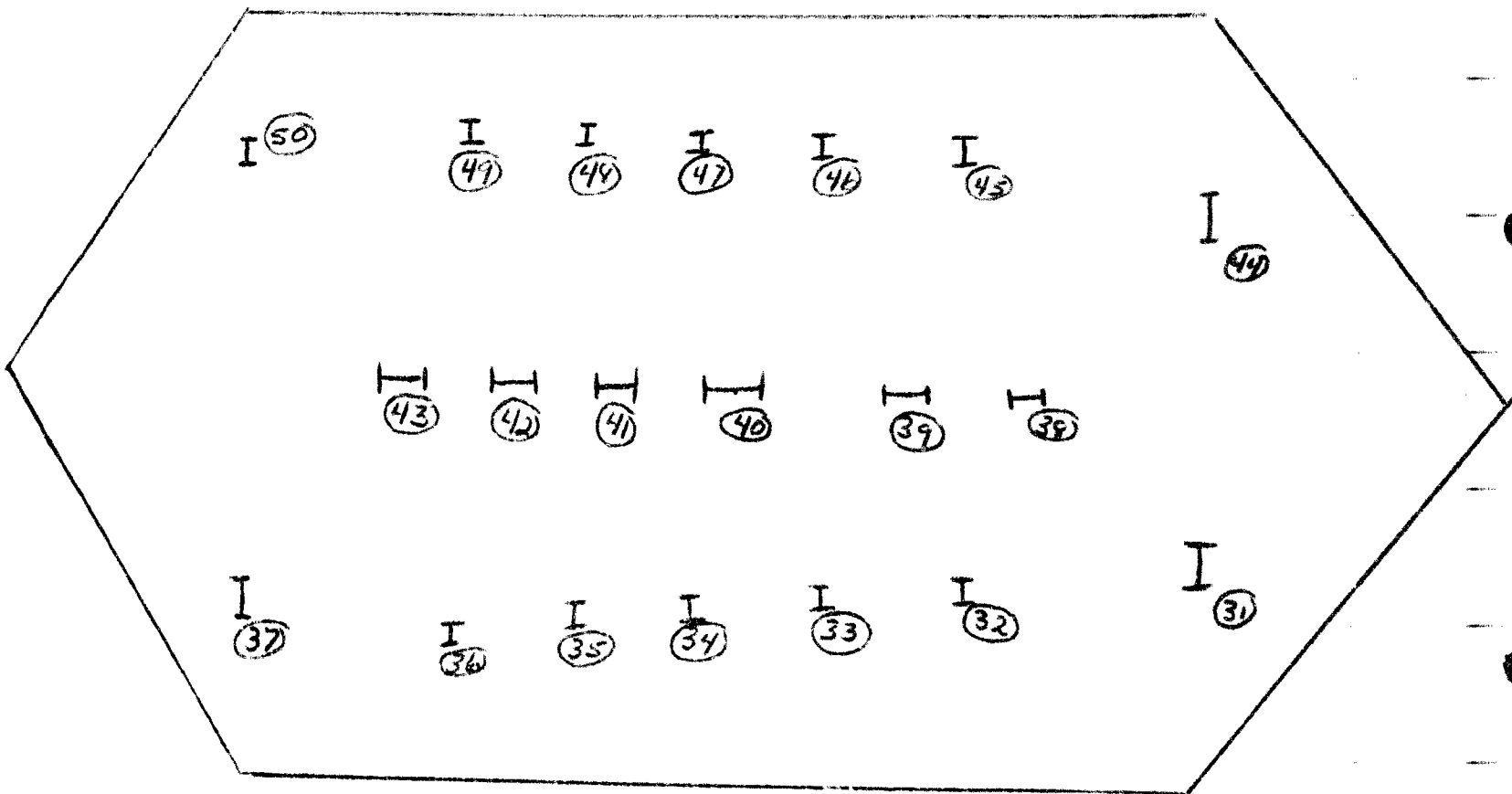


SOUTH ABUTMENT FOOTINGS
PILE LAYOUT



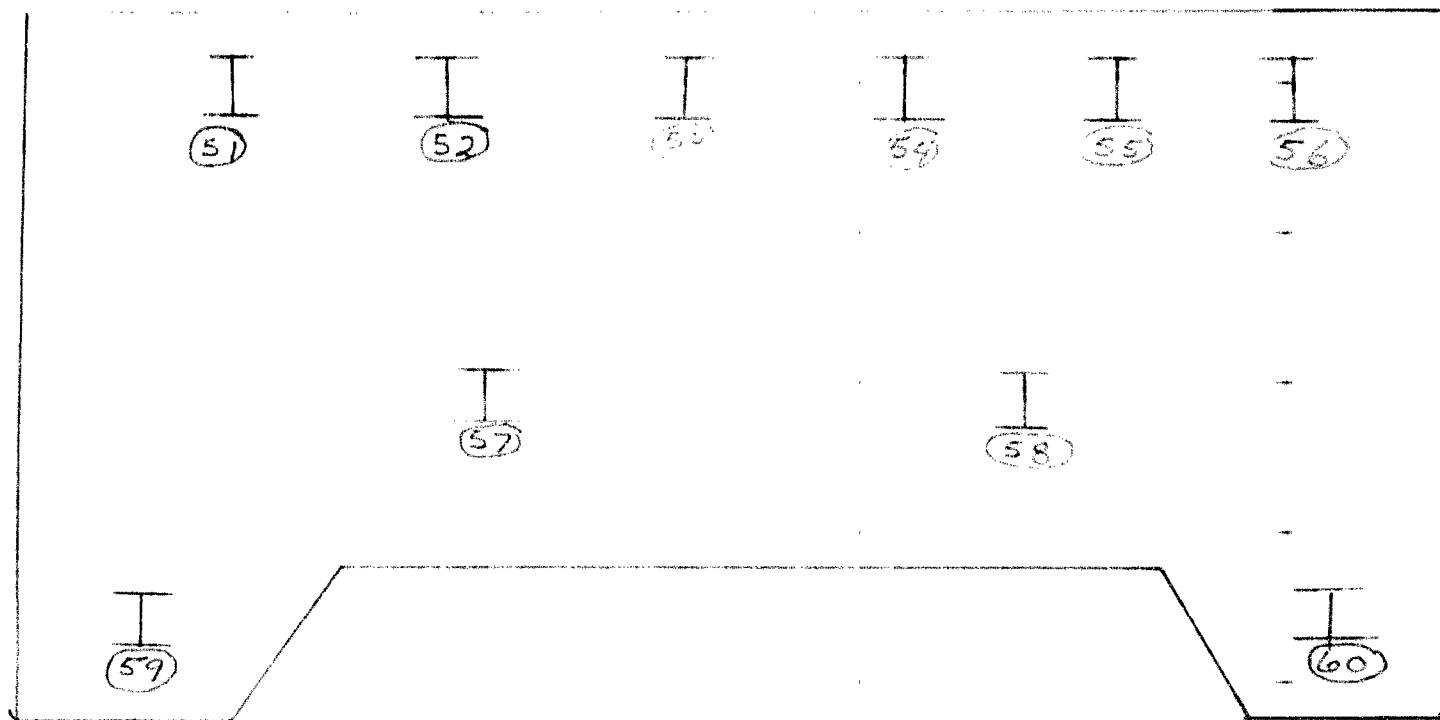


PIER # 1 (SOUTH PIER)



PIER #2





NORTH ABUTMENT FOOTING
PILE LAYOUT



185

14.41.5

34

ENGINEERING SERVICES BRANCH
SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 3 CONTRACT NO. 74-60 STRUCTURE CONESTOGA RIVER BRIDGE
CONTRACTOR BERMINGHAM DESIGN LOAD OF PILE 95 TON
HAMMER DETAILS: TYPE BERM 400 WEIGHT 5000 HEIGHT OF FALL OR ENERGY 46,000
TYPE OF ANVIL OR CAP BERM 400 WEIGHT OF ANVIL OR CAP 1800 lbs
PILE DETAILS H P 12 x 74 41' LONG VERTICAL N/O SHOE
PILE NO. 30 LOCATION PIER #1 DATE DRIVEN SEPT 11/74

