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G.I.-30 SEPT. 1976

GEOCRES No. 31C-152

DIST. 10 REGION

W.P. No. 103-63-04

CONT. No.

W. O. No.

STR. SITE No.

HWY. No. 62

LOCATION TREATMENT OF SETTLED AREAS OVER MUSKEG DEPOSITS

No OF PAGES - —

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:

BOARDROOMS E-1 and E-2
DOWNSVIEW M3M 1J8, Ontario

DATE: January 21, 1977

W.P. 103-63-02 CONTRACT 76-127 HIGHWAY 62 & 620

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

LOCATION Highway 62 From 0.2 Mile South of Highway 620 Northerly 9.2 Miles
Highway 620 Coe Hill Built-up Area 1.0 Mile

DISTRICT 10 ADVERTISING DATE February 23, 1977

ATTENDANCE

J. B. Wilkes	J. Brown	G. Wrong	W. Kataryncczuk
R. S. Pillar	J. E. Callaghan	W. Bennett	J. Davidson
J. R. Wear	R. A. Verscheure	J. Crannie	M. Devata
E. J. Willis		B. Giroux	M. Guyett

POINTS OF DISCUSSION

Preloading of Swamp - M. Devata opined preloading would not achieve absolute solution but as no alternative presented, project to remain as designed. Mr. Devata said effect would be monitered for a year or two so no funds to be set up for earth removal under this contract.

EJW/ls
cc: S. J. Radbone
E. R. Saint
R. S. Chapman
H. B. McKay
J. Heffernan
G. Wrong
C. Mirza
B. Giroux
J. Crannie
E. J. Willis
W. R. Bennett
R. S. Pillar
P. McWatt

E. J. Willis
Supervisor
Contract Review Section

RECEIVED GEOTECHNICAL OFFICE FEB 01 1977 SOIL MECHANICS MINISTRY OF TRANSPORTATION & COMMUNICATIONS

m devata
/
m m
/
FILES

Ministry of Transportation and Communications
Ontario

Memorandum

To: Mr. R. S. Chapman
District Engineer
Bancroft, Ontario

From: Planning and Design Office
Kingston, Ontario

Attention:

Date: December 14, 1976

Our File Ref.

In Reply to

Subject:

RE: W. P. 103-63-02, Highway #62, From 0.2 Miles South of Secondary Highway #620, Northerly 9.2 Miles, District #10 - Bancroft

Contract Drawings and Documents of the projects grouped under the above were issued June 14th, 1976, at which time, it was proposed to call a Regional Pre-Contract Review for August 1976.

Since that time, various changes have been made and additional modifications from Materials and Testing and the Traffic Office are pending.

In order to retain these projects in the 1976-77 Program Year, it will be necessary to forward the drawings and documents to Head Office no later than January 12th, 1977. This further necessitates the holding of a Regional Pre-Contract Review in the near future and arrangements are now being made to that effect.

Forwarded herewith are copies of the revised drawings and documents as they presently exist and these will be reviewed at 10:30 a.m., Wednesday, December 22nd, 1976, in Boardroom #1 of the Regional Offices.

J. F. Brown
Project Manager

JFB/il
Att'd.

c.c. P. D. Billings, E. R. Saint, H. B. McKay, J. S. Trew, T. C. Kingsland, R. S. Pillar, J. Wear, H. W. Miller, R. J. Forrest, B. Giroux, C. Mirza, A. E. McKim

MD.

WP 103-63-04

1 File

Design Synopsis Report

(A) W.P. 103-63-02, Resurfacing of Hwy. 62, From 0.2 miles South of Sec. Hwy. 620 Northerly 9.2 miles

(B) W.P. 103-63-04, Frost Heave Treatment and H. M. Paving of Hwy. 62, From 1.9 miles North of Bannockburn Northerly 13.4 miles to 1.1 miles North of St. Ola Road, Various Locations

(C) W.P. 213-66-00, Sec. Hwy. 620, G.D. G.B. and Paving of Coe Hill Built-Up Area Incl. 0.5 miles of Resurfacing

(D) W.P. 95-76-01, Resurfacing of Hwy. 62, From Hwy. 500 Northerly 0.9 miles Incl. 0.1 miles on Station St. from Hwy. 62 Westerly and a Frost Heave Treatment on Hwy. 28 0.8 miles South of Hwy. 62 - Connecting Link

(E) W.P. 95-76-02, Resurfacing of Hwy. 500, From Hwy. 62 Easterly 0.6 miles Connecting Link

(F) W.P. 21-76-01, Stockpile 15,000 tons of 5/8" Crushed Gravel 'A' in the Ormsby Patrol Yard at the Junction of Hwy. 62 and Sec. Hwy. 620

(G) W.P. 22-76-01, Stockpile 10,000 tons of 5/8" Crushed Gravel 'A' in the Hwy. 28 Patrol Yard at Apsley

District-10-Bancroft

The above noted projects are grouped together under Project (A) W.P. 103-63-02.

This section of Highway 62 was reconstructed under Contract 67-138 with follow-up Base Course Paving under Contract 69-061.

It is the purpose of the current project to provide a top course of $1\frac{1}{2}$" H.L. 4. Included with this will be the following:

(I) 4 Frost Heave Treatments involving excavation and/or ditch improvements.

(II) 5 Hot Mix Padding Areas

(III) Superelevation Correction to 3 Curves

(IV) Updating of tapers at the Junction of Sec. Hwy. 620, to present day standards

(V) Paving of open throats at 3 sideroads

(VI) Shoulder Protection Treatment at 1 sideroad intersection.

(V11) Paving of 1 C. S. Entrance.

(V111) Adjustment of Guide Rail.

(B) This section of Highway 62 was reconstructed under Contracts 61-044 and 62-081. The northern half was last paved in 1967 and the south half in 1972.

Due to severe longitudinal and random cracking severe dishing in wheel tracks, frost heaves and settlement in muskeg areas, the following work is proposed:

(1) 2 frost heave treatments involving excavation and ditching.

(2) 16 1½" - 2" Hot Mix Patching Areas.

Situated within the limits of this project is a one mile section, signed as "Rough Road" where muskeg deposits have adversely affected the condition and ridability of the pavement. Apart from becoming a continued maintenance problem, the distortion, settlement, cracking and wheel track rutting has made driving difficult and hazardous.

W.P 103-63-14 Hwy # 62

A 1976 investigation of this area indicated various degrees of displacement of organic material underneath the roadway fill thereby indicating the need of a grade change along this section. To effect this change, the Materials and Testing Office recommend the following treatment:

(a) Preload the distressed areas with a 2 foot surcharge of Granular 'C' in an attempt to completely displace or at least consolidate the underlying trapped organic material.

(b) Place a base course and a 20 foot wide pavement on top of the surcharge to maintain traffic.

(c) Remove the surcharge after one year has elapsed and excavate old road bed to allow pavement and granular courses to be placed at a lower grade.

The following work is proposed under this project:

(1) Reconstruct a 0.5 mile portion in Coe Hill to an urban cross-section identical to that provided by adjacent Contract 62-315, i.e. 22' pavement, mountable 'D' type curb and gutter and 6' paved reverse shoulder parking lanes.

(11) Resurface pavement constructed under Contract 62-315

(111) Waterproof deck and update steel beam guide rail at the Deer Creek Bridge.

(1V) Update and extend storm water sewer system.

(V) Reconstruct sidewalk where necessary.

(Vl) Slight improvement to horizontal alignment.

(Vll) Vertical alignment to be improved where possible.

(D) & (E) The work under this connecting link project involves:

(1) Frost Heave Treatments
Hastings Street - Hwy. 62 North 2 locations
Bridge Street - Hwy. 500 East 1 location
Hwy. 28 South 1 location

(11) Resurfacing
Hastings St. (Hwy. 62) from Bridge St. (Hwy. 500)
Northerly 0.87 miles
Bridge St. (Hwy. 500) from Hastings St. (Hwy. 62)
Easterly 0.6 miles
Station St. from Hastings St. (Hwy. 62)
Westerly 0.1 miles
Highway 28, from 0.83 miles from South
Juction of Hwy. 62 Westerly 0.01 miles

(111) Manhole and Catch Basin adjustments where necessary.

The reconstruction proposals at Coe Hill and the resurfacing at Bancroft have received the approval of the Municipal Councils concerned.

An Environmental Status Statement for the reconstruction at Coe Hill has been forwarded to the Ministry of the Environment.

