

G.I.-30 SEPT. 1976

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 40110-23

DIST. 3 REGION SOUTHWESTERN

W.P. No. 281-66-08

CONT. No. 76-56

W. O. No. _____

STR. SITE No: _____

HWY. No. 85N

LOCATION HWY. 85N OF S. JACOBS

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 10

REMARKS: DOCUMENTS TO BE UNFOLDED

BEFORE MICROFILMED



Ministry of
Transportation and
Communications

PRIORITY DEVELOPMENT BRANCH

PERSONAL & CONFIDENTIAL

PROGRAM STATUS REPORT

W. P. No. 281-66-080 DIST. 3 HWY. 85N TYPE OF WORK Str.
DESCRIPTION Rect. Walls & Headwall at West end of Mennonite Buggy Culvert N. of
City. Rd. 17.
PRESENT PROGRAM YEAR 1976 DATE INITIATED Jan. 22/76

The description and type of work of the above project has been revised as follows:

W. P. No.	Group No.	Type of Work	Description
281-66-080	281-66-02	S. D. Clv.	Special Design Mennonite Buggy Culvert North of Cty. Rd. 17

JG/DEW/me

10710-23
GEOCRES No.

REMARKS:

Cost Centre 4341

Where no date shown activity is N/A or complete.

PRE-CONTRACT ENGINEERING SCHEDULE

1. STATUS REPORT	21. STRUCT. QUANT'S COMPLETE	
2. ROUTE PLANNING STUDIES	22. STR. PLANS & D4 TO S.D.O.	V. S. A. P.
3. TRAFFIC ISSUED	23. N.W.P.A. APPL'N SUBM'D.	
4. PRE-DESIGN PHOTOGRAMMETRY	24. N.W.P.A. APPROVAL REC'D.	
5. DRAINAGE STUDY ISSUED	25. SOILS DESIGN REPORT	
6. DESIGN CRITERIA	26. 40' TO 1" PLANS ISSUED	
7. TITLE SEARCH REQUEST	27. CO-ORDINATED ALIGNMENT	
8. PRE-DESIGN REPORT	28. STRUCTURE SITE GEOMETRICS	
9. FINAL ALIGNMENT REQUEST	29. INTERSECTION DESIGN COMP.	
10. DESIGN X-SECTIONS REQ'T.	30. FINAL PROPERTY REQUEST	
11. DESIGN X-SECTIONS ISSUED	31. R.T.C. APPL'N SUBM'D.	
12. PLANS & PROF. TO S.D.O.	32. R.T.C. APPROVAL REC'D.	
13. PLANS & PROF. ISSUED	33. DESIGN SYNOPSIS REPORT	
14. E & G PLANS ISSUED	34. ILLUMINATION DESIGN COMP.	
15. ENG. & TITLE RECORDS	35. SYSTEMS DESIGN CONSULTS.	
16. FOUNDATION REPORT REQ'D.	36. PERCENT COMPLETE S.D.O.	
17. FOUNDATION REPORT ISSUED	37. STRUCT. DESIGN CONSULTS.	
18. STRUCT. PLANNING REPORT	38. PERCENT COMP. STR. DESIGN	May 31/76
19. PRELIM. STRUCTURE PLANS	39. DOCUMENTS IN SCRUTINY	
20. STRUCTURE DESIGN COMPLETE	40. PROPERTY CLEARANCE	

PROGRAM MANAGEMENT ENGINEER

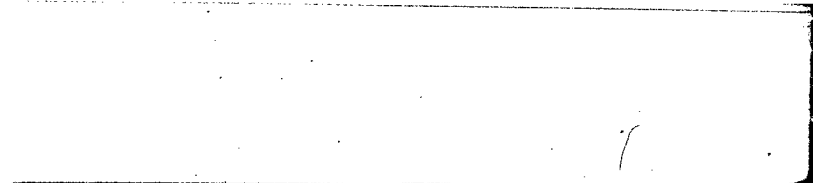
PROGRAM CONTROL ENGINEER

REGIONAL DIRECTOR

DATE

DATE

DATE



SPECIAL PROVISIONS

SPECIAL DESIGN MEMORITTE

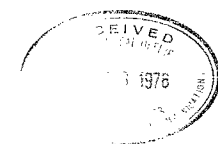
BOOBY CUMMERT

HIGHWAY 6850

DISTRICT #3

U.D. 201-66-08

40710-23
GEOGRAPH No.



NOTE TO REGIONAL PLANNING AND DESIGN OFFICE.

Add the following special provisions:

- (1) Special SP Granular A Backfill to Culvert (Item 3)
- (2) Special SP Steel Sheet Piling (Item 5)
- (3) Special SP Dead Man Anchorage (Item 6)

The following items are to be checked and/or completed by the Regional Planning and Design Office:

- (a) Earth Excavation required for placing Granular Backfill
- (b) Water for Compaction of Granular Backfill. (The approximate quantity of Granular Backfill is 750 cu.yd.)
- (c) Add Standard DD-806A & DD-813A
- (d) Supply and Place C.S. Pipe Subdrains (DD-74-29)

40P10-23 d.
SECRET. Rev.



PROPOSED SPECIAL PROVISION

No. 281-66-08 Contract No. District No. 3 Hwy. No. 851 Date Feb./76
 ation Type of work SPP Culvert

Initiated by (Give Names, Divisions, District & Jurisdictions, etc.)
 STRUCTURAL OFFICE.

(a) This S.P. is new (V) ☐
 This S.P. replaces No. in the Special Provisions Manual.
 This S.P. modifies the following Specification requirement:
 MTC Form 421B Section Page(s) Paragraph
 Remarks as follows:

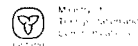
(b) Explanation of Intent
 To identify additional work and material included in this item.

Title and Text as follows:
 Specification No(s) 421B 435S Item No(s) 3
 TITLE GRANULAR "A" BACKFILL TO CULVERT.
 Subtitle

As part of the work to be performed at the contract price
 for the above tender item, the Contractor shall place and
 compact the granular "A" material inside the pipe culvert
 as shown on the contract drawings.

40210-03 3

Region Head Office
 Initialed by: N. Koltay Date Feb./76 Date
 Approved by: N. Stoyanoff Date Feb./76 Date



Sheet 1 of 1

PROPOSED SPECIAL PROVISION

No. 281-66-03 Contract No. District No. 3 Hwy. No. 85N Date Feb. 24/76
Location Regional Municipality of Waterloo Type of work SPP Culvert

Initiated by (Give Names, Divisions, District & Jurisdictions, etc.)

STRUCTURAL OFFICE:

(a) This S.P. is new (✓) ☐
This S.P. replaces No. in the Special Provisions Manual.
This S.P. modifies the following Specification requirement:
MTC Form 903 Section Page(s) Paragraph
Remarks as follows:

(b) Explanation of Intent

To identify the work and material included in the tender item.

Title and Text as follows:

Specification No(s) 903 Item No(s) 5

TITLE STEEL SHEET PILING

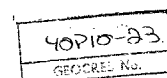
Subtitle

As part of the work to be performed at the contract price
for the above tender item, the Contractor shall;

(a) Supply and install rolled angles

(b) Supply and install unbalanced channels

all as shown on the contract drawings.

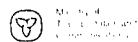


Region

Head Office

Initiated by: W. McFarlane Date Feb. /76

Date



Sheet 1 of 1

PROPOSED SPECIAL PROVISION

DESIGN DIVISION

No. 281-66-08 Contract No. District No. 3 Hwy. No. 85H Date Feb. 24/76
ation Regional Municipality of Waterloo Type of work SPP Culvert

Initiated by (Give Names, Divisions, District & Jurisdictions, etc.)

STRUCTURAL OFFICE.

(a) This S.P. is new. (✓) ☒ ☐
This S.P. replaces No. _____ in the Special Provisions Manual.
This S.P. modifies the following Specification requirement:
MTC Form _____ Section _____ Page(s) _____ Paragraph _____
Remarks as follows:

(b) Explanation of Intent

To outline work and material to be performed under this item.

Title and Text as follows:

Specification No(s) 435S Item No(s) 6

TITLE DEAD MAN ANCHORAGE

Subtitle

At the contract price for the above tender item, the Contractor shall supply all labour equipment and materials required to install the dead man and wire rope tie back system including any excavation and granular material inside the dead man pipe, all as shown on the contract drawings.

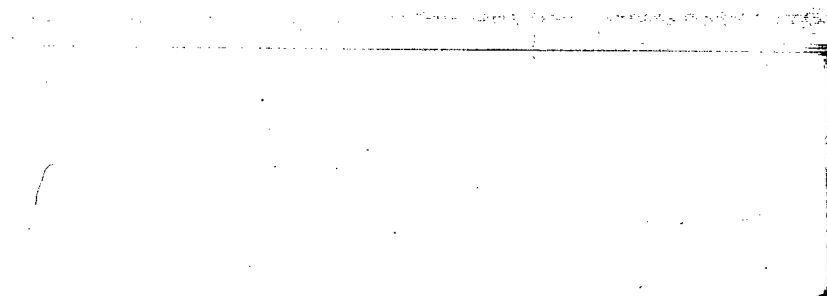
40P10-23

Region

Head Office

Initiated by: W. McFarlane Date Feb./76

Approved by: M. Zoltay Date Feb./76



MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

PROPOSED WORK

DISTRICT	D4
No. 3	No. _____

Contract No. _____ Project No. _____ W.P. No. 281-66-08 %Capital ☒ X
%Ordinary _____

District of Stratford Length _____ By ☒ Contract
Day Labour

Work of Special Design Mennonite Buggy Culvert

Location _____

Kings Hwy. No. 85N Development Rd. No. _____

Secondary Hwy. No. _____ Other Road Class _____

Township Woolwich Electoral District _____

PLAN NO.	STA	TO STA	PROF NO.	STA	TO STA
_____	_____	_____	_____	_____	_____

Bridge Drawing No. 33-316-1

Bridge Site No. 33-316 Soil Profile _____ Strip Map _____

ESTIMATED COST

Estimated Tender \$ _____

Estimated Material \$ _____

Estimated Engineering \$ _____

Estimated Sundry Const. \$ _____

Total Estimated Cost \$ _____

COST DISTRIBUTION

M.T.C. \$ _____ % 100

Other \$ _____ % _____

\$ _____ % _____

\$ _____ % _____

\$ _____ % _____

TYPE AND DATE
OF AGREEMENT 40P/10-23 6

SUBMITTED BY

M. Stogor
Structural Contract Engineer.

Date March 1/76

APPROVED

Construction Engineer _____
Manager, Contract Control _____
Maintenance Engineer _____
Municipal Engineer _____

Date _____

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

TENDER

CONTRACT NO. W.P. 281-66-08 Page 1 of 1

ITEM NO.	SPEC NO.	ITEM	UNIT	QUANTITY	UNIT PRICE	TOTAL
			BROUGHT FORWARD			
1	421B	Earth Excavation for Pipe Culvert	cu yd	620		
2	421B	SPP Culvert (13.5' dia.)	lf	106'-4"		
3	421B 435S SP	Granular 'A' Backfill to Culvert	lump sum			
4	903	Equipment for Driving Piles	lump sum			
5	903 SP	Steel Sheet Piling	sq ft	610		
6	435S SP	Dead Man Anchorage	lump sum			

40P10-23
673422 20

7

SUB-TOTAL

FORM OB-CC-53
JAN. 1965

DEPARTMENT OF HIGHWAYS ONTARIO

WP.281-66-08 Contract No. _____ District No. 3 Hwy. No. 85N Date _____

SUNDRY CONSTRUCTION

[illegible]

HEAD OFFICE REVIEW SUMMARY

BOARDROOMS E-1 and E-2
DOWNSVIEW M3M 1J8, Ontario
DATE: April 9, 1976

W.P. 281-66-02 CONTRACT 76-56 HIGHWAY 85 (New)

TYPE OF WORK Grading, Drainage, Granular Base and Hot Mix Paving

LOCATION Waterloo - Hwy 85N from 0.2 miles southeast of King Street N'ly 5.04

miles to existing Hwy 85 N of St. Jacobs.

DISTRICT 3 ADVERTISING DATE May 19, 1976

ATTENDANCE

J. B. Wilkes	F.G. Allen	W. Bennett	P. McWatt
J. R. Wear	J.E. Callaghan	J. Crannie	D. Mieh
E. J. Willis	G.A. Wrong	J. Davidson	W. Katarynczuk
T. Prokopec	R. Mepstead	R. S. Pillar	Penco
*W. McFarlane	W. Berkis		

POINTS OF DISCUSSION

1. The Committee asked if any agreement existed between the Menonites and MIC with regard to "Buggy" culvert and was told none existed so maintenance was nowhere defined although it was thought MIC would probably arrange something locally. The Region is requested to pursue legal status MIC and Menonites.
2. Mr. McFarlane opined that corrosion in pipe was no problem (No waterproofing felt necessary).
- * 3. Special Provision re: shutdown paving to be revised to delete mention of specific date - mention only shutdown for winter.

40910-23
GEOTRES No.

E. J. Willis
Supervisor
Contract Documentation

for:

J. R. Wear
Head
Contract Review Section

c.c. J. H. Blevins
A. Wittenberg
J. G. Forster
F. C. Brown
G.A. Sutherland
E. J. Willis
C. Grebski
P. McWatt

J. Heffernan
G. Wrong
C. Mirza
B. Giroux
J. Crannie
M. Stoyanoff
W.R. Bennett
R. S. Pillar
*D.M. Hopper



W.O. 281-66-08 HWY 85N N of S. Jacobs 40910-23
W.P. LOCATION GEOCRES NO.

• DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO: W.P. File CONTRACT 76-56

REMARKS _____

GEOCRES

INDEXING CARD FOR REPORTS NOT MICROFILMED

01-20 AUG 76

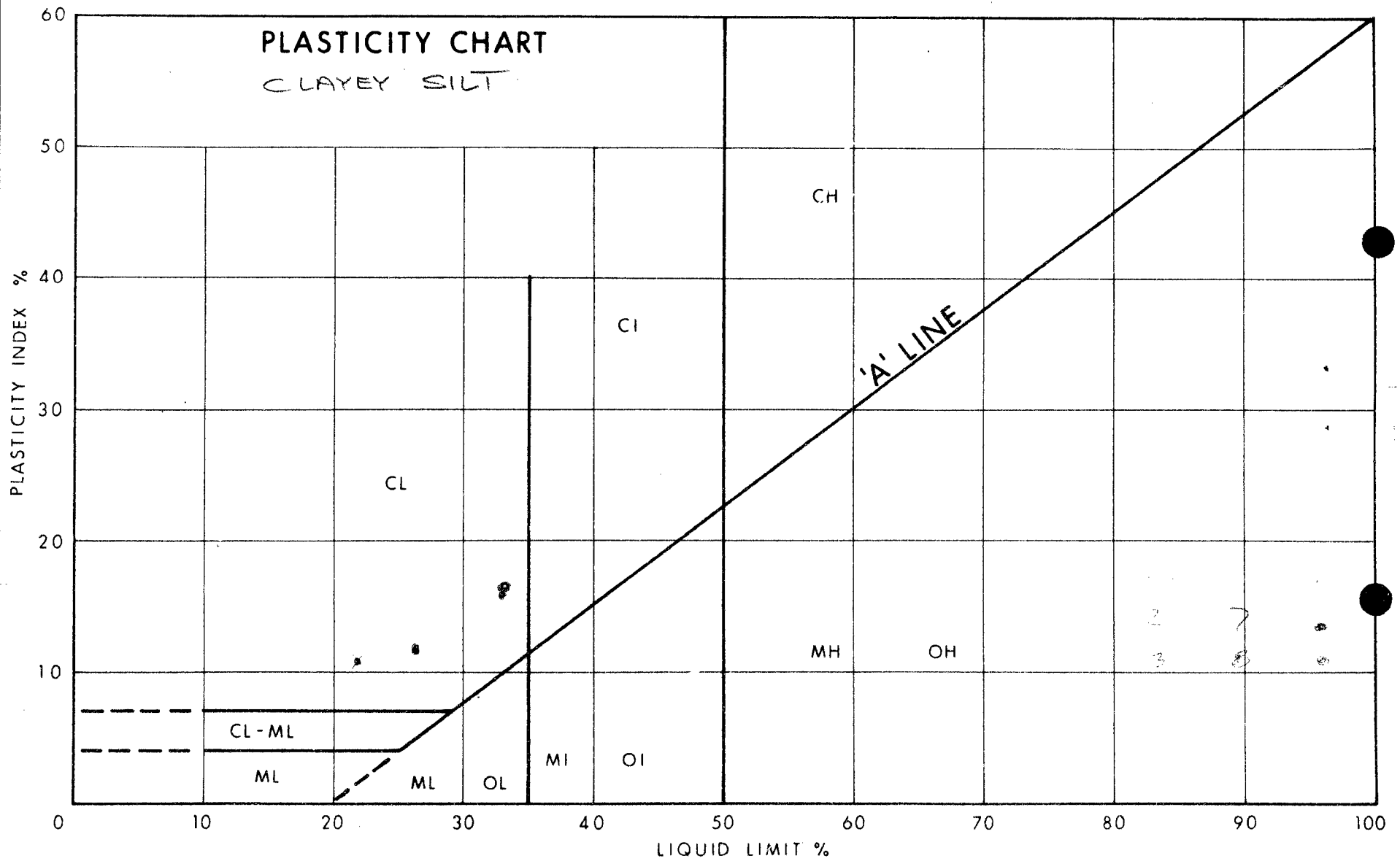


FIG. 2

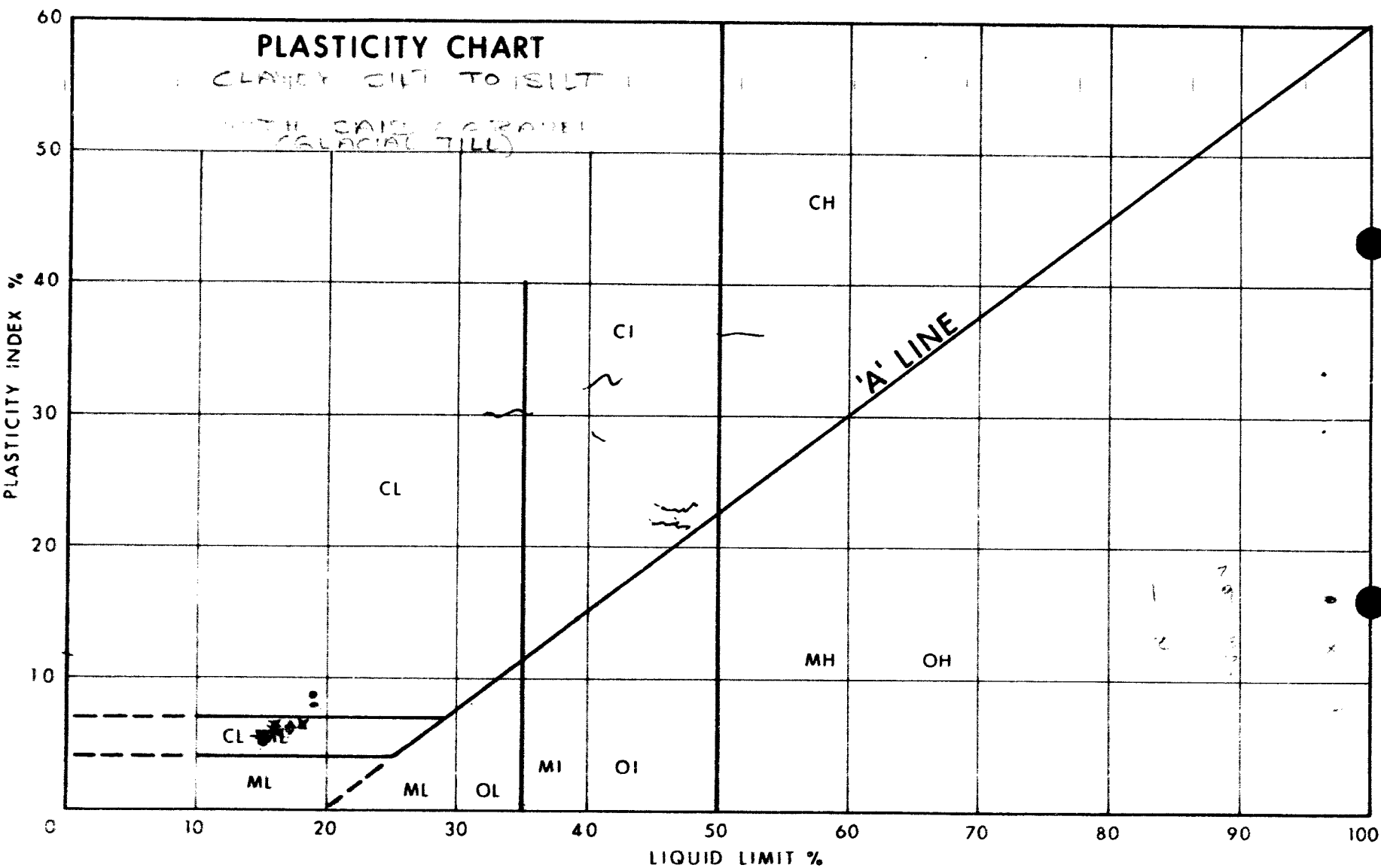


FIG.

3

W.O.

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT

SAND

GRAVEL

Fine

Medium

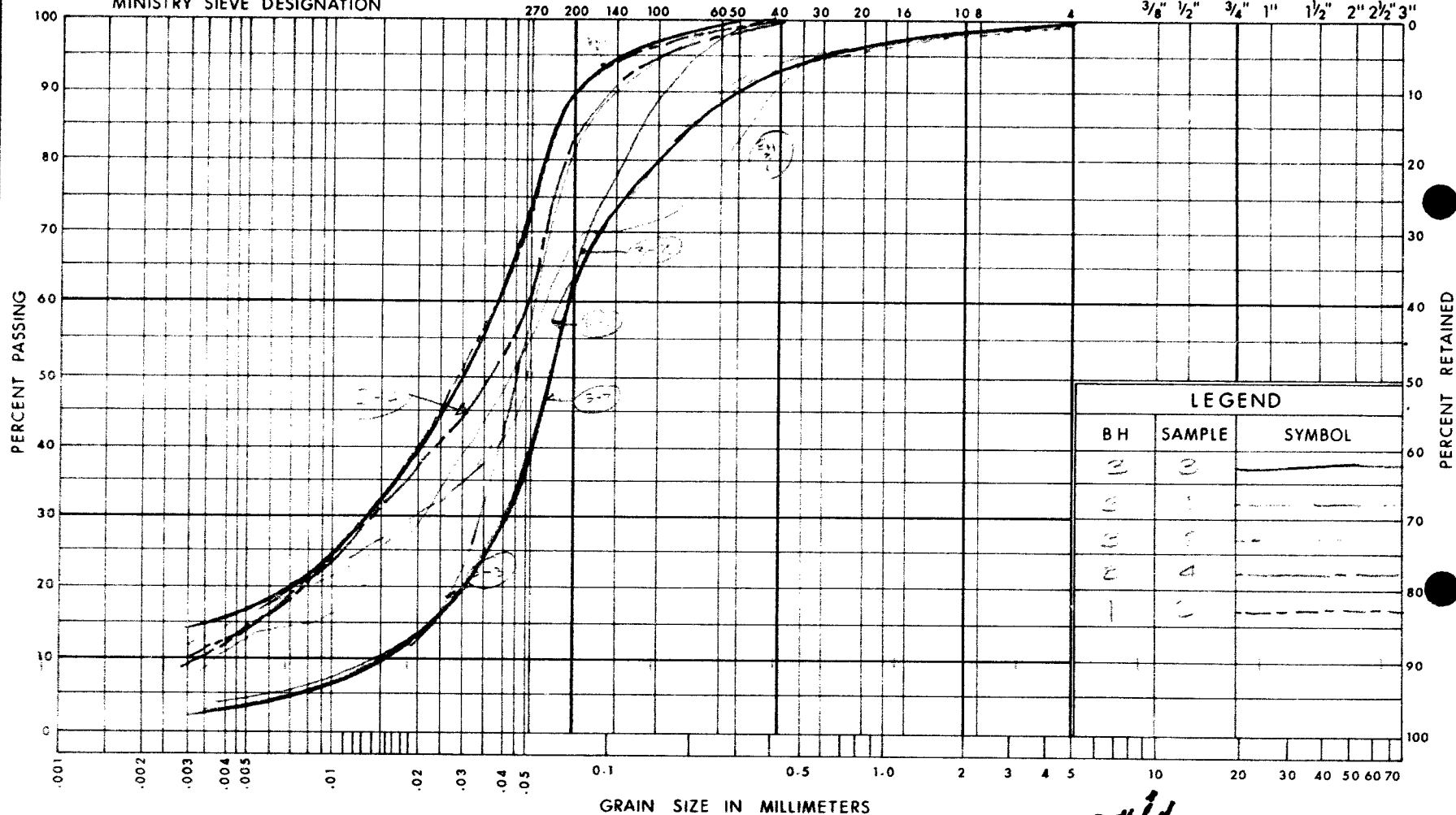
Coarse

Fine

Coarse

MINISTRY SIEVE DESIGNATION

270 200 140 100 60 50 40 30 20 16 10 8 4 3/8" 1/2" 3/4" 1" 1 1/2" 2" 2 1/2" 3"



Ministry of
Transportation and
Communications

ENGINEERING SERVICES BRANCH

GRAIN SIZE DISTRIBUTION

BRICK SILT
TRACE OF CLAY

FIG No 1

W P

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)

UTILITY COMPANY

TELEPHONE NO. FOR DEFINITE LOCATION

- 1 Please see the attached plans.

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 Mr. L. Heller (519) 664-2811
2 Please contact to inform the property owner before entering
3 the property.
4

WHO WILL OBTAIN NECESSARY PERMISSION? Soil Mechanics Section

HAS SITE BEEN SURVEYED & STAKED? YES ☒ NO ☐ IF YES, DATE OF MOST RECENT SURVEY November 1975

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) Municipal Drain No. 11, \pm 250'

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: Please contact Mr. Tom Jordan, Project Supervisor, for Contract 74-60
Tel. No. (519) 884-2740, for exact location of culvert and utilities.

DATE November 20, 1975

~~XXXXXXXXXXXXXXX~~ STRUCTURAL PLANNING ENGINEER - Mr. D. Tyagi

This report is based on information supplied by Reg'l Planning & Design Office.



Memorandum

To: Mr. K. G. Selby, Supvrg. Eng.
Soil Mechanics Section
Geotechnical Office
West Bldg., Downsview

From: Structural Planning Office
Southwestern Region

Attention:

Date: November 20, 1975

Our File Ref.

In Reply to

Subject: W.P. 281-66-08
Head Wall and Retaining Walls for Mennonite
Buggy Culvert
Highway 85N
District 3, Stratford 1975 Plan 7V.

The work project 281-66-02, GB.P., Waterloo - from 0.4 mi. north of King St. North, northerly, includes the construction of a Mennonite buggy culvert crossing Highway 85N at Station 854 + 24 (Stage 1).

Due to the insufficient distance between Highway 85N and existing Highway 85 at the culvert location, a head wall and retaining walls are required on the western end of the culvert. The proposed culvert is a 13'-6" Ø C.S.P. The maximum height of the retaining wall will be approximately 16'.

Would you kindly arrange to have a foundation investigation carried out for the above noted head wall and retaining walls. Please also comment if you foresee any problems in installing the culvert at this site.

Attached please find a plan showing location of retaining walls and head wall in red. Attached also is a Field Reconnaissance Report and two plans showing utilities in the area. For exact location of culvert and utilities please contact Mr. Tom Jordan, Project Supervisor, at field office for contract No. 74-60, Tel. No. (519) 884-2740.

D. Tyagi

D. Tyagi
Structural Planning Engineer

DT:sm
Enc.

cc A. Crowley





Memorandum

To: Mr. K. G. Selby, Supvrg. Eng.
Soil Mechanics Section
Geotechnical Office
West Bldg., Downsview

From: Structural Planning Office
Southwestern Region

Attention:

Date: November 20, 1975

Our File Ref.

In Reply to

Subject: W.P. 281-66-08
Head Wall and Retaining Walls for Mennonite
Buggy Culvert
Highway 85N
District 3, Stratford *1976 Proj JV.*

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D. Tyagi

D. Tyagi
Structural Planning Engineer

DT:sm
Enc.

cc A. Crowley



Soil Mechanics Section
Geotechnical Office
West Bldg.
1201 Wilson Ave.
Downsview, Ontario
M3M 1J6

Tel: (416) 248-3282

January 19, 1976

Atcost Soil Drilling
2160 Highway 7
Concord, Ontario
L4K 1b6


Dear Sirs:

This letter confirms our request by telephone of January 14, 1976 for the supply of a Type II Auger, M.V. mounted, n.S. (item no. 5-2 (I)), together with all necessary equipment, as per your Tender for Supply Contract S-75-1922 at St. Jacobs on Monday January 19, 1976.

Mobilization will be from Concord, Ontario.

Our Project number is W.P. 261-06-08.