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	0		26			51			76	
	2	1		27			52			77	
	3	1		28			53			78	
	4	2		29			54			79	
	5	6		30			55			80	
	6	10		31			56			81	
	7	12		32			57			82	
	8	15		33			58			83	
	9	15		34			59			84	
	10	20		35			60			85	
	11	23		36			61			86	
	12	27		37			62			87	
	13	30		38			63			88	
	14	35		39			64			89	
	15	38		40			65			90	
	16	42		41			66			91	
	17	48		42			67			92	
	18	53		43			68			93	
	19	57		44			69			94	
	20			45			70			95	
	21			46			71			96	
	22			47			72			97	
	23			48			73			98	
	24			49			74			99	
	25			50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	5	5	5	5	5	5
MEASURED REBOUND IN INCHES	1/4	1/4	1/4	1/4	1/4	1/4
FINAL LENGTH OF PILE	19.5					
FINAL CUT OFF ELEVATION	1035.00 1050.00					

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
ENGINEERING SERVICES BRANCH
MINISTRY OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED M R LICKERS
NAME (PRINT) M R LICKERS
DATE SEPT 11/74
ATTACH SKETCH OF PILE NUMBERING SYSTEM



ENGINEERING SERVICES BRANCH
SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 3 CONTRACT NO. 74-60 STRUCTURE CANESTOGO RIVER BRIDGE
CONTRACTOR BERMINCHAM DESIGN LOAD OF PILE 95 TON
HAMMER DETAILS: TYPE BERMAX 400 ^{4 Am} ~~400~~ ^{Piston} WEIGHT 5000 HEIGHT OF FALL OR ENERGY 46.000
TYPE OF ANVIL OR CAP BERM 400 WEIGHT OF ANVIL OR CAP 1800
PILE DETAILS HP 12X74 41' LONG VERTICAL NO SHOE
PILE NO. 43 LOCATION PIER # 2 DATE DRIVEN SEPT 17/74

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	0	41	26	45		51			76	
	2	2		27	41		52			77	
	3	5		28	42		53			78	
	4	4		29	44		54			79	
	5	5		30	50		55			80	
	6	1		31	59		56			81	
	7	1		32			57			82	
	8	6		33			58			83	
	9	10		34			59			84	
	10	11		35			60			85	
	11	12		36			61			86	
	12	10		37			62			87	
	13	12		38			63			88	
	14	13		39			64			89	
	15	13		40			65			90	
	16	14		41			66			91	
	17	17		42			67			92	
	18	19		43			68			93	
	19	19		44			69			94	
	20	22		45			70			95	
	21	22		46			71			96	
	22	28		47			72			97	
	23	30		48			73			98	
	24	34		49			74			99	
	25	38		50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	5	5	5	5	5	5
MEASURED REBOUND IN INCHES	1/4	1/4	1/4	1/4	1/4	1/4
FINAL LENGTH OF PILE	32.5					
FINAL CUT OFF ELEVATION	1035.0					

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
ENGINEERING SERVICES BRANCH
MINISTRY OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED MR Lickers
NAME (PRINT) M R LICKERS
DATE Sept 18/74
ATTACH SKETCH OF PILE NUMBERING SYSTEM



BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 3 CONTRACT NO. 74-60 STRUCTURE CUNESTAGO RIVER BRIDGE
CONTRACTOR BECKINGHAM DESIGN LOAD OF PILE 75 TON
HAMMER DETAILS: TYPE BECKINGHAM WEIGHT 5000 HEIGHT OF FALL OR ENERGY 41,000
TYPE OF ANVIL OR CAP BECKINGHAM WEIGHT OF ANVIL OR CAP 1200
PILE DETAILS HP 12x24 41' LONG VERTICAL NO. 542
PILE NO. 24 LOCATION PIE #1 DATE DRIVEN SEPT 16/74