Disposal — ?
Overloading — yes ? no restrictions ?
Burning — yes ? " ?
Specials — None Requiring committee Review.

```
ENTER LINESIZE, MAXIMUM IS 255 -
255

READY
BISHOP

UTILITY DATA SET NOT FREED, IS NOT ALLOCATED
IS THIS A METRIC INPUT? IF YES PUSH 'RETURN' KEY - ELSE ENTER 'NO'
N

DO YOU WANT PRINTOUT OF STANDARD TSO RULES -IF YES PUSH 'RETURN' ELSE ENTER 'NO'
N

ENTER INDEX NUMBER FOR THE FOLLOWING PROGRAM FUNCTIONS
1. SLOPE STABILITY ANALYSIS (BISHOP METHOD)-32-EFFECTIVE
2. SLOPE STABILITY ANALYSIS (BISHOP METHOD)-33-TOTAL
3. BERM DESIGN FOR A SLOPE(TOTAL STRESS ANALYSIS)-60-
33

ENTER INDEX NUMBER FOR THE FOLLOWING PROGRAM FUNCTIONS
1. SLOPE STABILITY ANALYSIS (BISHOP METHOD)-32-EFFECTIVE
2. SLOPE STABILITY ANALYSIS (BISHOP METHOD)-33-TOTAL
3. BERM DESIGN FOR A SLOPE(TOTAL STRESS ANALYSIS)-60-
2

ENTER NO. OF SLICES
30

ENTER INITIAL CIRCLE CENTRE : XO AND YO
15 -30

ENTER NO. OF POINTS ON EACH SIDE OF THE TRIAL CIRCLE CENTRE GRID
NO.OF POINTS EQUAL 3 IF LEAVE BLANK, GIVING A TOTAL OF NINE TRIAL CIRCLE CENTRES
NO. OF POINTS ON EACH SIDE MUST BE ODD NUMBER
5

ENTER DELTA-X AND DELTA-Y
5 5

ENTER Y-COORD OF RL AND DELTA-RL
15 2

ENTER NO. OF LEVELS
5

ENTER Y-COORD OF CRACK, NO. OF PT. ; -X SIDE AND +X SIDE
0 1 4

ENTER -X COORD AND +X COORD OF LIMIT LINE
-500 500


( 1) NO. OF  SLICES =  30.0
( 2) NO. OF POINTS ON EACH SIDE OF GRID =   5
( 3) XO =     15.00 (FT)
( 4) YO =    -30.00 (FT)
( 5) DELTA X =   5.00 (FT)
( 6) DELTA Y =   5.00 (FT)
( 7) Y-COORD RL =     15.00 (FT)
( 8) DELTA RL =   2.00 (FT)
( 9) NO.OF LEVELS =  5
(10) Y-COORD OF CRACK =      0.0  (FT)
(11) NO. OF POINTS ON -X SIDE =  1
(12) NO. OF POINTS ON +X SIDE =  4
(13) -X COORD OF LIMIT LINE =    -500.00 (FT)
(14) +X COORD OF LIMIT LINE =     500.00 (FT)
```

IS ALL INPUT ?

POINTS DEFINING CROSS-SECTION

ENTER X AND Y
-500 0

ENTER X AND Y
10 5

ENTER X AND Y
25 5

ENTER X AND Y
35 5

ENTER X AND Y
500 10

REPRINT OF INPUT

	X COORDINATE (FT)		Y COORDINATE (FT)
(1)	-500.000	(19)	0.0
(2)	10.000	(20)	5.000
(3)	25.000	(21)	5.000
(4)	35.000	(22)	5.000
(5)	500.000	(23)	10.000

IS ALL INPUT OK ?
N

ENTER INDEX AND A VALUE
22 10

ENTER INDEX AND A VALUE

(1)	-500.000	(19)	0.0
(2)	10.000	(20)	5.000
(3)	25.000	(21)	5.000
(4)	35.000	(22)	10.000
(5)	500.000	(23)	10.000

IS ALL INPUT OK ?

SECTIONAL DETAILS
ENTER NO. OF SECTIONS BEING CONSIDERED
2

NO. OF SECTIONS BEING CONSIDER IS 2. IS THAT CORRECT ?

ENTER NO. OF SOIL TYPE BEING CONSIDERED
2

NO. OF SOIL TYPE BEING CONSIDERED IS 2. IS THAT CORRECT ?

SECTION 1

ENTER X COORD AND WATER LEVEL
-500 10

ENTER 2 Y COORDINATES. ONE FOR EACH SOIL TYPE STARTING FROM UPPER BOUNDARY
0 10

REPRINT OF INPUT FOR SECTION NO. 1

(1) X-COORD = -500.000 (FT) (2) WATER LEVEL = 10.000 (FT)
Y COORDINATES (FT)
(3) 0.0 (4) 10.000

IS ALL INPUT OK ?

SECTION 2

ENTER X COORD AND WATER LEVEL
500 10

ENTER 2 Y COORDINATES. ONE FOR EACH SOIL TYPE STARTING FROM UPPER BOUNDARY
0 10

REPRINT OF INPUT FOR SECTION NO. 2

(1) X-COORD = 500.000 (FT) (2) WATER LEVEL = 10.000 (FT)
Y COORDINATES (FT)
(3) 0.0 (4) 10.000

IS ALL INPUT OK ?

SOIL PROPERTIES
ENTER COHESIVE STRENGTH, ANGLE OF SHEAR, BULK DENSITY, AND SUBMERGED DENSITY FOR
THE FOLLOWING SOIL TYPES :
SOIL TYPE NO. 1
0 35 130 130

SOIL TYPE NO. 2
250 0 80 18

REPRINT OF INPUT DATA

SOIL TYPE <- NO.->		<---COHESION---> (PSI)		ANGLE OF <-----SHEAR----> (DEGREES)		BULK <----DENSITY---> (LB/FT3)		SUBMERGED <-- DENSITY --> (LB/FT3)	
(1)	1	(2)	0.0	(3)	35.00	(4)	130.00	(5)	130.00
(6)	2	(7)	250.00	(8)	0.0	(9)	80.00	(10)	18.00

IS ALL INPUT OK ?

DO YOU WANT TO CORRECT ANY PREVIOUS DATA?
N

DO YOU WANT PRINT OUT OF ALL INPUT DATA?
N

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                    **********************
                    * O U T P U T  D A T A *
                    **********************

FAILURE CIRCLE CENTERS WITH CORRESPONDING FACTORS OF SAFETY(COORDINATES IN FT)
```

	5.00	10.00	15.00	20.00	25.00
-40.00	1.496	1.410	1.369	1.368	1.408
-35.00	1.420	1.326	1.283	1.283	1.325
-30.00	1.412	1.308	1.261	1.261	1.307
-25.00	1.415	1.294	1.241	1.241	1.294
-20.00	1.427	1.290	1.228	1.227	1.288

CRITICAL CIRCLES

	RADIUS (FT)	XC (FT)	YC (FT)	F. OF S.
1	43.00	20.00	-20.00	1.227
2	43.00	15.00	-20.00	1.228
3	48.00	20.00	-25.00	1.241
4	48.00	15.00	-25.00	1.242
5	53.00	20.00	-30.00	1.261
6	53.00	15.00	-30.00	1.262
7	58.00	15.00	-35.00	1.283
8	58.00	20.00	-35.00	1.284
9	43.00	25.00	-20.00	1.289
10	43.00	10.00	-20.00	1.291

```
IS THE NEXT PROBLEM A MODIFICATION OF THE PREVIOUS ONE?

DO YOU WANT TO CHANGE TO A DIFFERENT PROGRAM FUNCTION ?
N

( 1) NO. OF  SLICES =  30.0
( 2) NO. OF POINTS ON EACH SIDE OF GRID =  5
( 3) XO =     15.00 (FT)
( 4) YO =    -30.00 (FT)
( 5) DELTA X =   5.00 (FT)
( 6) DELTA Y =   5.00 (FT)
( 7) Y-COORD RL =      15.00 (FT)
( 8) DELTA RL =  2.00 (FT)
( 9) NO.OF LEVELS =  5
(10) Y-COORD OF CRACK =      0.0  (FT)
(11) NO. OF POINTS ON -X SIDE =  1
(12) NO. OF POINTS ON +X SIDE =  4
(13) -X COORD OF LIMIT LINE =    -500.00 (FT)
(14) +X COORD OF LIMIT LINE =     500.00 (FT)


IS ALL INPUT OK ?
N

ENTER INDEX AND A VALUE
3 25

ENTER INDEX AND A VALUE
4 -20

ENTER INDEX AND A VALUE
2 9
```

-8.00	1.805	1.614	1.465	1.398	1.467	999.998	999.998	999.998	999.998

CRITICAL CIRCLES

	RADIUS (FT)	XC (FT)	YC (FT)	F. OF S.
1	46.00	20.00	-23.00	1.305
2	43.00	20.00	-20.00	1.307
3	49.00	20.00	-26.00	1.311
4	40.00	20.00	-17.00	1.312
5	52.00	20.00	-29.00	1.318
6	37.00	20.00	-14.00	1.325
7	55.00	20.00	-32.00	1.326
8	46.00	25.00	-23.00	1.336
9	46.00	15.00	-23.00	1.336
10	49.00	25.00	-26.00	1.338

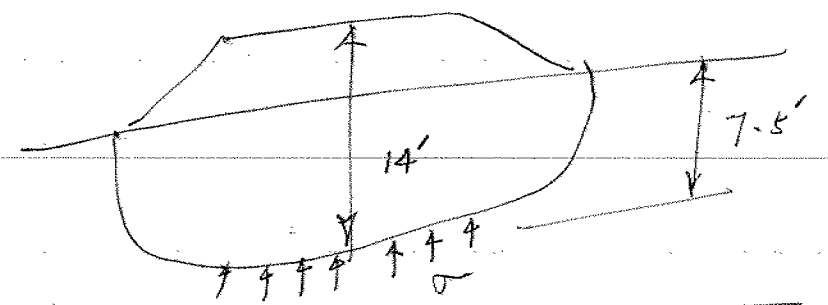
** WARNING ** THERE ARE OVER 100 UNDEFINED FACTORS OF SAFETY IN THE GRID - CHECK GEOMETRY AND INPUT DATA

IS THE NEXT PROBLEM A MODIFICATION OF THE PREVIOUS ONE?
!

READY
LOGOFF

TCSGPS LOGGED OFF TSO AT 15:07:09 ON DECEMBER 13, 1976

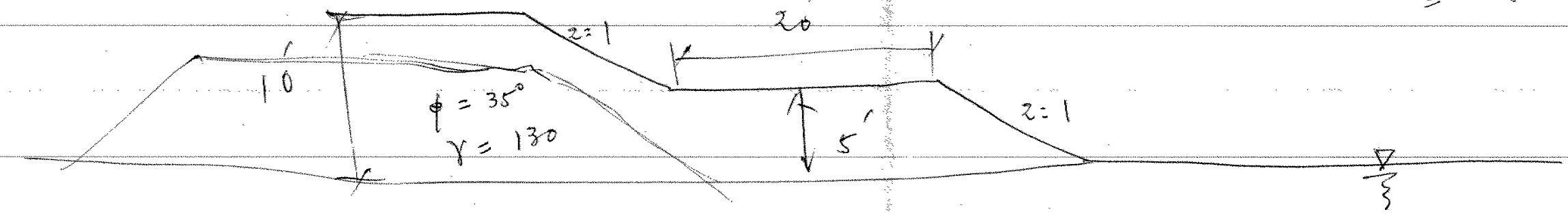
W.P. 103-63-04



$\sigma = 14 \times 130 - 7.5 \times 80$

$= 1820 - 600 = 1220 = 5c$

$c \doteqdot 240$ psf



$c = 250$

$\gamma = 80$

ENTER INDEX AND A VALUE

(1) NO. OF SLICES = 30.0
(2) NO. OF POINTS ON EACH SIDE OF GRID = 9
(3) XO = 25.00 (FT)
(4) YO = -20.00 (FT)
(5) DELTA X = 5.00 (FT)
(6) DELTA Y = 5.00 (FT)
(7) Y-COORD RL = 15.00 (FT)
(8) DELTA RL = 2.00 (FT)
(9) NO.OF LEVELS = 5
(10) Y-COORD OF CRACK = 0.0 (FT)
(11) NO. OF POINTS ON -X SIDE = 1
(12) NO. OF POINTS ON +X SIDE = 4
(13) -X COORD OF LIMIT LINE = -500.00 (FT)
(14) +X COORD OF LIMIT LINE = 500.00 (FT)

IS ALL INPUT OK ?
N

ENTER INDEX AND A VALUE
6 3

ENTER INDEX AND A VALUE

(1) NO. OF SLICES = 30.0
(2) NO. OF POINTS ON EACH SIDE OF GRID = 9
(3) XO = 25.00 (FT)
(4) YO = -20.00 (FT)
(5) DELTA X = 5.00 (FT)
(6) DELTA Y = 3.00 (FT)
(7) Y-COORD RL = 15.00 (FT)
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(11) NO. OF POINTS ON -X SIDE = 1
(12) NO. OF POINTS ON +X SIDE = 4
(13) -X COORD OF LIMIT LINE = -500.00 (FT)
(14) +X COORD OF LIMIT LINE = 500.00 (FT)

IS ALL INPUT OK ?

POINTS DEFINING CROSS-SECTION

DO YOU WANT TO MODIFY THE PREVIOUS SURFACE COORDINATES ?

REPRINT OF INPUT

	X COORDINATE (FT)		Y COORDINATE (FT)
(1)	-500.000	(19)	0.0
(2)	10.000	(20)	5.00
(3)	25.000	(21)	5.000
(4)	35.000	(22)	10.000