Yours truly,



K.G. Selby
Supervising Engineer

KGS/bp

cc: W.W. Fry
(Attn: V. Di Marco)
Files ✓
Record Services

FORM BC 5-3

BORING CONTRACTORS - COMPARATIVE COSTS

SUPPLY CONTRACT # 5-75-1922
PERIOD FROM NOV. 1ST 1975 TO APR. 30TH 1976DRILL ITEM NO. 5.2(I)START DATE JAN. 19/76ESTIMATED DRILLING FOOTAGE 150'W. P. 281-66-02UNIT REQUIRED H.S. 3 1/4" M.V.SITE 281-66-02ESTIMATED FEET PER HOUR 5'W. O. CONT. 74-60ESTIMATED TOTAL HOURS 30 hrRAFT REQUIRED YES ☐ NO ☒

CONTRACTOR	EQUIPMENT DESCRIPTION AND RATES										MOBILIZATION RATES			MOBILIZATION POINTS	MILES ONE WAY	MOB. COST	DRILLING COST	OTHER COST	TOT COS
	5.2(A) S.A. TRAIL	5.2(B) S.A. TRUCK	5.2(C) S.A. M.V.	5.2(D) H.S. 2 1/4" TRAIL	5.2(E) H.S. 2 1/4" TRUCK	5.2(F) H.S. 2 1/4" M.V.	5.2(G) H.S. 3 1/4" TRAIL	5.2(H) H.S. 3 1/4" TRUCK	5.2(I) H.S. 3 1/4" M.V.		6.2(A) TRAIL	6.2(B) TRUCK	6.2(C) M.V.						
ATCOST	30.00	30.00	35.00	33.00	33.00	38.00	33.00	33.00	38.00		1.25	1.20	1.40	CONCORD, BELLEVILLE, LONDON & NORTH BAY.	70	136.00	1140.00		1336.00
LONGYEAR	34.00	34.00	37.00	36.50	36.50	39.50	36.50	36.50	39.50		1.35	1.35	1.65	REXDALE Within 30 miles					
	36.50	36.50	39.50	39.00	39.00	42.00	39.00	39.00	42.00		1.35	1.35	1.65	TORONTO, NORTH BAY, LONDON, SUDBURY.	75	247.50	1260.00		1507.50
DODDS	45.00	45.00	59.00	45.00	45.00	59.00	45.00	45.00	59.00		1.50	1.50	1.50	TORONTO, THUNDER BAY	75	225.00	1770.00		1995.00
	Plus \$1.00/mile motel to jobsite or \$22/hour travelling time in client's vehicle if provided																		
DOMINION SOIL	50.00	50.00	50.00	--	--	--	50.00	50.00	50.00		1.50	1.50	1.50	TORONTO, KITCHENER, LONDON, WINDSOR, THUNDER BAY, SARNIA, NORTH BAY, OTTAWA	12	36.00	1500.00		1536.00
	Plus \$1.50/mile motel to jobsite return daily Thunder Bay, North Bay, Ottawa only																		
HAWTHORNE	--	--	39.50	--	--	--	--	--	39.50		--	--	2.00	OTTAWA					
JOHNSTON	30.00	30.00	35.00	33.00	33.00	38.00	33.00	33.00	38.00		1.00	1.00	1.25	OTTAWA, TORONTO Within 30 miles					
	32.50	32.50	37.50	35.50	35.50	40.50	35.50	35.50	40.50		1.00	1.00	1.25	OTTAWA, TORONTO Outside 30 miles	75	187.50	1215.00		1402.50
MOSTER	30.50	30.50	36.00	34.00	34.00	39.50	34.00	34.00	39.50		1.25	1.25	1.50	OTTAWA, TORONTO, NORTH BAY, LONDON.	75	225.00	1185.00		1410.00
P. K.	--	--	--	--	--	40.00	--	--	--		--	--	2.00	TORONTO, LONDON, BURFORD.					
SUBSOIL EXPL.	--	35.00	35.00	--	40.00	40.00	--	40.00	40.00		--	1.00	1.25	PETERBOROUGH, TORONTO	75	187.50	1200.00		1387.50
SITE INV. SERV.	--	35.00	37.50	--	37.50	40.00	--	37.50	40.00		--	1.00	1.50	PETERBOROUGH, ORILLIA, PORTHOPE, LONDON, BELLEVILLE, OSHAWA, BRAMPTON.	60	180.00	1200.00		1380.00

ASSIGNED TO ATCOST (CONCORD)

GIVE REASON IF OTHER THAN LOWEST COST CONTRACTOR ABLE TO SUPPLY EQUIPMENT ON

REQUIRED DATE DATE JAN. 12/76

SIGNATURE OF SUPERVISING ENGINEER

Robert Van O...REMARKS

FIELD INVESTIGATION REPORT

W.O. NO. _____ W.P. NO. 281-66-08 DATES FROM JAN 12/76 TO JAN 21/76
LOCATION HWY #85 & BARRY CULVERT ST. JACOBS ONT. ENGINEER R. VAN VEEN
DRILLING CO. ATCOST SOIL DRILLING INC. DRILLER M. RAICEVIC
TYPE OF DRILL _____

- (A) NO. OF BOREHOLES ----- 3
(B) NO. OF CONE TESTS ----- 2
(C) TOTAL DRILLING HOURS (INCLUDING MOVING, SETTING UP, LOADING & UNLOADING.) ----- 22
(D) TOTAL STANDBY HOURS ----- —
EXPLANATION FOR STANDBY _____
(E) TOTAL BREAKDOWN HOURS ----- —
EXPLANATION FOR BREAKDOWN _____
(F) TOTAL FOOTAGE OF DRILLING (EXCLUDING CONE TESTS) ----- 113.0
(G) TOTAL FOOTAGE OF CONE TESTS ----- 40.0
(H) TOTAL SAMPLES TAKEN: 1. SPLIT SPOON 33 2. SHELBY TUBES _____
3. ROCK CORES NO. _____ FEET _____ 4. OTHERS _____
(J) TOTAL NO. OF VANE TESTS PERFORMED ----- —
(K) TOTAL NO. OF PIEZOMETERS INSTALLED ----- 1. NORWEGIAN ----- —
2. CASAGRANDE ----- —

DRILLING FEET PER HOUR (F/C) ----- 5.1

COMMENTS

THE EQUIPMENT USED ON THE JOB WAS SATISFACTORY - NO
BREAKDOWNS OR DELAYS DUE TO EQUIPMENT MALFUNCTION.
THE DRILLER, MIKE RAICEVIC, WAS KNOWLEDGEABLE AND
PLEASING BUT REQUIRED CONSTANT SUPERVISION TO ENSURE
SATISFACTORY SAMPLING
THE HELPER, HOWEVER, WAS LACKING IN INITIATIVE AND
IN MY OPINION WAS EXTREMELY LAZY. THE DRILLER WAS
FORCED TO PERFORM SOME HELPER DUTIES

NOTE: TO BE COMPLETED AS SOON AS POSSIBLE AFTER THE JOB IS FINISHED, AND SEND TO
THE PRINCIPAL FOUNDATION ENGINEER D.H.O.
IF MORE DRILLS ARE USED PLEASE COMPLETE SEPARATE FORM FOR EACH MACHINE.

PROPERTY DAMAGE REPORT

W.P. 281-66-08

REGION: Southwestern Region

DATE: January 20, 21/76

IDENTIFICATION OF:

☐

OWNER

☐

TENANT

NAME: LORNE HELLER, 664-2811

POST OFFICE ADDRESS: Rural Hardware, R.R. #2, Elmira

LOCATION:

DISTRICT

HIGHWAY

3

85N.

TOWNSHIP, LOT AND CONCESSION ETC.

Township of Woolwich, Lot 36, Concession - German Company Tract

DETAIL OF DAMAGE:

DATE DAMAGE DONE:

TYPE(S) OF DAMAGE: (CROP, TREES, FENCES, LAWNS, FLOWER BEDS, ORNAMENTAL PLANTINGS ETC.)

- one borehole at Sta. 854+24 35' rt.
area = 5' x 5' = 25 sq. ft. (hole refilled)
- removed and replaced securely sections of gate and electric fence
- cut fence at Sta. 854+20 15' lt. for access and repaired same with wire

DETAILED DESCRIPTION OF EACH TYPE OF DAMAGE: (USE ADDED SHEETS IF REQUIRED)

PROPERTY REQUEST _____

PARTY CHIEF _____

WORK ORDER _____

SECTION _____

PROPERTY DAMAGE REPORT

W.P. 281-66-08

REGION: Southwestern Region

DATE: January 20, 21/76

IDENTIFICATION OF:

☐

OWNER

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TENANT

NAME: LORNE HELLER, 664-2811

POST OFFICE ADDRESS: Rural Hardware, R.R. #2, Elmira

LOCATION:

DISTRICT
3

HIGHWAY
85N.

TOWNSHIP, LOT AND CONCESSION ETC.

Township of Woolwich, Lot 36, Concession - German Company Tract

DETAIL OF DAMAGE:

DATE DAMAGE DONE:

TYPE(S) OF DAMAGE: (CROP, TREES, FENCES, LAWNS, FLOWER BEDS, ORNAMENTAL PLANTINGS ETC.)

- one borehole at Sta. 854+24 35' rt.
area = 5' x 5' = 25 sq. ft. (hole refilled)
- removed and replaced securely sections of gate and electric fence
- cut fence at Sta. 854+20 15' lt. for access and repaired same with wire

DETAILED DESCRIPTION OF EACH TYPE OF DAMAGE: (USE ADDED SHEETS IF REQUIRED)

PROPERTY REQUEST

PARTY CHIEF

WORK ORDER

SECTION

Oversized Drawings

Program Status Report.

Mr. A.P. Watt
Regional Structural
Planning Engineer
Southwestern Region, London

Soil Mechanics Section
Geotechnical Office
West Building, Downsview

February 3, 1976

Foundation Investigation For
Head Wall and Retaining Walls For
Mennonite Buggy Culvert
Hwy. 85N, Twp. of Woolwich
District 3, Stratford
W.P. 281-66-08

This memo is in reply to a request from D. Tyagi, Structural Planning Engineer, Southwestern Region, to carry out a foundation investigation on Site W.P. 281-66-08. This work project involves the construction of a mennonite buggy culvert, including a head wall and retaining walls, crossing Hwy. 85N at Sta. 854+24.

The foundation investigation was performed on January 19 to January 21, 1976. Due to the urgency of the investigation, the summarized results and recommendations are forwarded for your information in order to permit design work to proceed without delay.

1. SUBSURFACE CONDITIONS

Due to the adverse weather conditions and the close proximity of the existing Hwy. 85 to the proposed site it was not possible to bore more than one hole at the retaining wall location. Thus, one borehole was located at Sta. 854+24, offset 35' to the right, another at Sta. 854+24, offset 25' to the left, the last one at Sta. 854+00, offset 53' to the left. Based on these three boreholes and two additional cone penetration tests, the following soil conditions exist.

(a) 0.0 - 2.0 ft. (elev. 1125' - 1123')

This zone consists of a highly organic and fertile top soil considerably disturbed by frost penetration. This material undoubtedly will be excavated before any base will be placed. The third borehole, through the existing road bed, contains a granular fill material to an approximate depth of 5 ft. (elev. 1122').

(b) 2.0 - 17.0 ft. (elev. 1123' - 1106')

This predominant zone consists of a silty fine sand to a combination of fine to medium sand. This material exhibits a relative density of compact to dense indicated by 'N' values between 20 and 35.

cont'd....

(c) 17.0 - 20.0 ft. (elev. 1106' - 1103')

This layer consists of a silty clay with intermittent seams of silt and a trace of gravel. The consistency of this material is from very stiff to hard.

(d) 20.0 - 35.0 ft. (elev. 1103' - 1088')

This stratum of glacial till deposit consists of a hard dessicated clayey silt with traces of sand and gravel. This material has a very high consistency indicated by 'N' values between 136 blows/ft. and 170 blows/5". On this basis this stratum may be utilized as a sound, competent bearing surface if piles are considered.

(e) 735.0 ft. (elev. 1088')

Finally two boreholes indicated a deposit of very dense sandy silt to silty fine sand with a trace of coarse sand and gravel.

2. GROUNDWATER

Measurements taken in all three boreholes after a short duration indicated that the water table was located at approximately 2.0 ft. below original ground (elev. 1123.0). It must be noted, however, that the groundwater may rise to a higher elevation following periods of heavy rain.

3. DISCUSSION AND RECOMMENDATIONS

(3.1) Corrugated Steel Pipe

It is proposed to construct a 13.5' dia. multi-plate pipe 108 ft. long. At this site, the invert elevation at the west end will be 1119.83' with the east invert elevation being 1118.20'. In addition, approximately 2.5 ft. of granular 'A' base material will be placed inside the buggy culvert as a running surface.

The proposed culvert should be constructed according to M.T.C. standard DD-808-A (Type 2A). A minimum of 12 inches of granular 'A' should be placed below the invert: the remainder of the bedding should consist of granular 'B'.

Excavation for the culvert and bedding will be carried out below the ground water level. Subsoil consists of fine grained granular material which is likely to 'boil' under conditions of unbalanced hydrostatic head. A dewatering scheme will be required in order to prevent this occurrence.

(3.2) Retaining Wall - Head Wall

It is proposed to construct two concrete retaining walls at an approximate length of 26+' each with a maximum height of 16 ft.

cont'd....

from finished ground level. The proposed footing elevation will be 4 ft. below finished ground level at approximately 1118'. This is a zone of silty fine sand to a combination of fine to medium sand.

Three alternative methods of construction are suggested as follows:

(a) Spread footings may be founded as specified above and as previously discussed in 3.4.5, a dewatering scheme will be required. It is estimated that the bearing material at elev. 1118' will provide a net safe bearing capacity of 1 tsf. This is based on a maximum 1" settlement occurring immediately upon application of loads.

{ On the basis of an assumed angle of internal friction of 27° , the coefficient of friction against sliding due to lateral earth pressure will be $\tan 27^\circ = .5095$.

{ Active pressure may be computed assuming a coefficient $K_A = 0.33$.

(b) The second alternative would be to construct the footings as in 3.4.2 (a) but within a cofferdam of interlocking steel sheet piles driven to elevation 1106'. By leaving the steel sheet piles in place below top of footing level, it is estimated that a safe bearing capacity of 4 tsf. could be used for design purposes. This method will simplify dewatering operations.

(c) As a further alternative, the walls may be supported on 17 ft. long No. 14 treated timber piles driven to approximate elevation 1102.0'. A design capacity of 25 tons/pile should be achieved at this tip elevation.

(d) Consideration should be given to constructing sheet pile retaining walls as an alternative to the concrete walls as the former might be much less expensive and will be relatively simple to construct. Passive pressure may be computed assuming a coefficient $K_p = 3.0$. Active pressure will be as for the concrete wall. No driving problems are anticipated.

All retaining wall footings should be constructed prior to the installation of the corrugated steel pipe. All footings or pile caps should have 4 ft. of cover for frost protection.

This memo will be followed by a complete soils investigation report. We trust that the information provided in this report will be sufficient for your design purposes.

R. Van Veen
Project Engineer

For: K.G. Selby
Supervising Engineer

cc: J. Kean J. Anderson Files
A. Wittenberg A. Crowley Record Services

Oversized Drawings: -

Special Provisions

Special Design Mennonite

Buggy Cult.

8 pages. -



Memorandum

40 P10-23
GEOCRES No.

To: A.P. Watt (2)
Regional Structural Planning Engineer
Southwestern Region, London

From: Soil Mechanics Section
Geotechnical Office
West Building, Downsview

Attention:

Date: March 1, 1976

Our File Ref. W.P. 281-66-08

In Reply to

MAR 03 1976

Subject:

FOUNDATION INVESTIGATION REPORT

W.P. 281-66-08
Hwy. 85N, District 3, Stratford
Head Wall & Retaining Walls For
Mennonite Buggy Culvert

Attached we are forwarding to you our detailed Foundation Investigation Report on the subsoil conditions existing at the above mentioned site.

We believe that the factual data and recommendations contained therein will prove adequate for your requirements. Should additional information be required, please do not hesitate to contact our Office.