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	0		26			51			76	
	2	1		27			52			77	
	3	1		28			53			78	
	4	5		29			54			79	
	5	9		30			55			80	
	6	14		31			56			81	
	7	17		32			57			82	
	8	17		33			58			83	
	9	21		34			59			84	
	10	23		35			60			85	
	11	27		36			61			86	
	12	30		37			62			87	
	13	33		38			63			88	
	14	41		39			64			89	
	15	48		40			65			90	
	16	52		41			66			91	
	17	57		42			67			92	
	18	58		43			68			93	
	19	61		44			69			94	
	20			45			70			95	
	21			46			71			96	
	22			47			72			97	
	23			48			73			98	
	24			49			74			99	
	25			50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	5	5	5	5	5	5
MEASURED REBOUND IN INCHES	3/8	3/8	3/8	3/8	3/8	3/8
FINAL LENGTH OF PILE	20.0					
FINAL CUT OFF ELEVATION	(1035.0) 1050.0					

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
ENGINEERING SERVICES BRANCH
MINISTRY OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

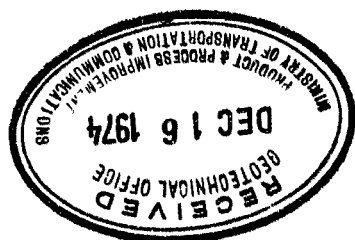
SIGNED M. R. LICKERS KL
NAME (PRINT) M. R. LICKERS
DATE Sept 16/74
ATTACH SKETCH OF PILE NUMBERING SYSTEM

Correct Elevation confirmed by Inspector.

3282

HENRY SZYMAŃSKI

Zawilski
Zawilski



ENGINEERING SERVICES BRANCH
SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 3 CONTRACT NO. 74-60 STRUCTURE CAWESGOGA RIVER BRIDGE, N.
CONTRACTOR BERNINGHAM DESIGN LOAD OF PILE 95.700
HAMMER DETAILS: TYPE BERNINGHAMER PILE WEIGHT 5000 HEIGHT OF FALL OR ENERGY 46.000
TYPE OF ANVIL OR CAP BERM 400 WEIGHT OF ANVIL OR CAP 1500
PILE DETAILS HP 12X74 41' LONG VERTICAL 50 SH. 12
PILE NO. 40 LOCATION PIER #2 DATE DRIVEN SEPT 17/74

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	0		26	48		51			76	
	2	0		27	48		52			77	
	3	1		28	46		53			78	
	4	1		29	52		54			79	
	5	4		30			55			80	
	6	5		31			56			81	
	7	1		32			57			82	
	8	1		33			58			83	
	9	9		34			59			84	
	10	10		35			60			85	
	11	12		36			61			86	
	12	15		37			62			87	
	13	14		38			63			88	
	14	17		39			64			89	
	15	17		40			65			90	
	16	19		41			66			91	
	17	20		42			67			92	
	18	18		43			68			93	
	19	21		44			69			94	
	20	23		45			70			95	
	21	25		46			71			96	
	22	30		47			72			97	
	23	36		48			73			98	
	24	35		49			74			99	
	25	37		50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	4	4	4	4	4
MEASURED REBOUND IN INCHES	1/4	1/4	1/4	1/4	1/4	1/4
FINAL LENGTH OF PILE	29.0					
FINAL CUT OFF ELEVATION	1035.0 1050.0					

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
1035.0 1050.0 ENGINEERING SERVICES BRANCH
29.0 29.0 MINISTRY OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED M R LICKERS
NAME (PRINT) M R LICKERS
DATE SEP 19/74
ATTACH SKETCH OF PILE NUMBERING SYSTEM

Confirmed by Inspector.



ENGINEERING SERVICES BRANCH
SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 3 CONTRACT NO. 74-60 STRUCTURE CONESTOGA RIVER B.C. N.B.L.