```
( 5)      500.000          (23)       10.000
IS ALL INPUT OK ?
3 30

ENTER INDEX AND A VALUE
4 40

ENTER INDEX AND A VALUE


( 1)     -500.000          (19)        0.0
( 2)       10.000          (20)        5.000
( 3)       25.000          (21)        5.000
( 4)       40.000          (22)       10.000
( 5)      500.000          (23)       10.000
IS ALL INPUT OK ?
N

ENTER INDEX AND A VALUE
3 30

ENTER INDEX AND A VALUE


( 1)     -500.000          (19)        0.0
( 2)       10.000          (20)        5.000
( 3)       30.000          (21)        5.000
( 4)       40.000          (22)       10.000
( 5)      500.000          (23)       10.000
IS ALL INPUT OK ?


                    SECTIONAL DETAILS
DO YOU WANT TO MODIFY THE PREVIOUS SECTIONAL DATA ?
N


                    SOIL PROPERTIES
DO YOU WANT TO MODIFY THE PREVIOUS SOIL PROPERTIES ?
N


DO YOU WANT TO CORRECT ANY PREVIOUS DATA?
N

DO YOU WANT PRINT OUT OF ALL INPUT DATA?
N


                    **************************
                    * O U T P U T  D A T A *
                    **************************

FAILURE CIRCLE CENTERS WITH CORRESPONDING FACTORS OF SAFETY(COORDINATES IN FT)
==============================================================================