K.G. Selby

K.G. SELBY
Supervising Engineer

cc: R.S. Pillar
C.S. Grebski
B.J. Giroux
G.A. Wrong
A. Wittenberg
J.R. Roy
F.C. Brown

R. Hore
J. Anderson)
A. Crowley) memo only
G. Sloan)

Files
Record Services

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FOUNDATION INVESTIGATION REPORT

for

W.P. 281-66-08
Hwy. 85N, District 3, Stratford
Head Wall & Retaining Walls For
Mennonite Buggy Culvert

1. INTRODUCTION

This report is to provide information for the design and construction of a mennonite buggy culvert, including a head wall and adjoining retaining walls, crossing Hwy. 85N at Sta. 854+24

The subsoil information is based on three sampled boreholes. Two dynamic cone penetration tests were also carried out adjacent to two boreholes.

2. SITE DESCRIPTION

The proposed site is in the Township of Woolwich approximately 0.8 miles north of the bridge in the town of St. Jacobs on Hwy. 85N.

3. SUBSURFACE CONDITIONS

Based on the samples obtained, it would appear that in general this immediate area is characterized by a deposit of clayey silt to silt with sand and gravel overlain by a stratum of sandy silt, trace of clay. These two predominant layers are separated by a 2 ft. to 3 ft. layer of clayey silt.

(3.1) Topsoil and Fill Material

Approximately 1 ft. to 2 ft. of highly organic and fertile topsoil is considerably disturbed due to frost action. Borehole No. 3, through the existing road bed, contains a very dense granular fill material to an approximate depth of 5 ft. (elev. 1124').

(3.2) Sandy Silt, Trace of Clay

This predominant zone consists of a sandy silt, trace of clay type of soil as shown in Fig. 1. This material exhibits a relative density of compact to dense indicated by 'N' values between 20 and 35 blows/ft. Samples obtained from B.H. #1, however, indicated a deposit of dense to very dense sand with silt, trace of clay from elev. 1116' to elev. 1108'.

(3.3) Clayey Silt

This is a layer of slightly plastic clayey silt indicated by points plotted on the plasticity chart in Fig. 2 with some intermittent seams of silt. The consistency of this material is from very stiff to hard.

(3.4) Clayey Silt to Silt

This stratum predominates to the bottom of all boreholes (elev. 1085'+). It consists of a glacial till deposit of clayey silt to silt with sand and gravel exhibiting a hard consistency indicated by 'N' values, between 136 blows/ft. and 170 blows/5". In this respect, this stratum may be utilized as a sound, competent bearing surface if piles are to be considered.

4. GROUNDWATER

Measurements taken in all three boreholes after a short duration indicated that the ground water table was located at approximately 2.0 ft. below original ground (elev. 1123.0). It must be noted, however, that the ground water may rise to a higher elevation following periods of heavy rain.

5. DISCUSSION AND RECOMMENDATIONS

(5.1) Discussion

It is proposed to construct a 13.5' diameter multi-plate pipe 106 ft. long at this site to facilitate local residents in crossing Hwy. 85N with horses and buggies.

Due to the limited distance between the revised twp. rd. 24 and the new Hwy. 85N, two retaining walls and a head wall will be required to retain the slope.

(5.2) Corrugated Steel Pipe

The multi-plate pipe, once in place, will have a west invert elevation of 1119.83' and an east invert elevation of 1118.20'. In addition, approximately 2.5 ft. of granular 'A' base material will be placed inside the buggy culvert as a riding surface.

The proposed culvert should be constructed according to MTC standard DD-808-A(type 2A). A minimum of 12 inches of granular 'A' should be placed below the invert: the remainder of the bedding should consist of granular 'B'.

Excavation for the culvert and bedding will be carried out below the observed ground water level. The subsoil consists of granular material which is likely to 'boil' under conditions of unbalanced hydrostatic head. A dewatering scheme will be required in order to prevent this occurrence.

(5.3) Retaining Wall-Head Wall

It is proposed to construct two concrete retaining walls at an approximate length of 26'± each with a maximum height of 16 ft. from finished ground level. The proposed footing elevation will be 4 ft. below finished ground level at an approximate elevation of 1118'±, within a zone of sandy silt, trace of clay.

Four alternative methods of construction are suggested as follows:

- (a) Spread footings may be founded as specified above and as previously discussed in 5.2, a dewatering scheme will be required. It is estimated that the bearing material elev. 1118± will provide a net safe bearing capacity of 1 tsf. This is based on a maximum 1" settlement occurring immediately upon application of loads.
- (b) The second alternative would be to construct the footings as in 5.3 (a) but within a cofferdam of interlocking steel sheet piles driven to elevation 1106±. By leaving the steel sheet piles in place below top of footing level, it is estimated that a safe bearing capacity of 4 tsf. could be used for design purposes. This method will simplify dewatering operations.

- (c) As a further alternative, the walls may be supported on 17 ft. long No. 14 treated timber piles driven to approximate elevation 1102 \pm . A design capacity of 25 tons/pile should be achieved at this tip elevation.
- (d) Consideration should be given to constructing sheet pile retaining walls as an alternative to the concrete walls as the former might be much less expensive and will be relatively simple to construct. No driving problems are anticipated.

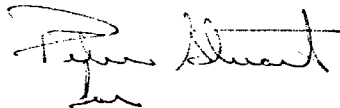
(5.4) General

On the basis of an assumed angle of internal friction of 27°, the coefficient of friction against sliding due to lateral earth pressure will be $\tan 27^\circ = .5095$.

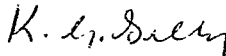
Active pressure for the two alternative retaining walls may be computed assuming a coefficient $K_A = 0.33$. In addition, passive pressure may be computed assuming a coefficient $K_P = 3.0$.

All retaining wall footings should be constructed prior to the installation of the corrugated steel pipe.

All spread footings or pile caps should have 4 ft. of cover for frost protection.



R. VAN VEEN
Project Engineer



K.G. SELBY
Supervising Engineer

February, 1976

APPENDIX

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 1

WP 281-66-08 LOCATION Sta. 854 + 24 o/s 35' Rt. 8 Hwy. 85N
DIST 3 HWY 85N BORING DATE January 19, 1976
DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger
ORIGINATED BY B.VV
COMPILED BY BVV
CHECKED BY CP

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		25	50	75	100	125	w_p	w	w_L		
1125.3	Ground Level															GR SA SI CL
0.0	Sandy silt, trace of clay.		1	SS	17											0 10 82 8
	Compact to Dense		2	SS	24	1120										
1115.8			3	SS	33											0 62 (38)
9.5	Sand, fine to medium with silt, trace of clay.		4	SS	33											
	Dense to Very Dense		5	SS	90	1110										
1107.3			6	SS	67											
18.0	Clayey silt, trace of gravel		7	SS	183											6 31 53 10
19.5	Clayey silt to silt with sand & gravel		8	SS	175/10	1100										
	Grey Hard (Glacial Till)		9	SS	189/9	1094.0										
31.3	End of Borehole															

20
15 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 2

WP 281-66-08

LOCATION Sta. 854 + 24 o/s 25' Lt. of Hwy. 85N

ORIGINATED BY BVV


DIST 3 HWY 85N

BORING DATE January 21, 1976

COMPILED BY BVV

DATUM Geodetic

BOREHOLE TYPE Hollow Stem Auger

CHECKED BY 

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		25	50	75	100	125	w_p	w	w_L		
1124.9	Ground Level															
0.0	Sandy silt, trace of clay		1	SS	16											0 31 68 1
	Compact		2	SS	24											
	Brown		3	SS	21											
			4	SS	20											
1109.4			5	SS	21											
15.5	Clayey silt.		6	SS	42											
1105.9	Grey Hard		7	SS	52											
19.0	Clayey silt to silt with sand & gravel		8	SS	150/7"											0 35 60 5
	Hard		9	SS	181/10"											
	Grey to Greyish Brown		10	SS	135/6"											
	(glacial till)		11	SS	170/5"											
1083.9			12	SS	140/6"											7 32 50 11
41.0	End of Borehole															

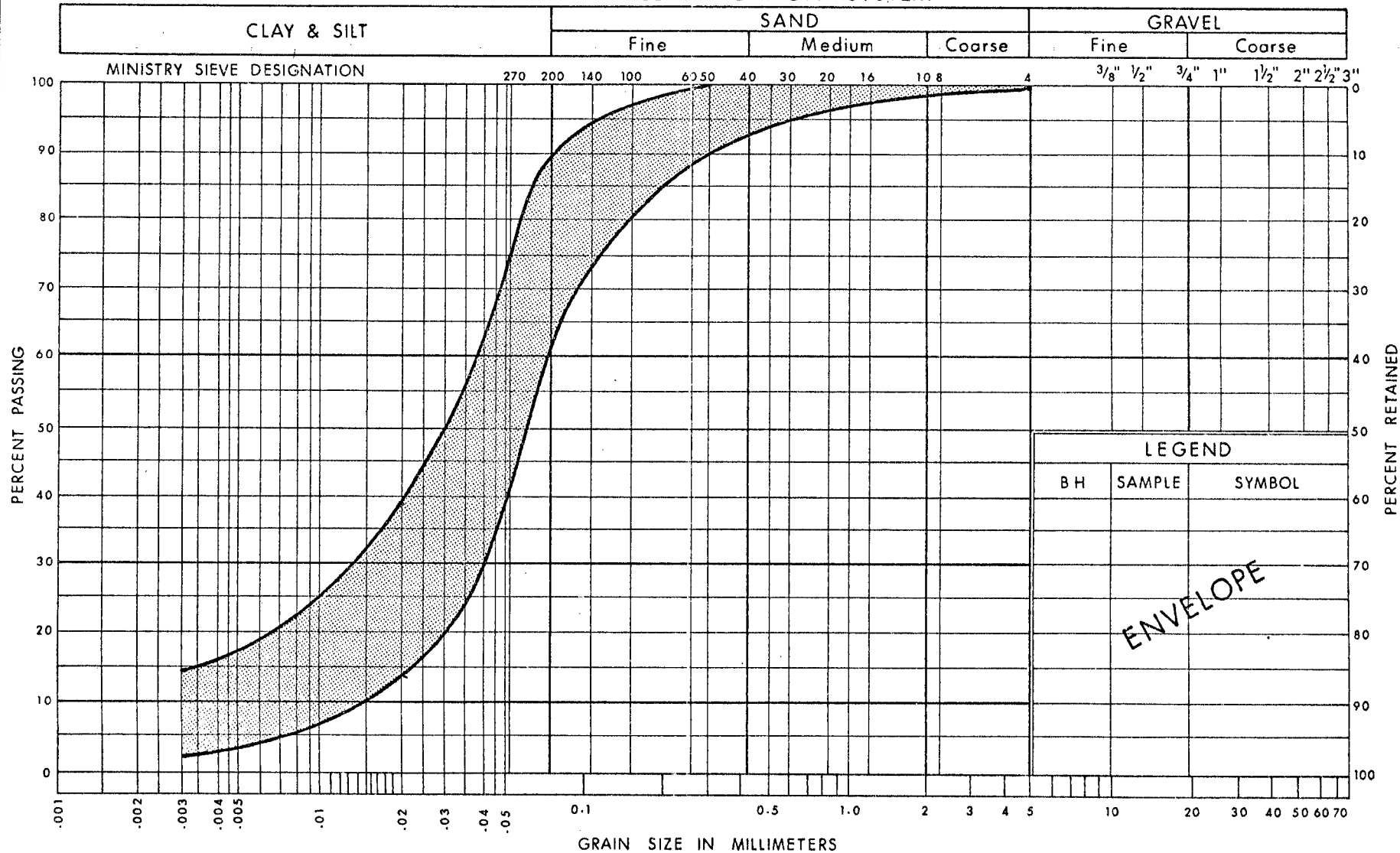
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

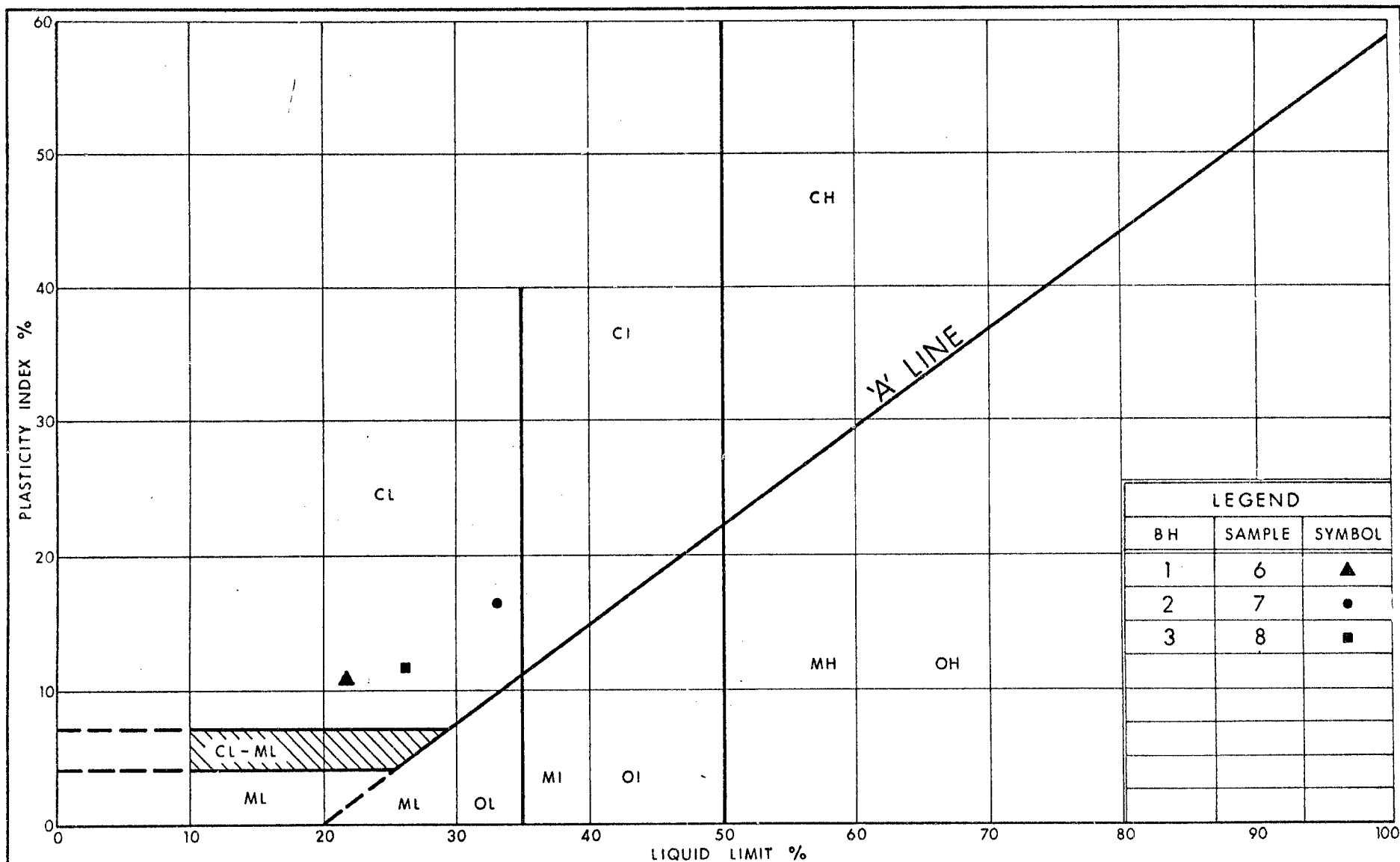
RECORD OF BOREHOLE NO 3

WP 281-66-08 LOCATION Sta. 854 + 00 o/s 53' Lt. 0 Hwy. 85N ORIGINATED BY BVV
DIST 3 HWY 85N BORING DATE January 30, 1976 COMPILED BY BVV
DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger CHECKED BY CP