CONTRACTOR BERMINGHAM DESIGN LOAD OF PILE 75 TON

HAMMER DETAILS: TYPE BERMINGHAM 8325 WEIGHT 2850 HEIGHT OF FALL OR ENERGY 29000

TYPE OF ANVIL OR CAP Beam 825 WEIGHT OF ANVIL OR CAP 11000

PILE DETAILS HT 12x24 VERTICAL NO 210E

PILE NO. 57 LOCATION NORTH ABUTMENT DATE DRIVEN Nov 15 1974

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.
49	1		49	26	79		81			76	
	2	5		27	110		82			77	
	3			28	109		83			78	
	4	5		29	155		84			79	
	5	9		30	179		85			80	
	6	20		31	201		86			81	
	7	21		32	211		87			82	
	8	23		33	217		88			83	
	9	19		34	223		89			84	
	10	20		35	241		90			85	
	11	20		36	248		91			86	
	12	18		37	250		92			87	
	13	15		38	259		93			88	
	14	16		39			94			89	
	15	16		40			95			90	
	16	16		41			96			91	
	17	16		42			97			92	
	18	19		43			98			93	
	19	18		44			99			94	
	20	19		45			100			95	
	21	18		46						96	
	22	25		47						97	
	23	37		48						98	
	24	49		49						99	
	25	56		50						100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	21	21	21	21	21	21
MEASURED REBOUND IN INCHES	1/4	1/4	1/4	1/4	1/4	1/4
FINAL LENGTH OF PILE	38.5			FINAL CUT OFF ELEVATION 1075.50		

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
ENGINEERING SERVICES BRANCH
MINISTRY OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED M.R. Lickers
NAME (PRINT) M. R. LICKERS
DATE Nov 15, 1974
ATTACH SKETCH OF PILE NUMBERING SYSTEM

TIPEL. 1037.0
OB-MT-285 3-74

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.



ENGINEERING SERVICES BRANCH
SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 3 CONTRACT NO. 74-60 STRUCTURE CHARTWELL RIVER BRIDGE NBL
CONTRACTOR BERMINGHAM DESIGN LOAD OF PILE 74 TONS 95 TON
HAMMER DETAILS: TYPE Bermingham B-225 WEIGHT 2250 HEIGHT OF FALL OR ENERGY 29000
TYPE OF ANVIL OR CAP Berm 225 WEIGHT OF ANVIL OR CAP 11000
PILE DETAILS HP 12X24 50' LONG VERTICAL NO SHOE
PILE NO. 3 LOCATION SOUTH ABUTMENT FOOTING DATE DRIVEN Nov 8, 1974

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.
50	1		50	26	45		81			76	
	2			27	51		82			77	
	3	12		28	64		83			78	
	4			29	43		84			79	
	5			30	30		85			80	
	6	2		31	25		86			81	
	7	3		32	27		87			82	
	8	5		33	31		88			83	
	9	6		34	32		89			84	
	10	7		35	38		90			85	
	11	12		36	50		91			86	
	12	15		37	53		92			87	
	13	16		38	70		93			88	
	14	19		39	86		94			89	
	15	22		40	112		95			90	
	16	24		41	118		96			91	
	17	23		42	165		97			92	
	18	22		43	218		98			93	
	19	22		44	241		99			94	
	20	21		45			100			95	
	21	17		46						96	
	22	18		47						97	
	23	22		48						98	
	24	28		49						99	
	25	35		50						100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	20	20	20	20	20	20
MEASURED REBOUND IN INCHES	3/8	3/8	3/8	3/8	3/8	3/8
FINAL LENGTH OF PILE	45'					FINAL CUT OFF ELEVATION 1079.00

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
1079.0
45.0
ENGINEERING SERVICES BRANCH
MINISTRY OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED M R Lickers
NAME (PRINT) M R LICKERS
DATE Nov 8, 1974
ATTACH SKETCH OF PILE NUMBERING SYSTEM

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.

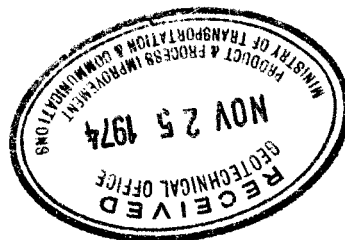
Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 $\frac{1}{2}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{1}{2}$ " x $\frac{1}{2}$ " steel plate shoe.

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.



SUMMARY OF PILE DRIVING RECORDS

W.O. 70-11081 W.P. 281-66-04 CONT. 74-60 DIST. 3

SITE CONESTOGA RIVER BRIDGE (NORTH BOUND LANE)

DATE DRIVEN SEP 16-17 & NOV. 8-15 / 74 WEIGHT OF ANVIL 1100 lb

HAMMER TYPE B-225 & B-400 ^{PISTON} WEIGHT 2850 lb ENERGY 29 000 FT/LB

46,000 lbs. (FOR PIERS* 1 & 2)

[illegible]