          5.00     10.00     15.00     20.00     25.00     30.00     35.00     40.00     45.00
-32.00    1.578     1.426     1.349     1.326     1.350     1.427     1.580     1.834   999.998
-29.00    1.595     1.428     1.343     1.317     1.343     1.426     1.593     1.868   999.998
-26.00    1.624     1.431     1.339     1.310     1.338     1.429     1.612     1.916   999.998
-23.00    1.657     1.438     1.336     1.305     1.336     1.437     1.639   999.998   999.998
-20.00    1.643     1.456     1.341     1.306     1.339     1.456     1.675   999.998   999.998
-17.00    1.684     1.484     1.349     1.312     1.350     1.480     1.728   999.998   999.998
-14.00    1.729     1.534     1.371     1.324     1.370     1.520   999.998   999.998   999.998
-11.00    1.774     1.598     1.405     1.352     1.404     1.578   999.998   999.998   999.998
```

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. E.V. Saint
Head Geotechnical Section
Kingston, Ont.

FROM: Engineering Materials Office
Soil Mechanics Section

ATTENTION: D.G. Guibord

DATE: December 9, 1976

OUR FILE REF.

IN REPLY TO

SUBJECT:

Treatment of Settled Areas Over Muskeg Deposits
From 8.9 Miles North of Bannockburn 100.3 Miles North of
St. Ola Rd.
W.P. 103-63-04, Highway #62
District #10 - Bancroft

We have completed our testing of the samples your Regional Soils Office obtained to determine the subsoil conditions of the above sections of Hwy. 62. Shown on the Record of Boreholes, attached, are the moisture content, the organic content and the grain size distribution as determined by our testing. Also please find attached Appendix 1 showing factual data of the locations, details of distress of roadway, existing elevation of embankment, average original ground elevation and a description of subsoil conditions.

In conversation with the Region we were informed that the original method of construction of the roadway embankment was displacement of the organics by granular and a well-graded sand fill. The Bancroft District Maintenance branch have kept records of maintenance operations on the above sections of highway since 1972. From these records the following information was obtained.

A) Cold mix applications twice per year
Hot mix applications once per year

B) 120 tons of cold mix every year
120 tons of hot mix every year

C) Settlements of about 4" to 8" (sometimes more) from one maintenance operation to the other

The Details of Distress of Roadway as described in Appendix 1 are explained as follows:

REASONS FOR DISTRESS

1. Since the organics are not removed or displaced completely, settlements (total as well as differential settlements) will occur in the future if present grades are maintained.

2. Since the organics are not of uniform thickness underneath roadway, the settlements will not be uniform.

3. We expect that there is a shear deformation of the organics due to low bearing capacity.

4. The general relief is very poor in this area. Fluctuations in water level due to seasonal variations will induce additional volume changes in the area adjacent to the roadway.

Our suggestions regarding treatment are as follows:

REMEDIAL MEASURES

1. If traffic conditions permit, then preloading the distress areas with additional fill and constructing adequate lengths of berms to ensure stability would be the best possible remedial measure. However, it is understood that detouring may not be economical. If it is feasible this section will provide the necessary recommendations pertaining to this aspect.

2. In our opinion the alternative would be to reduce the induced stresses in the underlying organic material by unloading the existing fills as much as possible, preferably three feet. The removed material should be used to flatten the side slopes and also to construct as berms on the sides. In addition areas lying in undated adjacent to the roadway should be filled. The new section should satisfy the following requirements.

A) Drainage of the area without flooding the roadway during spring thaw or heavy rain storms.

B) Frost protection requirements of the roadways.

C) A smooth transition in the profile grade should be provided between the treated and untreated areas.

Although settlements and maintenance costs will be significantly reduced by unloading the existing fill, settlements will continue indefinately due to the extreme compressibility of the organics.

If you have any further questions please do not hesitate to contact us.

Malcolm Maclean

M. MacLean
Project Engineer

For: M. Devata
Supervising Engineer

MM/bp

cc: G.A. Wrong
Files
Record Services

APPENDIX 1 FACTUAL DATA

Location Station to Station	Existing Elev. of Embankment	Average Original Ground Elev.	Details of Distress of Roadway	Subsurface Conditions	Remarks
561+00 to 563+50	1026±	1022±	Severe meander cracking Severe differential settlement on diagonal crossing centreline	Sta. 562+50 - Subsoil consists of 13 ft. of sand fill (roadway embankment) underlain by 8 ft. of organics which is followed by sand - The thickness of the roadway fill and that of the underlying organic material is more or less uniform at this location - The granular fill material above the water line is not susceptible to frost. The fill material below the water line is borderline susceptible to frost - Water line is at elev. 1020	Subsurface data at this location is based on borings and testing completed by the Regional Soils
569+00 to 576+00	1027±	1021±	Very severe distortion Very slight midlane cracks Mulch patch in poor condition Moderate to severe loss of coarse and fine aggregate Severe differential settlements Very severe wheel track rutting Worst settlement Sta. 572+50 to 573+50	Sta. 571+50 - B.H. 5-15' lt. of centreline Top of B.H. Elev. = 1026.3 Subsoil consists of 17 ft. of sand fill underlain by 10 ft. of organics underlain by bedrock - B.H. 1-15' rt. of centreline Top of B.H. Elev. = 1026.3 Subsoil consists of 25 ft. of sand fill underlain by 12 ft. of sand and gravel which is followed by bedrock - B.H. 2-72' rt. of centreline Top of B.H. at elev. 1022.0 Subsoil consists of 30 ft. of organics underlain by silty sand - The thickness of the roadway	Sta. 571+50 15' lt. B.H. 5 Moisture content of organics under roadway fill: at elev. 1005 = 355% at elev. 1000 = 441% Sta. 571+50 72' rt. B.H.2 Moisture content of organics outside of roadway fill at elev. 1018 = 683%

Location Station to Station	Existing Elev. of Embankment	Average Original Ground Elev.	Details of Distress of Roadway	Subsurface Conditions	Remarks
569+00 to 576+00 continued				fill and that of the organics is variable at this location - The granular fill material at this location is not susceptible to frost - Water line is at elev. 1020 Sta. 573+50 - B.H. 4 15' lt. of centreline Top of B.H. elev. = 1026.2 Subsoil consists of 17 ft. of sandy fill underlain by 5 ft. of organics underlain by sand - B.H. 6 15' rt. of centreline Top of B.H. elev. = 1026.2 Subsoil consists of 18 ft. of sandy fill underlain by silty sand - The thickness of the roadway fill and that of the organics is variable at this location - Granular fill at this location is not susceptible to frost - Water line is at elev. 1020	Sta. 573+50 15' lt. Moisture content of organics at elev. 1005 122%
589+00 to 591+00	1026±	1021±	Moderate differential settlement and distortion Severe loss of coarse aggregate	Sta. 590+50 - Subsoil consists of 13 ft. of sand fill roadway embankment underlain by 3 ft. of organics underlain by bedrock - Since only one borehole was done at this location the variation of thickness of the roadway fill and that of the organics is not known	Subsurface data at this location is based on borings and testing completed by the Regional Soils

Location Station to Station	Existing Elev. of Embankment	Average Original Ground Elev.	Details of Distress of Roadway	Subsurface Conditions	Remarks
				- Granular fill at this location above elev. 1015 is not frost susceptible - Water line is at elev. 1020	