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p	w	w_L		
1128.9	Ground Level															
0.0	Fill Material															
1123.9	Sand and gravel															
	Very Dense Brown															
5.0			1	SS	29											
	Sandy silt, trace of		2	SS	19	1120										0 37 55 8
	clay		3	SS	23											0 36 52 12
			4	SS	26											0 19 78 3
	Compact to Dense		5	SS	25											
	Brown		6	SS	14	1110										
1106.4			7	SS	32											0 35 62 3
22.5	Clayey silt.V. Stiff		8	SS	25											
	Grey															
24.5	Clayey silt to silt		9	SS	67											15 23 48 14
	with sand & gravel															
	Hard Grey		10	SS	136	1100										
	(glacial till)		11	SS	2007	6"										4 29 43 24
1188.4			12	SS	1577	6"										9 32 49 10
40.5	End of Borehole															

UNIFIED SOIL CLASSIFICATION SYSTEM





Ministry of
Transportation and
Communications

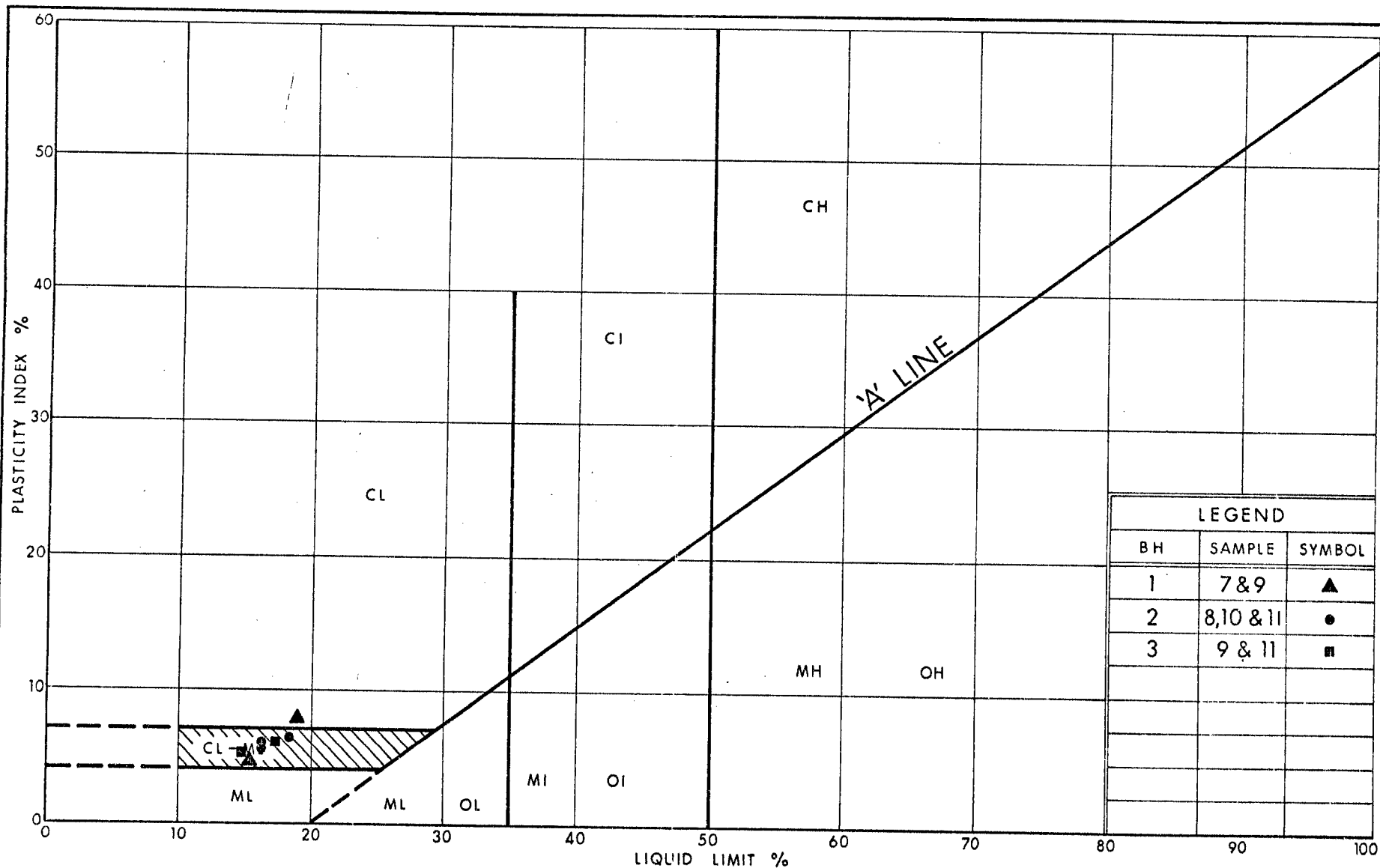
Ontario

ENGINEERING SERVICES BRANCH

PLASTICITY CHART CLAYEY SILT

FIG No 2

W P 281-66-08



Ontario

Ministry of
Transportation and
Communications

ENGINEERING SERVICES BRANCH

PLASTICITY CHART CLAYEY SILT TO SILT, WITH SAND & GRAVEL (Glacial Till)

FIG No 3

W P 281-66-08

ABBREVIATIONS & SYMBOLS USED IN THIS REPORTPENETRATION RESISTANCE

'N' = STANDARD PENETRATION RESISTANCE - 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>c LB./SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 250	VERY LOOSE	0 - 4
SOFT	250 - 500	LOOSE	4 - 10
FIRM	500 - 1000	COMPACT	10 - 30
STIFF	1000 - 2000	DENSE	30 - 50
VERY STIFF	2000 - 4000	VERY DENSE	> 50
HARD	> 4000		

TERMS TO BE USED IN DESCRIBING SOILS:-

TRACE < 10% , SOME 10-25% , WITH 25-40% , > 40% SILTY, SANDY, GRAVELLY, CLAYEY ETC.

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.T.	SLOTTED TUBE SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE

P.H. SAMPLE ADVANCED HYDRAULICALLY

P.M. SAMPLE ADVANCED MANUALLY

SOIL TESTS

U	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
UU	UNCONSOLIDATED UNDRAINED TRIAXIAL	F.V.	FIELD VANE
CIU	CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL	C	CONSOLIDATION
CID	" " DRAINED "	S	SENSITIVITY
CAU	" " ANISOTROPIC UNDRAINED "		
CAD	" " DRAINED "		

ABBREVIATIONS & SYMBOLS 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
w_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 INTERCEPT
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
$\bar{\sigma}$	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

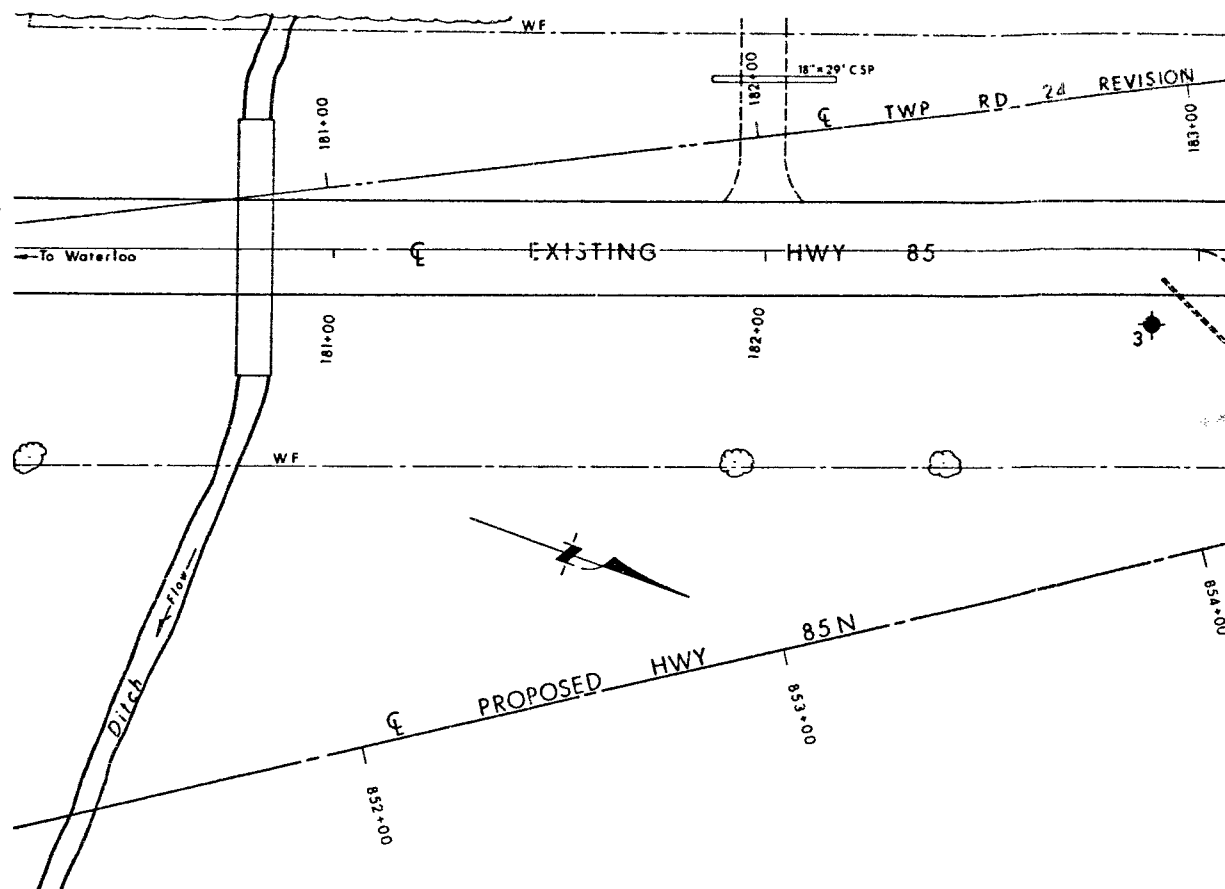
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_o	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

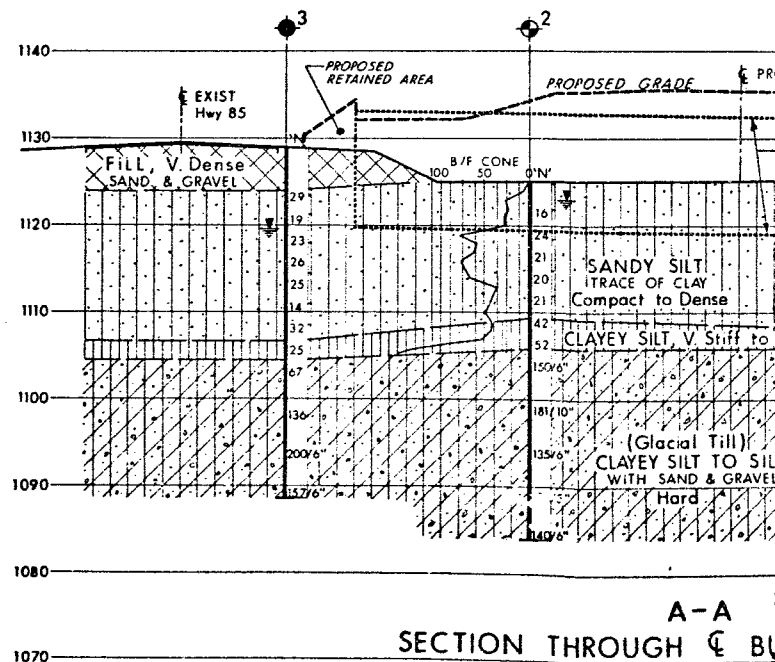
B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