594+00 to 598+00	1027±	1021±	Severe differential settlement Moderate to severe loss of fine aggregate Moderate midlane cracking with severe to very severe distortion	Sta. 596+00 - B.H. 8 14' lt. of centreline Top of B.H. Elev. 1025.6 Subsoil consists of 31 ft. of sand fill underlain by 3 ft. of organic followed by bedrock - B.H. 7 14' rt. of centreline Top of B.H. Elev. 1025.6 Subsoil consists of 21 ft. of sand fill underlain by 10 ft. of organics followed by bedrock - The thickness of the roadway fill and that of the organics under the roadway embankment is variable - Water line is at elev. 1020	Sta. 596+00 14' lt. Moisture content of organics at elev. 995 205% Sta. 596+00 14' rt. Moisture content of organics at elev. 1001 = 321%

Location Station to Station	Existing Elev. of Embankment	Average Original Ground Elev.	Details of Distress of Roadway	Subsurface Conditions	Remarks
615+00 to 618+00	P.G. at Sta. 615+00 1032.3 P.G. at Sta. 616+00 1033.0 P.G. at Sta. 617+00 1034.7 P.G. at Sta. 618+00 1038.0	(at Sta. 616+00) 1025±	Very severe differential settlement at Sta. 616+ Slight meandering cracks Severe distortion Severe loss of coarse aggregate	Sta. 615+00 - B.H. 10 14' lt. Top of B.H. Elev. 1032.6 Subsoil consists of 20 ft. of sand fill underlain by 10 ft. of organics underlain by bedrock - B.H. 9 15' rt. Top of B.H. Elev. 1032.6 Subsoil consists of 29 ft. of sand fill underlain by 4 ft. of organics followed by bedrock - The thickness of roadway fill and organics under the roadway embankment is variable - The granular fill material at this location is not susceptible to frost - Water line is at elev. 1025	At B.H. 10 14' lt. Moisture content of organics under roadway fill at elev. 1008 = 152% At B.H. 9 15' rt. Moisture content of organics under roadway fill at elev. 1003 = 158%

Mr. E.V. Saint
Head Geotechnical Section
Kingston, Ont.

D.G. Guibord

Engineering Materials Office
Soil Mechanics Section

December 9, 1976

Treatment of Settled Areas Over Muskeg Deposits
From 8.9 Miles North of Bannockburn 100.3 Miles North of
St. Ola Rd.
W.P. 103-63-04, Highway #62
District #10 - Bancroft

We have completed our testing of the samples your Regional Soils Office obtained to determine the subsoil conditions of the above sections of Hwy. 62. Shown on the Record of Boreholes, attached, are the moisture content, the organic content and the grain size distribution as determined by our testing. Also please find attached Appendix 1 showing factual data of the locations, details of distress of roadway, existing elevation of embankment, average original ground elevation and a description of subsoil conditions.

In conversation with the Region we were informed that the original method of construction of the roadway embankment was displacement of the organics by granular and a well-graded sand fill. The Bancroft District Maintenance branch have kept records of maintenance operations on the above sections of highway since 1972. From these records the following information was obtained.

A) Cold mix applications twice per year
Hot mix applications once per year

B) 120 tons of cold mix every year
120 tons of hot mix every year

C) Settlements of about 4" to 8" (sometimes more) from one maintenance operation to the other

The Details of Distress of Roadway as described in Appendix 1 are explained as follows:

REASONS FOR DISTRESS

1. Since the organics are not removed or displaced completely, settlements (total as well as differential settlements) will occur in the future if present grades are maintained.

2. Since the organics are not of uniform thickness underneath roadway, the settlements will not be uniform.

3. We expect that there is a shear deformation of the organics due to low bearing capacity.

4. The general relief is very poor in this area. Fluctuations in water level due to seasonal variations will induce additional volume changes in the area adjacent to the roadway.

Our suggestions regarding treatment are as follows:

REMEDIAL MEASURES

1. If traffic conditions permit, then preloading the distress areas with additional fill and constructing adequate lengths of berms to ensure stability would be the best possible remedial measure. However, it is understood that detouring may not be economical. If it is feasible this section will provide the necessary recommendations pertaining to this aspect.

2. In our opinion the alternative would be to reduce the induced stresses in the underlying organic material by unloading the existing fills as much as possible, preferably three feet. The removed material should be used to flatten the side slopes and also to construct as berms on the sides. In addition areas lying in undated adjacent to the roadway should be filled. The new section should satisfy the following requirements.

A) Drainage of the area without flooding the roadway during spring thaw or heavy rain storms.

B) Frost protection requirements of the roadways.

C) A smooth transition in the profile grade should be provided between the treated and untreated areas.

Although settlements and maintenance costs will be significantly reduced by unloading the existing fill, settlements will continue indefinately due to the extreme compressibility of the organics.

If you have any further questions please do not hesitate to contact us.

Malcolm Maclean

M. MacLean
Project Engineer

For: M. Devata
Supervising Engineer

MM/bp

cc: G.A. Wrong
Files
Record Services

APPENDIX 1 FACTUAL DATA

Location Station to Station	Existing Elev. of Embankment	Average Original Ground Elev.	Details of Distress of Roadway	Subsurface Conditions	Remarks
561+00 to 563+50	1026±	1022±	Severe meander cracking Severe differential settlement on diagonal crossing centreline	Sta. 562+50 - Subsoil consists of 13 ft. of sand fill (roadway embankment) underlain by 8 ft. of organics which is followed by sand - The thickness of the roadway fill and that of the underlying organic material is more or less uniform at this location - The granular fill material above the water line is not susceptible to frost. The fill material below the water line is borderline susceptible to frost - Water line is at elev. 1020	Subsurface data at this location is based on borings and testing completed by the Regional Soils
569+00 to 576+00	1027±	1021±	Very severe distortion Very slight midlane cracks Mulch patch in poor condition Moderate to severe loss of coarse and fine aggregate Severe differential settlements Very severe wheel track rutting Worst settlement Sta. 572+50 to 573+50	Sta. 571+50 - B.H. 5-15' lt. of centreline Top of B.H. Elev. = 1026.3 Subsoil consists of 17 ft. of sand fill underlain by 10 ft. of organics underlain by bedrock - B.H. 1-15' rt. of centreline Top of B.H. Elev. = 1026.3 Subsoil consists of 25 ft. of sand fill underlain by 12 ft. of sand and gravel which is followed by bedrock - B.H. 2-72' rt. of centreline Top of B.H. at elev. 1022.0 Subsoil consists of 30 ft. of organics underlain by silty sand - The thickness of the roadway	Sta. 571+50 15' lt. B.H. 5 Moisture content of organics under roadway fill: at elev. 1005 = 355% at elev. 1000 = 441% Sta. 571+50 72' rt. B.H.2 Moisture content of organics outside of roadway fill at elev. 1018 = 683%

Location Station to Station	Existing Elev. of Embankment	Average Original Ground Elev.	Details of Distress of Roadway	Subsurface Conditions	Remarks
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594+00 to 598+00	1027±	1021±	Severe differential settlement Moderate to severe loss of fine aggregate Moderate midlane cracking with severe to very severe distortion	Sta. 596+00 - B.H. 8 14' lt. of centreline Top of B.H. Elev. 1025.6 Subsoil consists of 31 ft. of sand fill underlain by 3 ft. of organic followed by bedrock - B.H. 7 14' rt. of centreline Top of B.H. Elev. 1025.6 Subsoil consists of 21 ft. of sand fill underlain by 10 ft. of organics followed by bedrock - The thickness of the roadway fill and that of the organics under the roadway embankment is variable - Water line is at elev. 1020	Sta. 596+00 14' lt. Moisture content of organics at elev. 995 = 205% Sta. 596+00 14' rt. Moisture content of organics at elev. 1001 = 321%

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Ministry of Transportation and Communications
Ontario

Memorandum

To: Mr. M. Devata, Supervising Engineer,
Soils Mechanics Office,
West Building,
Downsview, Ontario.

From: Materials and Testing Office,
Kingston, Ontario.

Attention:

Date: 2 November 76.

Our File Ref.

In Reply to

Subject:

W. P. 103-63-04, Highway #62
District #10 - Bancroft

Attached herewith are a profile and six cross-sections of the muskeg areas that were under investigation this year.

We will await your detailed suggestions and recommendations regarding the swamp treatments.

D. G. Guibord

D. G. Guibord,
Project Soils Engineer.

/sgr

Att'd.

Ministry of Transportation and Communications
Ontario

Memorandum

To: Mr. M. Devata, Supervising Engineer, Soils Mechanics Office, W. Building, Downsview, Ontario.

From: Materials and Testing Office, Kingston, Ontario.

Attention:

Date: 13 October 76.

Our File Ref.

In Reply to

Subject:

W. P. 103-63-04, Highway #62 - Treatment of Settled Areas Over Muskeg Deposits, From 8.9 Miles North of Bannockburn to 0.3 Miles North of St. Ola Road

On October 5, 1976 two borings were obtained for one additional muskeg location. These were taken to bedrock with a truck-mounted flight auger. A third boring was done at yet another location to attempt to penetrate through the bouldery material. However, penetration was limited to a depth of 16' (4.8m). I am forwarding a copy of these field notes for your information. The two samples collected are being analyzed for gradation and moisture content at our Regional Soils Lab.

D. G. Guibord

D. G. Guibord,
Project Soils Engineer.

/sgr

c.c. G. A. Wrong

Encl.

SEP 8 9 59 AM '76

TCI746 09080950
KIN283
DNA
MR. MURTI DEVATA, SOILS MECHANICS SECTION

RE: W.P. 103-63-04, HWY 62, TREATMENT OF
SETTLED AREAS OVER MUSKEG DEPOSITS.

AS PER YOUR REQUEST FOR FURTHER CLARIFICATION ON THE 600 FEET OF DRILLING, WE SUBMIT THE FOLLOWING. THIS IS THE TOTAL DISTANCE OF DRILLING, WHICH INCLUDES 400 FEET THROUGH MUSKEG APPROXIMATELY.

D.G. GUIBORD, M AND T
VF

Ministry of Transportation and Communications
Ontario

Memorandum

To: Mr. M. Devata
Supervising Engineer
Soil Mechanics Office, West Building,
Attention: Downsview

From: Materials & Testing Office
Eastern Region, Kingston

Date: 1 September 1976

Our File Ref.

In Reply to

Subject: W.P. 103-63-04, Hwy #62
Treatment of Settled Areas over Muskeg Deposits and
HM Paving, From 1.9 Mi. N. Bannockburn N'ly to 1.1 Mi.N.of St.Ola.

As discussed with you on August 31, 1976, we would appreciate it if you could assist us with sub-surface investigation and development of design alternatives for treatment of the problem areas on the above noted project.

We are interested in carrying out the field investigation in the Region, but would like your advice on the investigation program and your assistance on the analysis of the field data and on the development of the possible design alternatives.

It would therefore be appreciated if you would arrange for a Diamond Drill and a drilling machine with hollow stem augers to arrive on the site either on Sept. 13,14 or 20, 1976. Denis Guibord, Project Soils Engineer, will supervise the site investigation work. When final arrangements have been made, please notify Mr.Guibord or the undersigned.

Investigation will involve establishment of 4 bore holes (2 through existing roadbed fill and 2 at offsets) at 5 locations along the settled areas. The swamp depths are approximately 25' to 30', therefore approximately 600' of drilling is required.

It would be appreciated if we could meet with you or your representative on the site to assess the drilling program in its early stage.

You mentioned that you will forward your office stationery for recording the field investigation data. Also, could you bring some Shelby Tubes when you visit the site.

We will pay the Drilling Contractor for the work from this office, in accordance with the Ministry's Agreement and Denis will record equipment time sheets etc.

Should you require additional information, please do not hesitate to contact us.

A.M.Batten
Senior Soils Supervisor

RECEIVED
GEOTECHNICAL OFFICE
SEP 07 1976
SOIL MECHANICS
MINISTRY OF TRANSPORTATION & COMMUNICATIONS

c.c.
G.Gauthier
G.A.Wrong

/jeb

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

Soils Field Summary

Hwy. 62 W.P. 103-63-04

Location: 8.9 MI. N. OF BANNOCKBURN N'LY TO 0.3 MI. N. OF ST. OLA RD.

Type of Proposed Contract: MISC. Length: VAR.

Soils Profile	Line	Chainage	Township	County
NOTE: THESE NOTES WERE EXTRACTED FROM THE SOILS PROFILE. ~~(K-62-A-2)~~				
K-62-A-2	-	557+50 - 617+18	TUDOR	HASTINGS

GENERAL DATA

Type of Survey: Pedological Sketch (Logs of Borings)

Method of Investigation: Power Auger Peat Sampler Hand Auger Vanes

Line On: Existing Road New Location

Type of Surface: H.M. & MULCH PATCH Width of: Surface 22' Shoulders 6'

Condition of Surface at time of Survey: POOR AT SWAMP LOCATIONS, WHERE DRILLING WAS MADE.

NOTE: BOREHOLES WITH ASTERISK WERE OBTAINED IN 1976, WITH PRESENT ℄ DATUM, OTHER OFFSETS OBTAINED IN 1960.

General Description of Existing Gradeline and Alignment:

BOTH SATISFACTORY RE GEOMETRICS.

SOILS DATA

Physiography (Topography and Land Form):

Describe General Soil Types and Conditions:

What type of Earth Borrow is available if required?

Are any Foundation problems anticipated with fills greater than 10'? YES.

Does this Survey include a Granular Survey? NO.

Party Chief: Date:

~~Sample Results~~ Transferred by: D.G. Guitard Date: 28 Sept 76

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Ontario

SUBGRADE CHECK FIELD SHEET

PAGE NO. 1

TWP. _____ DATE _____ 19____

557+50 40' Rt (-8')

0-5' MUCK
5' NFP SOLID SA BOTTOM

557+50 40' Lt (-8')

0-5' MUCK
5' NFP SOLID SA BOTTOM.

559+00 40' Rt (-5')

0-5' BR-BLK MUCK
5'-6' VF SA & SI
6' NFP BLDS

559+00 40' Lt (-5')

0-5' BR-BLK MUCK
5' NFP B.R.

561+50 50' Rt (-4')

0-22' BR-BLK MUCK (LOGS) SAT SLY FIB & SLY ~~SOFT~~ (WDY)
22'-24' VF SA & SI FIRM @ 24'

HWY. NO. 62 LOCATION W.P. 103-63-04 ENGINEER _____

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Ministry of Transportation and Communications
Ontario

SUBGRADE CHECK FIELD SHEET

PAGE NO. 2

TWP. [redacted] DATE 19

561+50 50' Lt (-4')

0 – 8' BR-BLK MUCK (LOGS) SAT. SLY FIB & SLY WDY (SOFT)
8' NFP LOGS

562+20 14' Rt

0 – 8" BR CR GR
8" – 96" BR F GR
96" – 13' GRY FSA LO TILL (SI SEAMS) (TR ORG)
13' – 15.5' BR ORG DRY (VERY WDY)
15.5' NFP (VERY COMP.)

563+50 45' Rt (-4')

0 – 22' BR-BLK MUCK SLY FIB & WDY SOFT.
22' – 24' VF SA & SI FIRM @ 24'

563+50 45' Lt (-4')

0 – 17' BR-BLK MUCK SAT. SLY FIB & SLY WDY SOFT.
17' – 20' VF SA & SI FIRM @ 20'

568+50 50' Rt (-5')

0 – 18' BR-BLK MUCK (LOGS) SLY FIB & SLY WDY - SOFT.
18' – 19' GRY M. SA.

HWY. NO. LOCATION ENGINEER

OB-MT-161 6-74

Ministry of Transportation and Communications
Ontario

SUBGRADE CHECK FIELD SHEET

PAGE NO. 3

TWP. _____ DATE _____ 19____

568 +50 40' Lt (-5')

0-6' BR-BLK MUCK SLY FIB & SLY WDY
6'-7' GRY M. SA SAT.
7'+ NFP

570 +00 60' Rt (-6')

0-18' BR-BLK MUCK (LOGS) SAT. SLY FIB & SLY WDY (SOFT)
18' SOLID SA BOTTOM

570+00 35' Lt (-6')

0-24" WATER
24"-12.5' BR-BLK MUCK (LOGS) SAT. SLY FIB & SLY WDY SOFT
12.5' SOLID SA BOTTOM.

571+00 40' Rt (-6')

0-23' BR-BLK MUCK (LOGS) (SAT) SLY FIB & SLY WDY SOFT
23'-26' GRY VF SA & SI WET.
26' NFP POSS B.R.

572+00 50' Lt (-5')

0-23' BR-BLK MUCK SAT SLY FIB & SLY WDY - SOFT.
23'-25' GRY VF SA & SI WET F. FIRM TO FIRM.

HWY. NO. _____ LOCATION _____ ENGINEER _____

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Ontario

SUBGRADE CHECK FIELD SHEET

PAGE NO. 4

TWP. _____ DATE _____ 19____

572+50 12' Rt.

0-14" BR CR GR
14"-15.5' BR F GR (SAT. 10'+)

573+00 12' Lt

0-7" BR CR GR
7"-40" BR F GR
40"-45" ASPH
45"-15' BR F GR (SAT 10'+)

573+00 50' Rt (-6')

0-7' BR-BLK MUCK (LOGS) SAT. SLY FIB & SLY WDY - SOFT.
7'+ NFP LOGS.

573+50 12' Lt.

0-8" BR CR GR
8"-12' BR F GR
12'-15' BR F SA LO TILL
15' NFP RK FILL

SURFACE VEGETATION - CLASS 'A'	
VANE TESTS - UNDIST/REMOLD (P.S.F.)	
STA. 573±-35' Rt. (-6')	STA. 573±-42' Lt (-6')
@3'-200/120	@3'-480/160
@7'-380/140	@6'-360/120
@9'-480/240	@8'-400/120
@11'-640/380	@11'-400/200
@13'-880/600	@14'-640/340
	@16'-760/440

574+00 50' Lt (-6')

0-21' BR-BLK MUCK SAT. SLY FIB & SLY WDY - SOFT.
21'-23' GRY VF SA & SI WET SOFT TO FIRM @ 23'.

HWY. NO. _____ LOCATION _____ ENGINEER _____

OB-MT-161 6-74

Ministry of Transportation and Communications