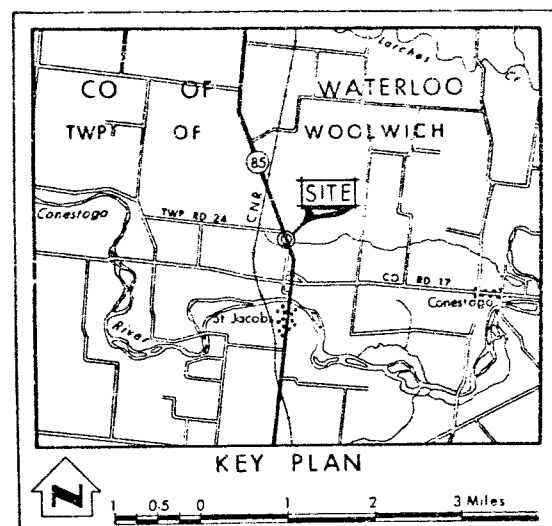
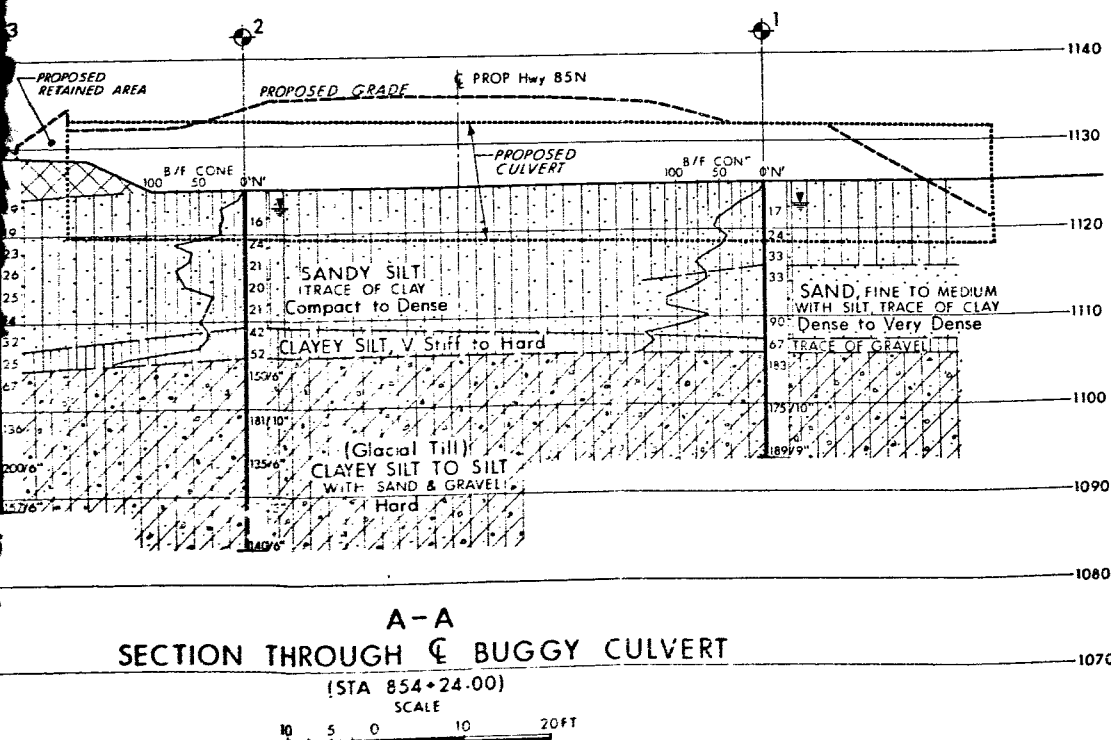
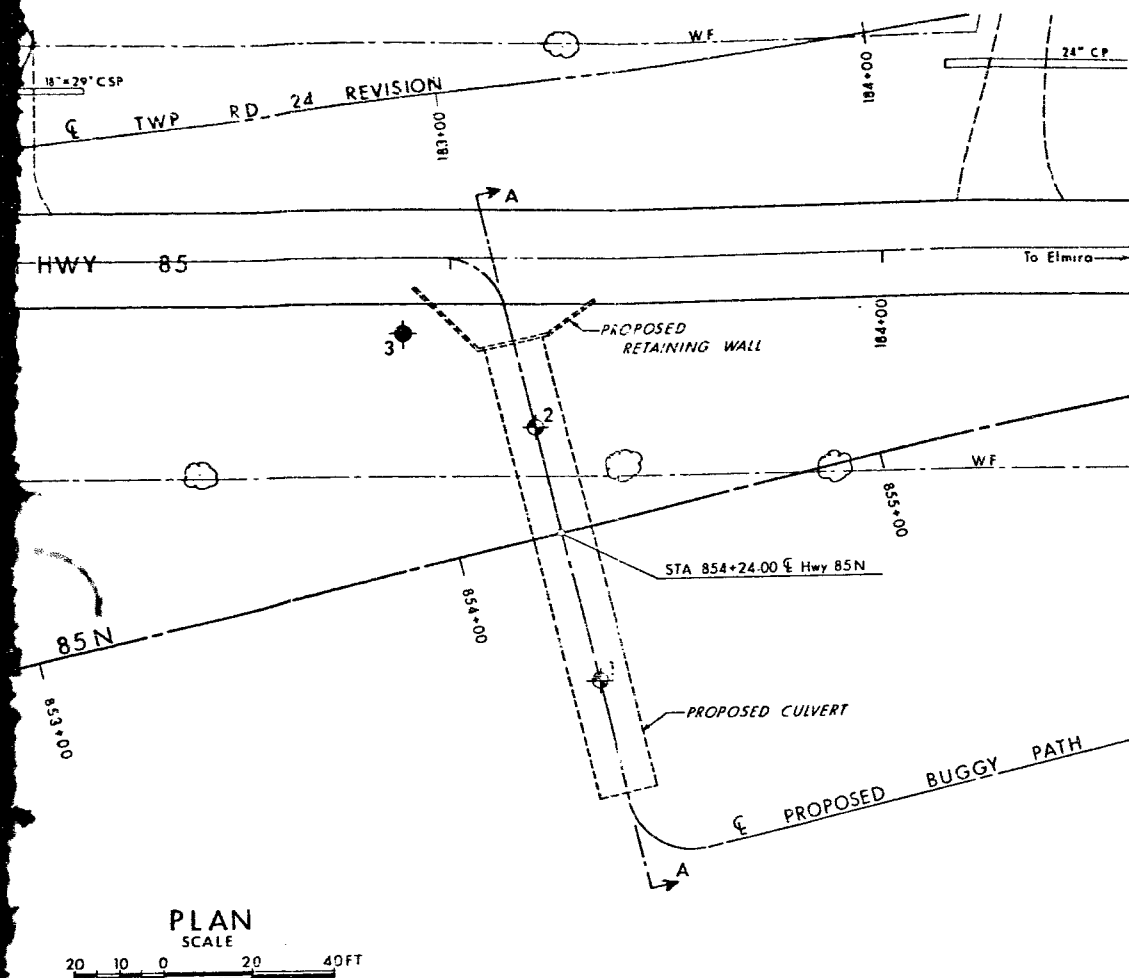
H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



PLAN
SCALE
20 10 0 20 40 FT



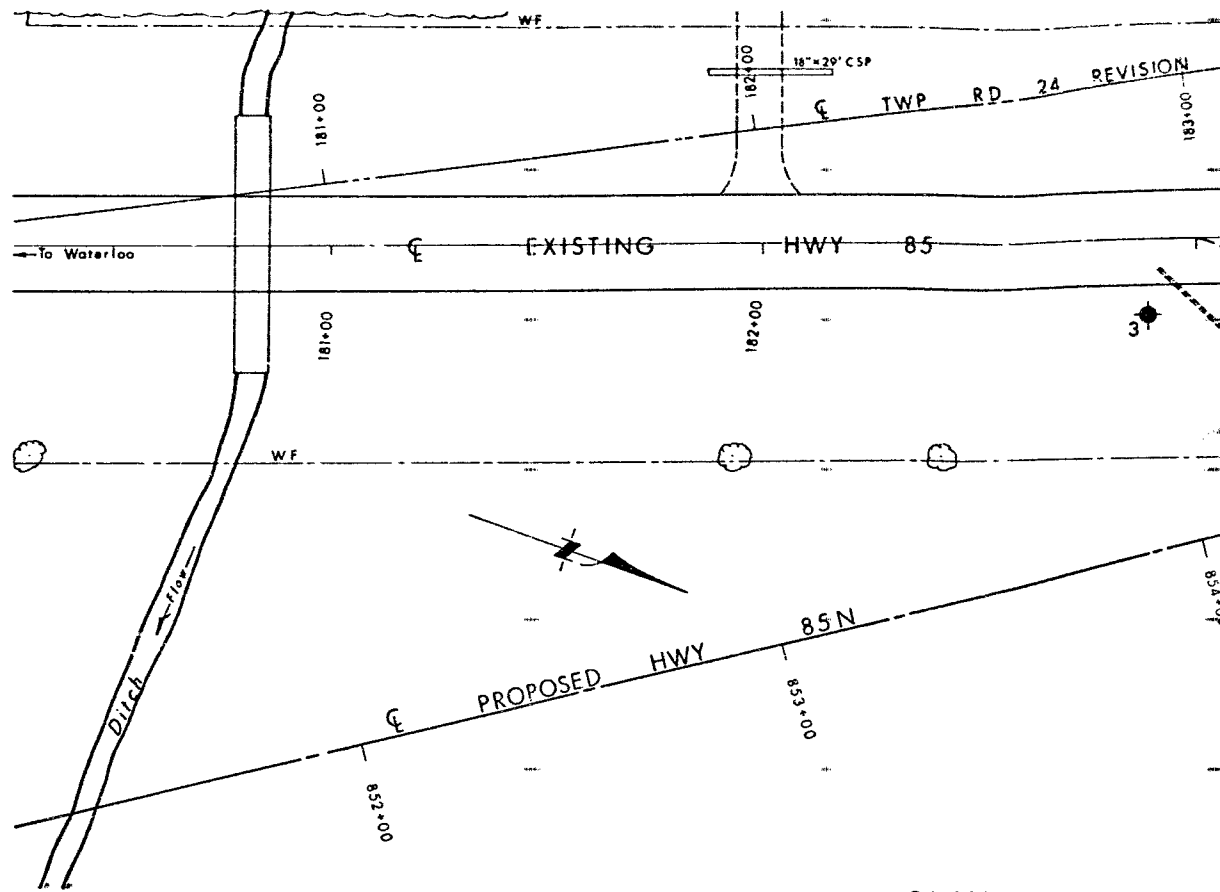
A-A
SECTION THROUGH C B
(STA 854+24.00)
SCALE
10 5 0 10



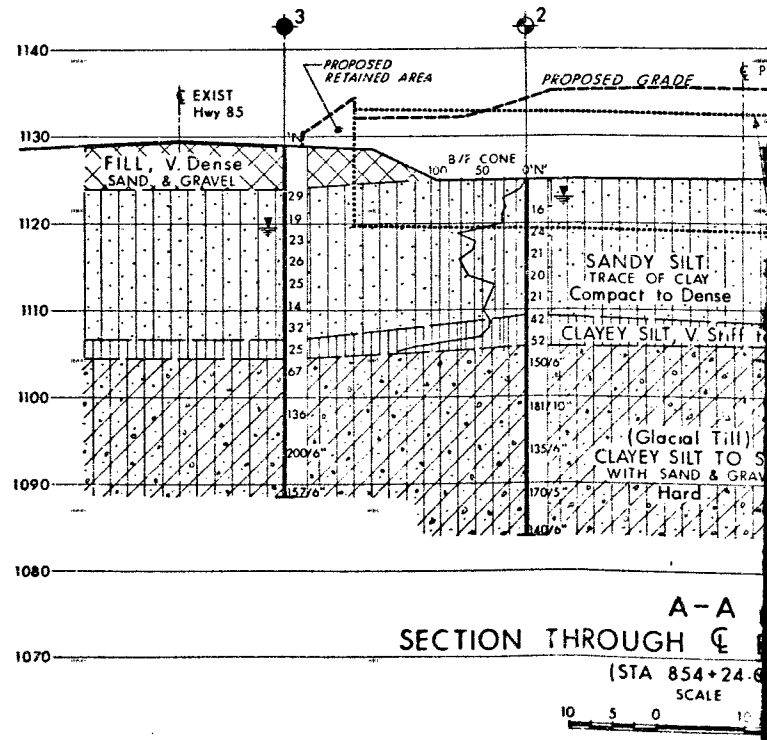
LEGEND			
	Bore Hole		
	Dynamic Cone Penetration Resistance Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation, Jan 1976		
NO.	ELEVATION	STATION	OFFSET
1	1125.3	854+24	35' RT
2	1124.9	854+24	25' LT
3	1128.9	854+00	53' LT

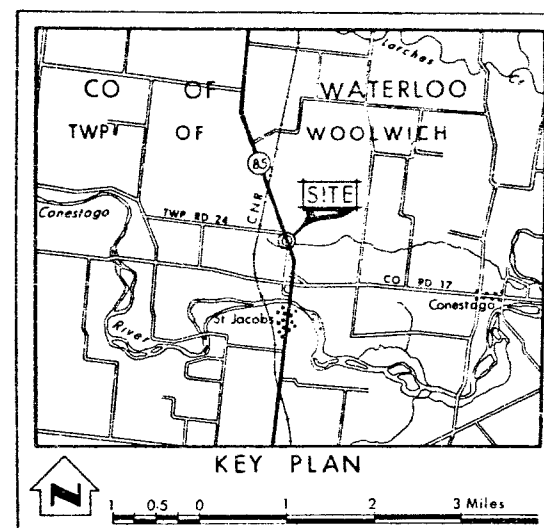
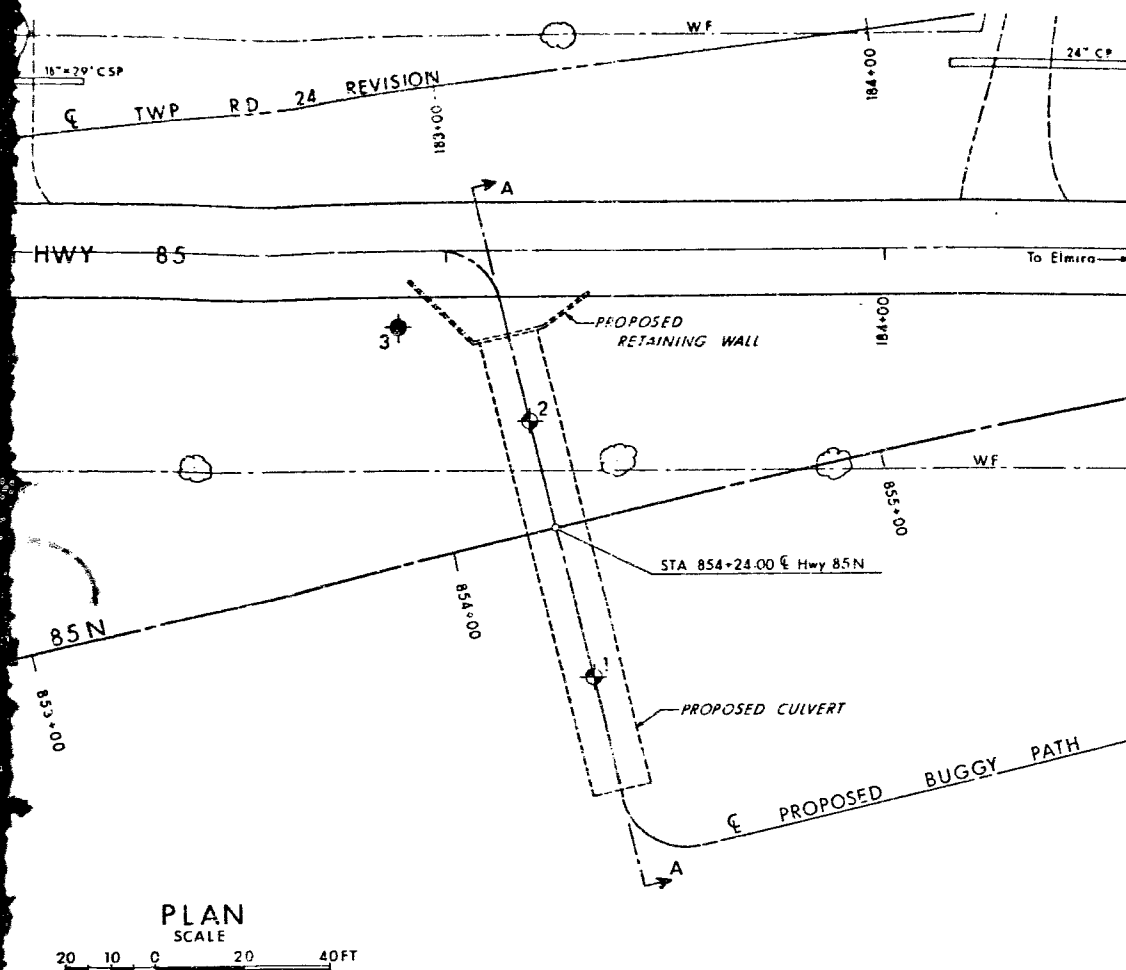
— NOTE —
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO ENGINEERING SERVICES BRANCH—GEOTECHNICAL OFFICE—SOIL MECHANICS SECTION			
MENNONITE BUGGY CULVERT (STA 854+24.00)			
HIGHWAY NO. 85N	DIST NO. 3		
CO. WATERLOO	TWP. WOOLWICH		CON. G.C.T.
BORE HOLE LOCATIONS & SOIL STRATA			
SUBMIT BY VV	CHECKED	WP NO. 281-66-08	DRAWING NO. 2816608-A
DRAWN	CHECKED	AD NO.	BRIDGE DRAWING NO.
DATE Feb. 19, 1976	SITE NO. 33-316		
APPROVED	CONT NO.		



PLAN
SCALE
20 10 0 20 40 FT





LEGEND			
	Bore Hole		
	Dynamic Cone Penetration Resistance Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation, Jan 1976		
NO.	ELEVATION	STATION	OFFSET
1	1125.3	854+24	35' RT
2	1124.9	854+24	25' LT
3	1128.9	854+00	53' 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.