Ontario

SUBGRADE CHECK FIELD SHEET

PAGE NO. 5

TWP. _____ DATE _____ 19____

575+00 50' Rt (-6')

0-25' BR-BLK MUCK LOGS SAT SLY FIB & SLY WDY-SOFT
25'+ NFP B.R.

589+00 45' Lt. (-4')

0-7' - BR-BLK MUCK SAT. FIB.
7'+ NFP BLDS.

590+00 13' Rt. ℄

0-8" BR CR GR
8"-10' BR F GR
10' NFP BLDS

590+00 45' Rt. (-4')

0-12' BR-BLK MUCK SAT. FIB.
12'-14' F SA BLDY

591+00 50' Rt. (-4')

0-11' BLK-BR MUCK SAT. FIB.
11'+ NFP BLDS

HWY. NO. _____ LOCATION _____ ENGINEER _____

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SUBGRADE CHECK FIELD SHEET

PAGE NO. 6

TWP. _____ DATE _____ 19____

594 + 10 34' Lt. (-5')

0-15' BLK MUCK SAT. FIB.

595 + 45 12' Rt.

0-7" BR CR GR
7"-38" BR F GR
38"-44" ASPH
44"-96" BR F GR
96"-13' GRY F SA LO TILL (TR ORG)
13'-15.5' BR ORG WDY (VERY COMP)
15.5' NFP

595 + 50 55' Rt. (-5')

0-18' BLK-BR MUCK SAT FIB
18'-19' VF SA & SI WET FIRM (BLDS)

596 + 00 14' Lt.

0-9" BR CR GR
9"-96" BR F GR
96"-9.5' GRY F SA LO (TR ORG 8'-9')
9.5'-15' BR F SA LO TILL

HWY. NO. _____ LOCATION _____ ENGINEER _____

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Ontario

SUBGRADE CHECK FIELD SHEET

PAGE NO. 7

TWP. _____ DATE _____ 19____

596+00 55' Lt. (-5')

0-28' BLK MUCK SAT SOFT FIB
28'-32' BR-BLK ORG. SI. WET. F. FIRM
32'+ NFP.

597+50 45' Rt (-6')

0-18' BLK-BR MUCK SAT. FIB. PART. DECOMP.
18'-19' VF SA & SI WET FIRM

598+00 50' Lt (-6')

0-11' BLK MUCK SAT SOFT
11' NFP BLDS

613+00 45' Lt (-6')

0-7' MUCK SAT BLK SOFT.
7'+ NFP B.R.

614+00 40' Rt. (-6')

0-5' MUCK SAT BLK SOFT.
5'+ NFP SA & BLDS

HWY. NO. _____ LOCATION _____ ENGINEER _____

08-MT-161 6-74

Ministry of Transportation and Communications
Ontario

SUBGRADE CHECK FIELD SHEET

PAGE NO. 8

TWP. _____ DATE _____ 19____

615+00 45' Lt (-6')

0-20' MUCK SAT. BLK SOFT
20'+ NFP BLDS & SA.

616+00 50' Rt. (-7')

0-29' MUCK SAT FIB SOFT.
29'-30' VF SA & SI WET.
30' NFP

616+00 55' Lt (-7')

0-16' MUCK SAT BLK-BR FIB SOFT
16'+ NFP SA & BLDS.

616+25 14' Rt.

0-18" BR CR GR
18"-96" BR F GR (SAT 7'+)
96"-16' BR F SA

617+00 15' Lt.

0-8" BR CR GR
8"-12' BR F GR (DIRTY 3'+)(SAT. 8'+)
12'-16' GRY F SA LO TILL

HWY. NO. _____ LOCATION _____ ENGINEER _____

08-MT-161 6-74

Ministry of Transportation and Communications
Ontario

SUBGRADE CHECK FIELD SHEET

PAGE NO. 9

TWP. _____ DATE _____ 19____

617 +18 40' Rt (-10')

0-19'	MUCK SAT FIB SOFT
19'-20'	VF SA & SI WET F. SOFT.
20'	NFP PROB BLDS.

617 +18 40' Lt (-10')

0-15"	WATER
15"-20'	MUCK SAT SOFT (TR SA)
20'-26'	F SA WET.
26'	NFP

HWY. NO. _____ LOCATION _____ ENGINEER _____

08-MT-161 6-74

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Ontario

FIELD BORING LOG

SOIL MECHANICS SECTION

SHEET 1 OF 10

DRILLING CO. ATCOST (TORONTO) DATUM ELEV. GEODETIC B.H. No. 1
DRILLER MIKE REVEKIO GROUND ELEV. JOB No. W.P. 103-63-04
ENGINEER W.D. FOX CASING SIZE NX DATE 21 SEPT 76
SITE LOCATION 8.9 MI. N. OF BANNOCKBURN TO 0.3 MI. N. OF ST. OLA RD. (HWY 62)
HOLE LOCATION STA. 571+50 15'RT (CO. HASTINGS, TWP. TUDOR)
REMARKS

DEPTH FEET FROM	DEPTH FEET TO	DESCRIPTION	SAMPLE TYPE, No. & RECOVERY	METHOD OR BLOWS & DISTANCE
		DYNAMIC CONE PENETRATION TEST		
0'	10'	12-23-19-12-10-9-8-14-22-26		
10'	20'	25-15-13-5-3-4-3-4-5-9		
20'	27'	9-9-14-21-49-100-130		
		WASHING & SAMPLING		
0'	5'0"	DROVE NX CASING		
5'0"	6'6"	ATTEMPT SAMPLE RECOVERY - UNSUCCESSFUL		
		BLOWS: 4-4-4		
		WATER LEVEL @ 6'1"		
5'0"	10'0"	DROVE NX CASING		
10'0"	11'6"	BLOWS: 8-8-9		
		SAMPLES: 10'0"-11'0" SA LO TILL	S.S. #1	
		11'0"-11'6" GRY SALOTILL	S.S. #2	
10'0"	15'0"	DROVE NX CASING		
15'0"	16'6"	BLOWS: 5-5-1 FGR.	S.S. #3	
15'0"	20'0"	DROVE NX CASING (WASHED STARTING @ 16'6")		
20'0"	21'6"	BLOWS: 6-3-3 SA LO TILL	S.S. #4	
20'0"	25'0"	DROVE NX CASING & WASH		
25'0"	26'6"	BLOWS: 26-20-83 F-MED SA	S.S. #5	
25'0"	30'0"	DROVE NX CASING & WASH		
30'0"	31'6"	BLOWS: 37-14-10 CO. SA & WOOD	S.S. #6	
30'0"	35'0"	DROVE NX CASING & WASH		
35'0"	36'8"	F SA LO TILL & CO SA (OVER B.R.) TRACE ORG		6-17 for 5"
		at 35'0". WATER GUSHED FOR HOLE @ 35'.		
36'8"	40'0"	CORED GRANITE ROCK (DIAMOND BIT 984921)		

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FIELD BORING LOG

SOIL MECHANICS SECTION

SHEET 2 OF 10

DRILLING CO. ATCOST (TORONTO) DATUM ELEV. GEODETIC B.H. No. 2
DRILLER STAN SUKUNDA GROUND ELEV. JOB No. W.P. 103-63-04
ENGINEER W.D. FOX CASING SIZE NX DATE 21 SEP 76
SITE LOCATION 8.9 MI. N. OF BANNOCKBURN TO 0.3 MI. N. OF ST. OLA RD. (HWY 62)
HOLE LOCATION STA. 571+50 72' RT. (-6')
REMARKS BOMBARDIER MOUNTED HOLLOW STEM AUGER

DEPTH FEET FROM	DEPTH FEET TO	DESCRIPTION	SAMPLE TYPE, No. & RECOVERY	METHOD OR BLOWS & DISTANCE
		DYNAMIC CONE PENETRATION TEST		
0'	3'	1 BLOW FOR 3'		
3'	10'	1-1-1-1-2-2-3		
10'	20'	4-2-3-2-2-3-2-2-5-4		
20'	30'	7-5-4-6-4-5-5-6-8-8		
30'	31'	100		
31'0"	31'6"	100		
		WASHING & SAMPLING		
0'	3'0"	DROVE HOLLOW STEM AUGER — TOPSOIL & ORG. WOOD		
3'0"	6'0"	DROVE AUGER — BLK ORG WDY (WATER @ 1'2")	S.S. #1	1-1-1
6'0"	8'6"	BLK ORG WDY (WATER @ 2'0")	S.S. #2	1 for 1', 1 for 1'6"
10'0"	14'0"	BLK ORG WDY (WATER @ 3'0")	S.S. #3	1-1
15'0"	19'0"	BLK ORG WDY	S.S. #4	1 FOR 4'0"
20'0"	27'0"	BLK ORG WDY & PEAT	S.S. #5	1 FOR 7'0"
27'0"	28'0"	BLK ORG WDY		
30'0"	32'0"	F SISA & FGR	S.S. #6	1-2-47-28
0'	2'	TRS & ORG WOOD		
→	28'	ORGANIC MATERIAL		

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FIELD BORING LOG

SOIL MECHANICS SECTION

SHEET 3 OF 10

DRILLING CO. ATCOST (TORONTO) DATUM ELEV. GEODETIC B.H. No. 3

DRILLER STAN SUKUNDA GROUND ELEV. JOB No. 103-63-04

ENGINEER W.P. FOX CASING SIZE NX DATE 22 SEP 76

SITE LOCATION HWY 62 - 8.3 MI. N OF BANNOCKBURN TO 0.3 MI. N. OF ST. OLA RD.

HOLE LOCATION STA. 573+50 70' RT. (-5')

REMARKS BOMBARDIER MOUNTED HOLLOW STEM AUGER

DEPTH FEET FROM	DEPTH FEET TO	DESCRIPTION	SAMPLE TYPE, No. & RECOVERY	METHOD OR BLOWS & DISTANCE
		DYNAMIC CONE PENETRATION TEST		
0'	10'	1 (FOR 3') - 1 - 1 - 1 - 1 - 2 - 5 - 2		
10'	20'	3 - 3 - 3 - 3 - 3 - 4 - 4 - 4 - 4 - 4		
20'0"	29'6"	7 - 4 - 6 - 4 - 6 - 5 - 6 - 8 - 9 - 16 FOR 6"		
		REFUSAL AT 29'6"		
		SAMPLING		
0'0"	2'0"	AUGERED HOLE - TRS & ORG, PEAT, WOOD (WATER @ 1'4")		
2'0"	5'0"	AUGERED HOLE		
3'0"	5'0"	BLK ORG WDY SOFT	S.S. #1	1 FOR 1'6" 1 FOR 6"
5'0"	8'0"	AUGERED HOLE		
		BLK ORG WDY SOFT	S.S. #2	1 FOR 2' 1 FOR 6", 1 FOR 6"
8'0"	14'0"	AUGERED HOLE		
10'0"	14'0"	BLK ORG WDY SOFT	S.S. #3	1 FOR 2', 1 FOR 2'
14'0"	18'0"	AUGERED HOLE		
15'0"	18'0"	BLK ORG WDY	S.S. #4	1 FOR 3'
18'0"	28'0"	AUGERED HOLE		
20'0"	27'0"	BLK ORG WDY (PEAT)	S.S. #5 (2 bags)	?
27'0"	27'3"	GRY CL SI		1 - 1 - 2
28'0"	30'6"	AUGERED HOLE		
27'3"	29'0"	F SI SA WITH F CL SI LAYERS WET		
29'0"	30'6"	MED SA & CO. SA WET	S.S. #6	1 - 2 - 3 -
		REFUSAL - HOLE ENDS AT 30'6"		(50 FOR 0")

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FIELD BORING LOG

SOIL MECHANICS SECTION

DRILLING CO. ATCOST (TORONTO) DATUM ELEV. GEODETIC B.H. No. 4
DRILLER STAN SUKUNDA GROUND ELEV. JOB No. 103-63-04
ENGINEER W. D. FOX CASING SIZE NX DATE 23 SEP 76
SITE LOCATION 8.9 MI. N. OF BANNOCKBURN TO 0.3 MI. N. OF ST. OLA RD. (HWY 62)
HOLE LOCATION 573+50 15' LT.
REMARKS

DEPTH FEET FROM	DEPTH FEET TO	DESCRIPTION	SAMPLE TYPE, No. & RECOVERY	METHOD OR BLOWS & DISTANCE
		DYNAMIC CONE PENETRATION TEST.		
0'	10'	5-17-23-12-9-9-8-12-20-13		
10'	20'	8-5-3-5-6-7-10-11-19-25		
20'	26'	27-26-25-26-25-55		
26'0"	26'3"	16 FOR 3" THEN 100 FOR 0"		
		(REFUSAL AT 26'3" WITH POINT)		
		SAMPLING		
0'0"	2'6"	DROVE NX CASING		
2'6"	4'0"	S, SA & FGR	S.S.#1	8-10-12
2'6"	6'0"	DROVE NX CASING		
6'0"	7'6"	BR SA & FGR WET FROM 5'0" TO 6'9"	S.S.#2	4-7-8
6'0"	9'0"	DROVE NX CASING		
9'0"	11'0"	BR SA & FGR - CHANGE AT 10'0" TO	S.S.#3	7-6-5-5
		GRY CO SA & FGR WET		
9'0"	12'0"	DROVE NX CASING		
12'0"	14'0"	F SI SA WET.	S.S.#4	1-1-1-3
12'0"	15'0"	DROVE NX CASING		
15'0"	16'6"	CO SA SOME ORG AT 16'3" TO 16'6"	S.S.#5	4-3-1
15'0"	20'0"	DROVE NX CASING		
20'0"	21'6"	ORG. PEAT - REFUSAL AT 21'6" WITH	S.S.#6	1-2-2
		CASING & S.S.		
20'6"	23'0"	F SA USED AUGER		
23'0"	24'6"	MED SA - REFUSAL AT 24'6"		

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FIELD BORING LOG

SOIL MECHANICS SECTION

SHEET 5 OF 10

DRILLING CO. ATCOST (TORONTO) DATUM ELEV. GEODETIC B.H. No. 5
DRILLER MIKE REVEKIO GROUND ELEV. JOB No. 103-63-04
ENGINEER W.D. FOX CASING SIZE NX DATE 23 SEP 76