REVISIONS	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO
ENGINEERING SERVICES BRANCH—GEOTECHNICAL OFFICE—SOIL MECHANICS SECTION

MENNONITE BUGGY CULVERT (STA 854+24.00)

HIGHWAY NO. 85 N DIST. NO. 3
CO. WATERLOO
TWP. WOOLWICH LOT. 37 CON. G.C.T.

BORE HOLE LOCATIONS & SOIL STRATA

SUBMITTED BY	CHECKED	WP NO. 281-60-08	DRAWING NO.
DRAWN	CHECKED	AC NO.	2816608-A
DATE Feb 19, 1976	SITE NO. 33-316	BRIDGE DRAWING NO.	
APPROVED	CONF. NO.		



Ministry of
Transportation and
Communications

MEMORANDUM TO:

MR. D. M. HOPPER
MANAGER, CONTRACT CONTROL OFFICE
CENTRAL BUILDING

PROGRAM CONTROL SECTION
PRIORITY DEVELOPMENT BRANCH

DATE April 6/76

RE: ADVANCE NOTICE FOR CALLING TENDERS

CONT. No. 76-56 W. P. No. 281-66-02 281-66-07 281-66-08 DIST. No. 3

HWY. No. 85N TYPE of WORK G.D. GB. Pav. & S.D. Culvt.

LOCATION 0.4 Mi. North of King St., Waterloo N'ly 4.3 Mi., from
Reg. Rd. # 17 to existing Hwy 85 at St. Jacobs 0.8 Mi.
and Mennonite Buggy Culvert North of Cty. Rd. #17

RETURN CLEARANCE NOTICE BY: Apr 28/76

ADVERTISING DATE May 19/76

TENDER OPENING DATE June 23/76 TENDER OPENING No. 12

THIS FORM TO BE RETAINED BY SECTION

W. KATARYNCZUK

PROGRAM CONTROL ENGINEER

*END Enb
20 10/76*

~~*[Signature]*~~

*DELIVERED
22/4/76*

K2

MINUTES OF
STRUCTURAL REVIEW COMMITTEE MEETING

TIME: 9:30 A.M., April 7th, 1976.

PLACE: Boardroom 'B', West Building.

PRESENT: Messrs. A.E. McKim - Construction Branch
K. Luczka - Construction Branch
W. McFarlane - Structural Office
S. Kryzevicius - Structural Office
M. Stoyanoff - Structural Office
W. Birch - Structural Maintenance
K. Selby - Soils Mechanics Section

PROJECTS: (a) Special Design Mennonite Buggy Culvert,
W.P. 281-66-08.
(b) Alqoma Central and Hudson Bay Railway
W.P. 908-73-09

The first project to be reviewed, W.P. 281-66-08, was presented by Mr. W. McFarlane and the following points were reviewed.

General

As this structure will be constructed with new Highway 85 maintenance of traffic presents no problem; however, the maintenance of buggy traffic may be required, and Regional Planning and Design should ensure provision has been made for these vehicles.

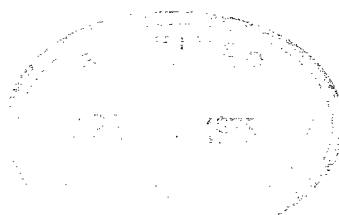
Structure

- (a) The need for temporary bracing during construction was queried, and it was agreed that the pipe size called for does not warrant bracing.
- (b) The committee recommends that the grade of the roadway at the approaches and through the structure be designed to eliminate any drainage problems within the structure.

The second project, W.P. 908-73-09, was presented by Mr. S. Kryzevicius in the absence of Mr. A. Radkowski, and the following points were discussed.

General

The committee questioned the borehole drawing to ensure that such a drawing exists. To be confirmed by the Structural Office.



Structure

- (a) The detail on the drawings for the transverse tie rods in the prestressed beams is to be reviewed and confirmed by the Construction Branch.
- (b) Machine finish of the deck is not required.

No further matters were brought up and the meeting adjourned at 11:30 A.M.

M. Stoyanoff

M. Stoyanoff,
Structural Contract Engineer.

MS/ac

c.c. J.B. Wilkes
W. Wigle
E. Orr
R. Dorton
C. Grebski
G. Burkhardt
H. Ernesaks
V. Lin
K. Bassi
J. Keen
All Present

Oversized Drawings

Head Office Review Summary



Memorandum

To: Mr. A. Wittenberg,
Regional Manager,
Planning & Design Office,
Southwestern Region, London.

From: Structural Office,
West Building, Downsview.

Attention:

Date: May 3, 1976

Our File Ref.

In Reply to

Subject: W.P. 281-66-08, Site 33-316,
Mennonite Buggy Culvert (Special Design)
Hwy. 85N, District 3.

The bridge drawing number should be changed to read
33-316-1 to 2 inclusive.

GP/WMCF/cf

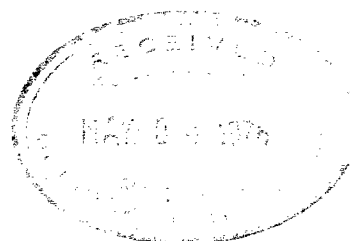
G. Pajus
G. Pajus,

for: W. McFarlane,
Regional Structural Design Engineer.

c.c. J. Keen
J. Wear
F. C. Brown
K. C. Howe
B. Giroux
A. E. McKim
A. P. Watt
W. Birch
C. Mirza
N. Zoltay

Justified - Pajus

OK
Lo



FOUNDATION INVESTIGATION REPORT

CONTRACT NO 76-56



Ministry of
Transportation and
Communications



INDEX

<u>Page No.</u>	<u>Description</u>
1	Index
2-3	Abbreviations & Symbols
4- 12	Foundation Investigation Report Mennonite Buggy Culvert W.P. 281-66-08

NOTE For purposes of the contract this report supercedes all other Foundation Investigation Reports prepared by or for the Ministry in connection with the above mentioned project.

ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

PENETRATION RESISTANCE

N = STANDARD PENETRATION RESISTANCE - 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>c LB/SQ FT</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 250	VERY LOOSE	0 - 4
SOFT	250 - 500	LOOSE	4 - 10
FIRM	500 - 1000	COMPACT	10 - 30
STIFF	1000 - 2000	DENSE	30 - 50
VERY STIFF	2000 - 4000	VERY DENSE	> 50
HARD	> 4000		

TERMS TO BE USED IN DESCRIBING SOILS -

TRACE < 10% , SOME 10-25% , WITH 25-40% , > 40% SILTY, SANDY, GRAVELLY, CLAYEY ETC

TYPE OF SAMPLE

S.S	SPLIT SPOON	T W	THINWALL OPEN
W S	WASHED SAMPLE	T P	THINWALL PISTON
S T	SLOTTED TUBE SAMPLE	O S	OESTERBERG SAMPLE
A S	AUGER SAMPLE	F S	FOIL SAMPLE
C S	CHUNK SAMPLE	R C	ROCK CORE

P H SAMPLE ADVANCED HYDRAULICALLY

P M SAMPLE ADVANCED MANUALLY

SOIL TESTS

U	UNCONFINED COMPRESSION	L V	LABORATORY VANE
UU	UNCONSOLIDATED UNDRAINED TRIAXIAL	F V	FIELD VANE
CU	CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL	C	CONSOLIDATION
CU	" " DRAINED "	S	SENSITIVITY
CAU	" " ANISOTROPIC UNDRAINED "		
CAU	" " DRAINED "		

ABBREVIATIONS & SYMBOLS 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
w_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_α	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 INTERCEPT
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

IN TERMS OF
EFFECTIVE STRESS
 $\tau_f = c' + \sigma' \tan \phi'$

IN TERMS OF
TOTAL STRESS
 $\tau_f = c_u + \sigma \tan \phi$

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
$\bar{\sigma}$	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

FOUNDATION INVESTIGATION REPORT

For

Mennonite Buggy Culvert, Hwy. 85N
W.P. 281-66-08, District 3, Stratford

INTRODUCTION

This report contains results of a foundation investigation carried out at the site of the above mentioned project. The fieldwork was done during the period January 21-30, 1976, using a 3½ inch I.D. hollow stem continuous flight auger.

SITE DESCRIPTION

The site is located approximately 0.8 miles north of the Conestogo River on Hwy. 85N just north of St. Jacobs. The terrain in the general site area is rising to the west and flat to gently rolling to the east. On the west side of Hwy. 85 there are a number of private dwellings, on the east side the land is cultivated farmland.

SUBSURFACE CONDITIONS

Subsoil at this site consists of about 15 to 20 feet of glacio-fluvial sands and silts underlain by what is presumably the parent glacial till which consists of hard clayey silt to silt with sand and gravel. The predominant surface deposit is a compact to dense sandy silt. Boundaries between the different soil types are shown on the Record of Borehole Sheets contained in the Appendix of this report. The locations and elevations of the boreholes, together with the inferred subsoil stratigraphy are shown on Drawing 33-316-2 of the Contract Drawings. From ground level downward the different soil types are described as follows:

Fill Material

This is the material found in the existing Hwy. 85 roadbed. It consists of about 5 feet of very dense sand and gravel.

Sandy Silt, Traces of Clay

This is the predominant surface deposit and consists in the main of from 10 to 15 feet of compact silty sand with traces of clay. Grain-size distribution tests indicate the following composition:

Sand size 10% - 37%
Silt size 52% - 82%
Clay size 1% - 12%

These test results are plotted in envelope form on Fig. #1 of the Appendix. Standard Penetration Test 'N' values range from 16 to 33 blows/ft. indicating a mainly compact relative density. The natural moisture content ranges from 14% to 22%.

Sand With Silt

This deposit was found in one borehole only and underlies the above mentioned sandy silt. The depth is about 8 feet and the material consists of dense to very dense fine to medium sand with silt. The natural moisture content is the order of 18%. The permeability is much higher than that of the overlying sandy silt.

Clayey Silt

This underlies the above mentioned non-cohesive deposits and consists of from 1.5 to about 4 feet of very stiff to hard clayey silt containing intermittent thin seams of silt. The plasticity index ranges from about 11% to 17%. Atterberg limit test results are plotted on Fig. #2 of the Appendix.

Clayey Silt to Silt With Sand and Gravel (Glacial Till)

This underlies all of the above mentioned deposits and consists of a heterogeneous mixture of clay, silt, sand and gravel in varied proportions. It is mainly of a cohesive nature having a slight plasticity with indices ranging from 4% to 8% (see Fig. #3). The natural moisture content ranges from 7% to about 10%. Standard Penetration Test 'N' values are well in excess of 100 blows/ft. and indicative of a hard consistency.

Groundwater

Measurements taken in the boreholes after a short duration indicate the groundwater level to be about 2.0 feet below the original ground surface. It is believed that higher levels will prevail following periods of heavy rain.

K. G. Selby

K.G. Selby, P. Eng.
Supervising Engineer

April, 1976

APPENDIX

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 1

WP 281-66-08

LOCATION Sta. 854 + 24 o/s 35' Rt. 2- Hwy. 85N

ORIGINATED BY B.VV

DIST 3 HWY 85N

BORING DATE January 19, 1976

COMPILED BY BVV

DATUM Geodetic


BOREHOLE TYPE Hollow Stem Auger

CHECKED BY *CP*

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		25	50	75	100	125	w_p	w	w_L		
1125.3	Ground Level															GR SA SI CL
0.0	Sandy silt, trace of clay.		1	SS	17											0 10 82 8
	Compact to Dense		2	SS	24	1120										
1115.8			3	SS	33											0 62 (38)
9.5	Sand, fine to medium with silt, trace of clay.		4	SS	33											
	Dense to Very Dense		5	SS	90	1110										
1107.3			6	SS	67											
18.0	Clayey silt, trace of gravel		7	SS	183											6 31 53 10
19.5	Clayey silt to silt with sand & gravel		8	SS	1757	1100										
	Grey Hard (Glacial Till)		9	SS	1897	1094.0										
31.3	End of Borehole															

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION


RECORD OF BOREHOLE NO 2

WP 281-66-08 LOCATION Sta. 854 + 24 o/s 25' Lt. & Hwy. 85N ORIGINATED BY BVV
 DIST 3 HWY 85N BORING DATE January 21, 1976 COMPILED BY BVV
 DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger CHECKED BY 

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		25	50	75	100	125	w_p	w	w_L		
1124.9	Ground Level															GR SA SI CL
0.0	Sandy silt, trace of clay		1	SS	16											0 31 68 1
	Compact		2	SS	24	1120										
	Brown		3	SS	21											
			4	SS	20											0 18 76 6
1109.4			5	SS	21	1110										
15.5	Clayey silt.		6	SS	42											
1105.9	Grey Hard		7	SS	52											
19.0	Clayey silt to silt with sand & gravel		8	SS	1507	6"										0 35 60 5
	Hard		9	SS	1817	10"										
	Grey to Greyish Brown		10	SS	1357	6"										
	(glacial till)		11	SS	1707	5"										
1083.9			12	SS	1407	6"										7 32 50 11
41.0	End of Borehole															

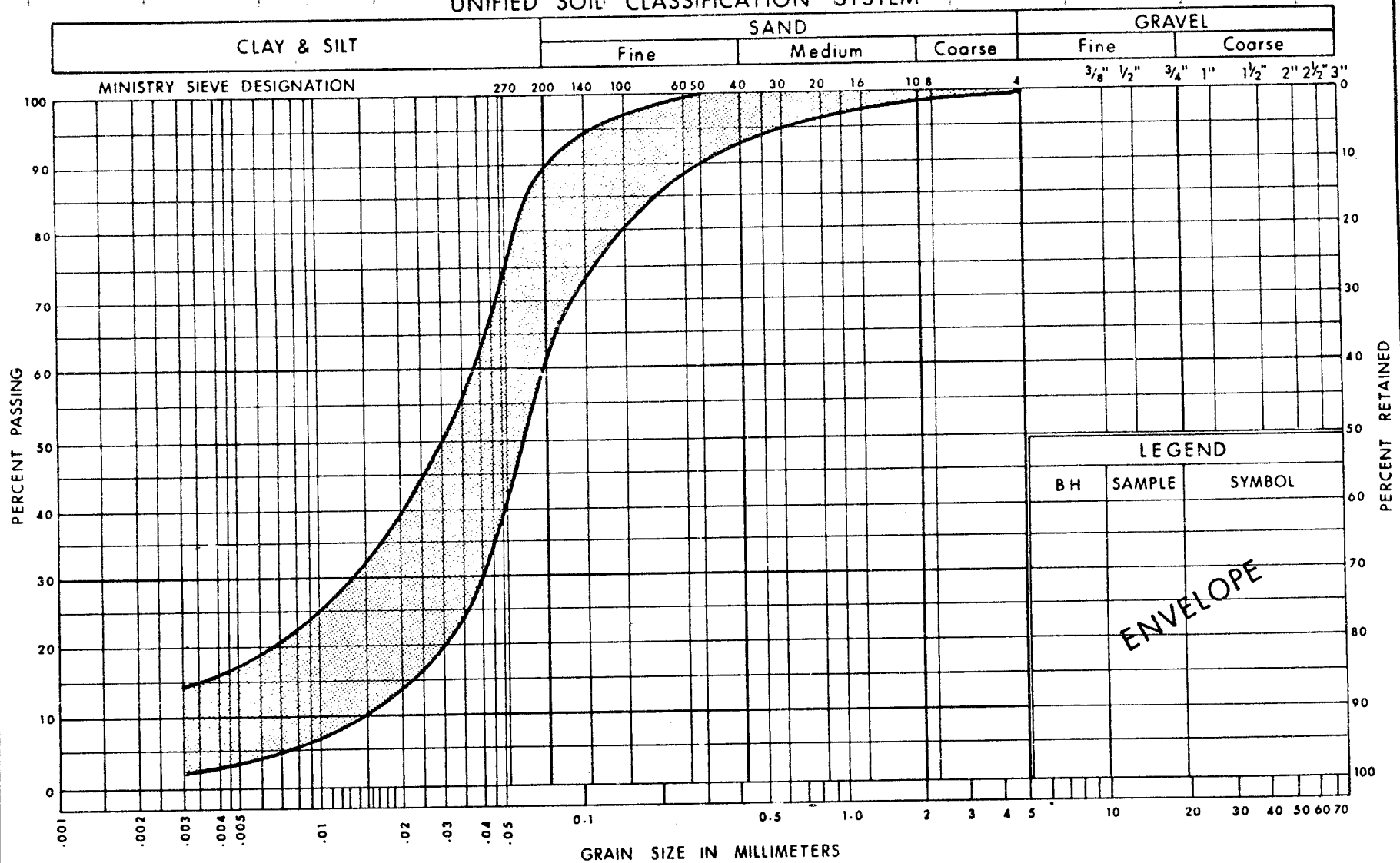
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 3

WP 281-66-08 LOCATION Sta. 854 + 00 o/s 53' Lt. of Hwy. 85N ORIGINATED BY BVV
 DIST 3 HWY 85N BORING DATE January 30, 1976 COMPILED BY BVV
 DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger CHECKED BY 

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p	w	w_L		
1128.9	Ground Level															
0.0	Fill Material															
1123.9	Sand and gravel															
	Very Dense Brown															
5.0	Sandy silt, trace of clay		1	SS	29											0 37 55 8
			2	SS	19											0 36 52 12
			3	SS	23											0 19 78 3
			4	SS	26											
	Compact to Dense		5	SS	25											
	Brown		6	SS	14	1110										
1106.4			7	SS	32											0 35 62 3
22.5	Clayey silt. V. Stiff		8	SS	25											
24.5	Clayey silt to silt with sand & gravel		9	SS	67											15 23 48 14
	Hard Grey		10	SS	136	1100										
	(glacial till)		11	SS	2007 6"											4 29 43 24
1188.4			12	SS	1577 6"	1090										9 32 49 10
40.5	End of Borehole															

UNIFIED SOIL CLASSIFICATION SYSTEM



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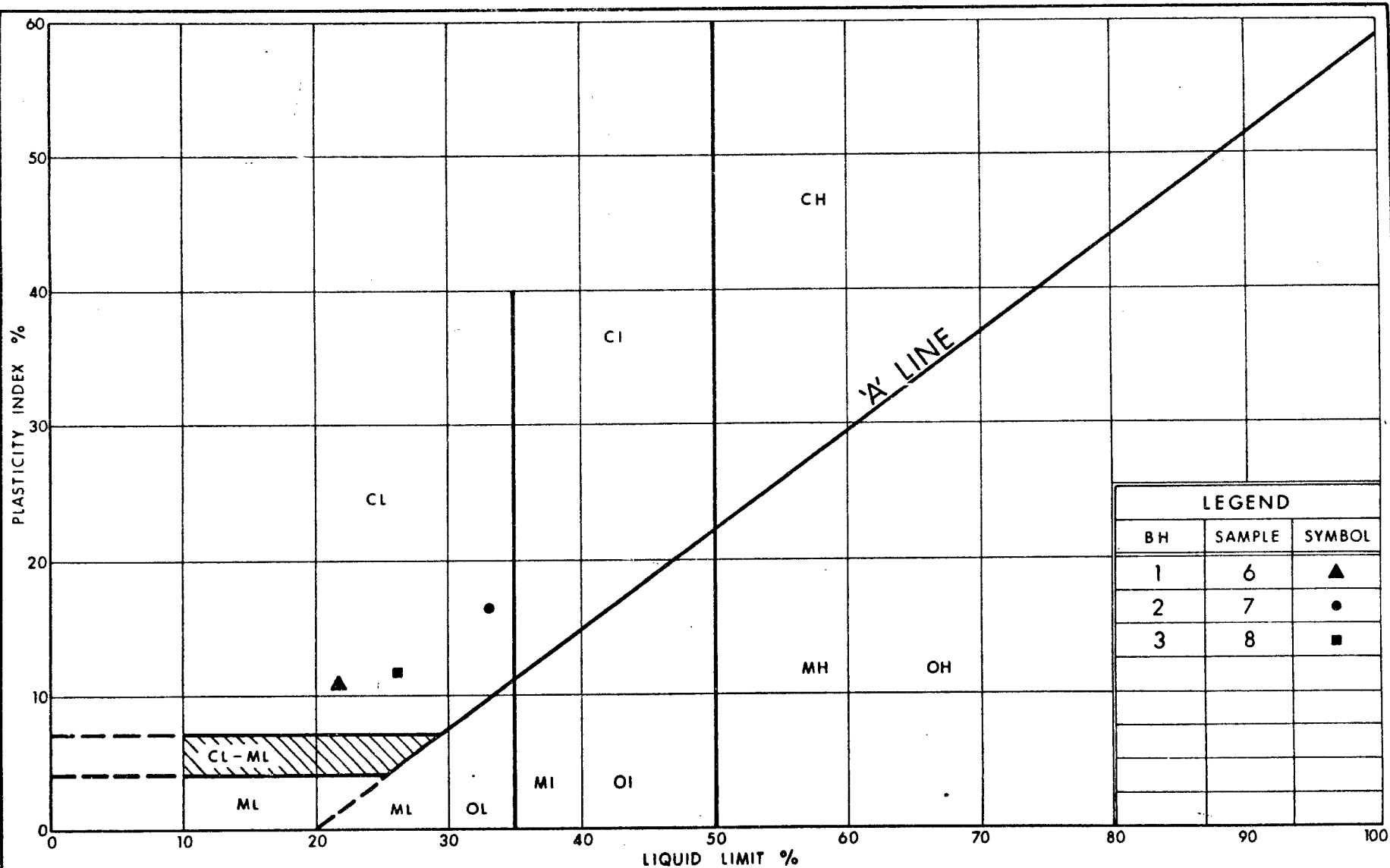
Ontario

ENGINEERING SERVICES BRANCH

GRAIN SIZE DISTRIBUTION
SANDY SILT, TRACE OF CLAY

FIG No 1

W P 281-66-08



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ENGINEERING SERVICES BRANCH

PLASTICITY CHART CLAYEY SILT

FIG No 2

W P 281-66-08



VISUAL CLASSIFICATION SHEET
SOILS MECHANICS OFFICE

PROJECT <u>BUGGY CULVERT</u>		SITE <u>281-66-08</u>		BOREHOLE NO. <u>1</u>		GROUND ELEVATION <u>1125.3'</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 AND CLAY										
SS 1	2.5-4.0	-	-	-	100		-	-	RAPID	-	EARTHYY	BROWN	+	COMP	FINE SAND	
SS 2	5.6-6.5	-	-	-	30	70	-	-	VERY RAPID	-	"	BROWN	+	COMP	SILT WITH FINE SAND TRACE OF CLAY	
SS 3	17.5-90	-	-	-	60	40	-	-	"	-	"	BROWN	+	DENSE	FINE SILTY SAND	
SS 4	10.0-11.5	-	-	-	60	20	-	-	"	-	"	"	+	DENSE	FINE TO MED SAND SOME SILT	
SS 5	15.0-16.5	-	-	-	100	-	-	-	-	-	"	BROWN	+	VERY DENSE	MED SAND 1" LAYER FINE SAND WITH SILT	
SS 6	17.5-19.0	1/2"	SUB ANG	10	-	90	-	DULL	NIL	LOW	"	GREY	+	HARD	CLAYEY SILT, TRACE OF GRAVEL, SILT SEAMS	
SS 7	20.0-21.5	1/2"	SUB ANG	10	10	80	-	-	LOW	LOW	"	"	+	HARD	CLAYEY SILT TRACE OF COARSE SAND GRAVEL	
SS 8	25.0-26.5															
SS 9	30.0-31.5														1/2" LAYER, VERT OF GREY SILT	

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

VISUAL CLASSIFICATION SHEET

SOILS MECHANICS OFFICE

PROJECT		SITE		BOREHOLE NO.		GROUND ELEVATION										
BUGGY CULVERT		281-66-08		2		1124.9'										
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 AND CLAY										
1	2.0-3.0	-	-	-	20	80	-	-	RAPID	NIL	EARTHY	BROWN	POS. COMP.	COMPACT SILT, SOME CLAY AND FINE SAND 2" LAYER MED. SAND @ 3.0'		
2	5.0-6.0	-	-	-	85	15	-	-	VERY RAPID	NIL	"	"	POS. COMP.	COMPACT FINE SAND, SOME SILT, HOMOGENEOUS		
3	7.0-8.0	-	-	-	90	10	-	-	"	"	"	"	"	COMPACT FINE SAND, TRACE OF SILT, HOMOGENEOUS		
4	10.0-11.0	-	-	-	40	60	-	-	"	"	"	"	"	COMPACT FINE SANDY SILT, HOMOGENEOUS		
5	12.5-14.0	-	-	-	40	60	-	-	"	"	"	"	"	COMPACT FINE SANDY SILT, HOMOGENEOUS, LAYER OF MED. SAND		
6	15.0-16.5	-	-	-	-	100	-	MED. TO HIGH	NIL	VERY PLASTIC	"	"	POS. HARD	HARD BROWN CLAY, SOME SILT, HOMOGENEOUS. TOP 7" BROWN MED. SAND		
7	17.5-19.0	-	-	-	-	100	-	MED. - HIGH	NIL	VERY PLASTIC	"	GREY	POS. HARD	HARD GREY CLAY, SOME SILT, HOMOGENEOUS 2" LAYER OF LIGHT GREY SILT		
8	20.0-22.5	1"	ANGULAR	10	70	20	-	NIL	V. RAPID	-	"	GREY	"	VERY DENSE	VERY DENSE FINE-MED. SAND, SOME SILT, TRACE OF FINE TO COARSE GRAVEL, STILL DEPOSIT, HOMOGENEOUS	GR. SE
9	23.0-25.0	1/4"	SUB ANGULAR	5	40	55	-	MED.	V. RAPID	LOW PLASTICITY	"	"	"	HARD	CLAYEY SILT WITH MED-TO COARSE SAND, TRACE OF FINE GRAVEL, STILL DEPOSIT	

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



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VISUAL CLASSIFICATION SHEET

SOILS MECHANICS OFFICE

PROJECT BUGGY CULVERT SITE 281-66-08 BOREHOLE NO. 2 (CONT'D) GROUND ELEVATION _____

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 AND CLAY										
SS 10	30.0- 31.0	1/2"	ANGULAR	5	10	85	-	DULL	MED.	MED.	EARTHY	GREY	SLOW REACTION	HARD	CLAYEY SILT, TRACE OF COARSE SAND & GRAVEL (TILL DEPOSIT), HOMO.	
SS 11	35.0- 35.5	1/4"	SUB ANGULAR	5	40	55	-	-	MED.	MED.	"	GREYISH BROWN	POS.	VERY DENSE	SANDY SILT, TRACE OF CLAY & FINE GRAVEL, HOMOGENEOUS (TILL DEPOSIT)	
SS 12	40.0- 41.0	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"

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



VISUAL CLASSIFICATION SHEET
SOILS MECHANICS OFFICE

PROJECT <u>BUGGY CULVERT</u>		SITE <u>281-66-08</u>		BOREHOLE NO. <u>3</u>		GROUND ELEVATION <u>1128.9'</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 AND CLAY									
SS 1	5.0-6.5	-	-	-	60	40	-	-	MED.	-	TRACE OF PETROLEUM	BROWN BLACK	POS. DENSE	BROWN SILTY SAND, TRACE OF ORGANICS (OXIDATION) PETRO SMELL PROBABLY FROM RIG	
SS 2	7.5-9.0	-	-	-	70	30	-	-	RAPID	-	"	BROWN	POS. COMPACT	BROWN FINE SAND WITH SILT, TRACE OF CLAY, PETRO SMELL TRACE OF COARSE SAND, HOMOGENEOUS, FROM RIG	
SS 3	10.0-11.5	-	-	-	10	90	-	-	U. RAPID	-	EARTHY	BROWN	POS. COMPACT	BROWN SILT, TRACE OF FINE SAND, HOMOGENEOUS	
SS 4	12.5-14.0	-	-	-	10	90	-	-	U. RAPID	-	EARTHY	BROWN	POS. COMPACT	SAME AS ABOVE	
SS 5	15.0-16.5	-	-	-	20	80	-	-	U. RAPID	-	"	"	POS. "	BROWN SILT, SOME VERY FINE SAND, HOMOG.	
SS 6	17.5-19.0	-	-	-	40	60	-	-	U. RAPID	-	"	"	POS. "	BROWN FINE SANDY SILT, TRACE OF CLAY, HOMOG.	
SS 7	20.0-21.5	-	-	-	40	60	-	-	"	-	"	"	DENSE	BROWN FINE SANDY SILT, HOMOG.	
SS 8	22.5-24.0	-	-	-	-	100	-	MED. TO HIGH	NIL	HIGHLY PLASTIC	"	GREY	POS. VERY STIFF	GREY SILTY CLAY, TOP 2" FINE SANDY SILT.	
SC 9	25.0-26.5	1/2"	ANGULAR TO SUB-ANGULAR	10	70	20	-	-	RAPID	-	"	GREY	POS. U. DENSE	GREY MED. TO COARSE SAND, SOME SILT, TRACE OF FINE TO COARSE GRAVEL, 2" LAYER HIGHLY PLASTIC CLAY	

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



VISUAL CLASSIFICATION SHEET
SOILS MECHANICS OFFICE

PROJECT		SITE		BOREHOLE NO.		GROUND ELEVATION										
E GY CULVERT		281-66-08		3 (CONT'D)												
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 AND CLAY										
SC 10	30.0-31.5	3/4"	SUB-ANGULATED	10	80	10	1	MED.	NIL	PLASTIC	EARTHY	GREY	POS.	HARD	HARD SILTY CLAY, TRACE OF MED. TO COARSE SAND, DESSICATED	
SC 11	35.0-36.5	1/2"	"	10	10	80	1	DULL	MED.	LOW	"	"	"	HARD	MED. TO COARSE SAND, TRACE OF GRAVEL, HARD DESSICATED SILTY CLAY, TRACE OF MED. TO COARSE SAND & FINE GRAVEL, HOMOGENEOUS	
SC 12	40.0-40.5	1/2"	"	10	50	40	1	NIL	SLOW	LOW	"	BROWN & GREY	"	U. DENSE	U. DENSE DESSICATED SILTY FINE SAND, TRACE OF U. COARSE SAND & GRAVEL	GR. S.

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