SITE LOCATION HWY 62 - 8.9 MI. N. OF BANNOCKBURN TO 0.3 MI. N. OF ST. OLA RD.
HOLE LOCATION STA 571+50 15' LT.
REMARKS

DEPTH FEET FROM	DEPTH FEET TO	DESCRIPTION	SAMPLE TYPE, No. & RECOVERY	METHOD OR BLOWS & DISTANCE
		DYNAMIC CONE PENETRATION TEST		
0'0"	10'0"	16-40-39-30-17-14-22-28-38-45		
10'0"	17'0"	90-30-15-7-7-15-18		
17'0"	17'6"	100 for 6" REFUSAL		
		SAMPLING & WASHING		
0'0"	3'0"	DROVE NX CASING		
3'0"	4'6"	FGR	S.S. # 1	15-13-12
3'0"	6'0"	DROVE NX CASING & WASHED		
6'0"	7'6"	FGR	SS. # 2	7-11-14
6'0"	9'0"	DROVE NX CASING & WASHED		
9'0"	10'6"	SI SA TILL	S.S. # 3	17-20-24
9'0"	12'0"	DROVE NX CASING & WASHED		
12'0"	13'6"	SI SA TILL	S.S. # 4	7-2-2
12'0"	15'0"	DROVE NX CASING & WASHED		
15'0"	16'6"	SI SA TILL	S.S. # 5	4-5-12
15'0"	20'0"	DROVE NX CASING & WASHED		
20'0"	21'6"	BLK ORG WDY	S.S. # 6	4-4-5
20'0"	25'0"	DROVE NX CASING & WASHED		
25'0"	26'6"	BLK ORG WDY	S.S. # 7	5-4-7
26'6"	28'5"	DROVE NX CASING & WASHED		
		REFUSAL @ 28'5" WITH CASING		

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FIELD BORING LOG

SOIL MECHANICS SECTION

DRILLING CO. ATCOST (TORONTO) DATUM ELEV. GEODETIC B.H. No. 6
DRILLER STAN SUKUNDA GROUND ELEV. JOB No. 103-63-04
ENGINEER W.D. FOX CASING SIZE NX DATE 23 SEP 76
SITE LOCATION HWY 62 - 8.9 MI. N. OF BANNOCKBURN TO 0.3 MI. N. OF ST. OLA RD.
HOLE LOCATION STA. 573+50 15' RT.
REMARKS

DEPTH FEET FROM	DEPTH FEET TO	DESCRIPTION	SAMPLE TYPE, No. & RECOVERY	METHOD OR BLOWS & DISTANCE
		DYNAMIC CONE PENETRATION TEST		
0'	10'	3 - 8 - 11 - 7 - 5 - 4 - 9 - 13 - 24 - 30		
10'	20'	19 - 8 - 6 - 3 - 16 - 26 - 25 - 28 - 23 - 35		
20'	30'	37 - 37 - 27 - 26 - 30 - 51 - 87 - 73 - 100 - 110		
30'	33'	100 - 85 - 110		
33'0"	33'3"	100 FOR 3"		
		SAMPLING		
0'0"	5'0"	AUGERED HOLE (HOLLOW STEM)		
3'0"	5'0"	CO SA & F GR V. MOIST AT 4'9"	S.S. #1	2-3-4-2
5'0"	7'6"	AUGERED HOLE		
6'0"	7'6"	BR SA SI & CO SA & FGR WET (ROADWAY FILL)	S.S. #2	5-5-11
7'6"	10'0"	AUGERED HOLE		
9'0"	11'0"	BR SA & FGR	S.S. #3	10-12-8-6
		CHANGE AT 10'0" TO GRY CO SA		
		& AT 10'6" TO F SI SA WET.		
10'0"	17'6"	AUGERED HOLE		
12'0"	14'0"	F SA & SI ——— FILL	S.S. #4	1-1-6-7
16'0'	18'0"	F SA & SI	S.S. #5	8-14-8-6
		CHANGE AT 17'6" TO FSISA & ORG MIXED WET		
17'6"	20'0"	AUGERED HOLE		
		F SA & SI WITH ORG MIXED WET		
		REFUSAL AT 20'0" WITH AUGER.		

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FIELD BORING LOG

SOIL MECHANICS SECTION

SHEET 7 OF 10

DRILLING CO. AIRCOST (TORONTO) DATUM ELEV. GEODETIC B.H. No. 7
DRILLER STAN SUKUNDA GROUND ELEV. JOB No. 103-63-04
ENGINEER W.D. FOX CASING SIZE NX DATE 24 SEP 76
SITE LOCATION HWY 62 - 8.9 MI. N. OF BANNOCKBURN TO 0.3 MI. N. OF ST. OLA RD.
HOLE LOCATION STA 596+00 14' RT
REMARKS

DEPTH FEET FROM	DEPTH FEET TO	DESCRIPTION	SAMPLE TYPE, No. & RECOVERY	METHOD OR BLOWS & DISTANCE
		DYNAMIC CONE PENETRATION TEST		
0'	10'	3-12-13-6-6-11-15-16-18-21		
10'	20'	10-5-2-1-5-2-5-5-5-11		
20'	31'	17-13-13-13-16-19-30-31-30-30-42		
31'0"	31'4"	41 FOR 4" THEN 100 FOR 0"		
		SAMPLING & WASHING		
0'0"	3'0"	DROVE NX CASING & WASHED		
3'0"	4'6"	BR SISA & FGR (ROADWAY FILL)	S.S. #1	5-5-7
3'0"	6'0"	DROVE NX CASING & WASHED		
6'0"	7'6"	SISA & COSA & SOME ORG WET (FILL)	S.S #2	6-8-8
6'0"	9'0"	DROVE NX CASING & WASHED		
9'0"	11'0"	AS PREVIOUS BUT CHANGE AT 10'6" TO GRY & WET	S.S. #3	16-12-8-7
9'0"	12'0"	DROVE NX CASING & WASHED		
12'0"	13'6"	GRY SISA WET SOFT	S.S. #4	2 FOR 6" 1 FOR 1'
12'0"	15'0"	DROVE NX CASING & WASHED		
15'0"	17'0"	F SISA SOME ORG WET (ROADWAY FILL)	S.S. #5	1-1-2
15'0"	20'0"	DROVE NX CASING & WASHED		
20'0"	22'0"	GRY SI & MED SA WET (FILL) MOIST	S.S. #6	5-3-4-5
		CHANGE AT 20'6" TO BLK ORG PEAT	(2 bags)	
		(ORIGINAL SOIL) NO WATER IN PEAT		
20'0"	25'0"	DROVE NX CASING & WASHED		
25'0"	27'0"	PEAT - WOOD - BLK ORG WDY	S.S. #7	5-3-3-4
25'0"	30'3"	DROVE NX CASING & WASHED		
30'3"	30'8"	GRY SI CL - SAMPLED FROM AUGER	SAMPLE #8	16 FOR 5"
		REFUSAL AT 30'8".		

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FIELD BORING LOG

SOIL MECHANICS SECTION

DRILLING CO. ATCOST (TORONTO) DATUM ELEV. GEODETIC B.H. No. 8

DRILLER MIKE REVEKIO GROUND ELEV. JOB No. 103-63-04

ENGINEER W. D. FOX CASING SIZE NX DATE 24 SEP 76

SITE LOCATION HWY 62 - 8.9 MI. N. OF BANNOCKBURN TO 0.3 MI. N. OF ST. ola RD.

HOLE LOCATION STA 596+00 14' LT

REMARKS

DEPTH FEET FROM	DEPTH FEET TO	DESCRIPTION	SAMPLE TYPE, No. & RECOVERY	METHOD OR BLOWS & DISTANCE
		DYNAMIC CONE PENETRATION TEST		
0'	10'	11-21-22-19-13-7-8-9-22-20		
10'	20'	24-14-8-4-5-8-10-8-6-10		
20'	30'	16-18-11-17-11-12-15-18-13-13		
30'0"	33'0"	13-12-15		
33'0"	33'4"	5 FOR 4" THEN 100 FOR 0"		
		REFUSAL AT 33'4" (BEDROCK)		
		SAMPLING & WASHING		
0'0"	4'6"	DROVE NX CASING		
3'0"	4'6"	FGR	S.S. #1	11-10-7
4'6"	7'6"	DROVE NX CASING		
6'0"	7'6"	FGR	S.S. #2	9-17-7
7'6"	15'0"	DROVE NX CASING & WASHED (SI SA TILL)		
		REFUSAL WITH S.S. AT 9', CASING DRIVEN		
		& HOLE WASHED TO 9', SAMPLED 9'-10'6"		(13-7-4)
		BUT NO RECOVERY		
13'6"	15'0"	SI SA TILL	S.S. #3	2-1-1
15'0"	21'6"	DROVE NX CASING		
20'0"	21'6"	SI SA TILL	S.S. #4	1-2-1
21'6"	26'6"	DROVE NX CASING		
25'0"	26'6"	SI SA TILL & FSA	S.S. #5	7-5-5
26'6"	31'6"	TILL TO 30'6", SAMPLED FROM 30'6"-31'6" BLK ORG WDY	S.S. #6	(30'0"→31'6") 4-7-5
30'6"	33'0"	BLK ORG WDY		
		REFUSAL AT 33'0" WITH CASING.		
		(WATER IN HOLE AT 5')		

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SOIL MECHANICS SECTION

DRILLING CO. ATCOST (TORONTO) DATUM ELEV. GEODETIC B.H. No. 9
DRILLER STAN SUKUNDA GROUND ELEV. JOB No. 103-63-04
ENGINEER W.D. FOX CASING SIZE NX DATE 24 & 27 SEP 76
SITE LOCATION HWY 62 - 8.9 MI. N. OF BANNOCKBURN TO 0.3 MI. N. OF ST. OLA RD.
HOLE LOCATION STA. 615+00 14' RT
REMARKS

DEPTH FEET FROM	DEPTH FEET TO	DESCRIPTION	SAMPLE TYPE, No. & RECOVERY	METHOD OR BLOWS & DISTANCE
		DYNAMIC CONE PENETRATION TEST		
0'	10'	2-9-3-2-10 (5' TO 6' EMPTY SPACE) 16-9-6-14		
10'	20'	27-52-31-25-30-16-11-8-10-14		
20'	30'	15-15-15-19-18-20-20-23-27-28		
30'0"	33'8"	30-42-40-50 FOR 8"		
		REFUSAL AT 33'8" (100 FOR 0")		
		SAMPLING (USED AUGER-HOLLOW STEM)		
0'0"	5'0"	AUGERED HOLE		
3'0"	5'0"	FGR	S.S. #1	1-1-1-2
5'0"	8'6"	AUGERED HOLE		
6'0"	8'0"	FGR	S.S. #2	2-1-1 for 1"
8'6"	10'6"	AUGERED HOLE		
9'0"	10'6"	FGR	S.S. #3	1-3-7
10'6"	13'6"	AUGERED HOLE		
12'0"	13'6"	SISA TILL TR. ORG	S.S. #4	7-7-7
13'6"	17'0"	AUGERED HOLE		
15'0"	17'0"	SISA TILL	S.S. #5	5-3-3-3
17'0"	22'0"	AUGERED HOLE		
20'0"	22'0"	SISA TILL	S.S. #6	2-4-9-6
22'0"	27'0"	AUGERED HOLE		
25'0"	27'0"	SISA TILL	S.S. #7	3-2-2-4
27'0"	32'0"	AUGERED HOLE		
30'0"	32'0"	BLK ORG WDY & MARL	S.S. #8	2-2-4-4
32'0"	33'6"	AUGERED HOLE		
32'0"	33'0"	BLK ORG & SICL MIXED - REFUSAL AT 33'6" (B.R.)	S.S. #9	?
		WATER IN HOLE @ 6'7"		
		CAVED IN @ 7'6"		

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SOIL MECHANICS SECTION

DRILLING CO. ATCOST (TORONTO) DATUM ELEV. GEODETIC B.H. No. 10
DRILLER STAN SUKUNDA GROUND ELEV. JOB No. 103-63-04
ENGINEER W. D. FOX CASING SIZE NX DATE 24,27 SEP 76
SITE LOCATION 8.9 MI. N. OF BANNOCKBURN TO 0.3 MI. N. OF ST. OLA RD. (HWY. 62)
HOLE LOCATION STA. 615+00 14' LT.
REMARKS

DEPTH FEET FROM	DEPTH FEET TO	DESCRIPTION	SAMPLE TYPE, No. & RECOVERY	METHOD OR BLOWS & DISTANCE
		DYNAMIC CONE PENETRATION TEST		
0'	10'	6-20-10-4-2-1-4-6-7-19		
10'	20'	11-5-5-4-2-3-4-4-4-4		
20'	29'	7-8-12-10-9-15-17-27-29		
29'0"	29'1"	15 FOR 1" THEN 100 FOR 0" (REFUSAL)		
		SAMPLING		
0'0"	4'6"	AUGERED HOLE		
3'0"	4'6"	F GR	S.S. #1	13-13-10
4'6"	8'0"	AUGERED HOLE		
6'0"	8'0"	F GR	S.S. #2	5-3-3-2
8'0"	10'6"	AUGERED HOLE		
9'0"	10'6"	SISA TILL	S.S. #3	4-5-5
10'6"	13'6"	AUGERED HOLE		
12'0"	13'6"	SI SA TILL	S.S. #4	2 FOR 6" 3 FOR 9", 1 FOR 6"
13'6"	17'0"	AUGERED HOLE		
15'0"	17'0"	SI SA TILL TR ORG.	S.S. #5	2-1-1-1
17'0"	23'0"	AUGERED HOLE		
18'0"	20'0"	F SA & SI SA TILL	S.S. #6	2-2-3-3
23'0"	28'0"	AUGERED HOLE		
25'0"	27'0"	BLK ORG WDY	S.S #7	6-7-10-9
28'0"	29'6"	AUGERED HOLE		
		GRY SI CL		
		REFUSAL AT 29'6" (BEDROCK)		

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SUBGRADE CHECK FIELD SHEET

PAGE NO. 1

TWP. _____ DATE SEPT 27 19 7-

B.H. # 1 571+50 15' RT

0 - 8' F GRAVEL
8 - 15' BR SA Lo TILL
15 - 21'6" F GRAVEL
21'6" 26'5" F - MED SAND
26'5" - 35' Co SAND (PIECES OF WOOD @ 31')
35' - 36.8' F SA Lo TILL & Co SAND (TR OF ORG AT 35')
36.8' - 40' CORED B.R.

B.H. # 2 571+50 72' RT (-6')

0 - 28' BLK ORG WOODY
28 - 31'6" F SAND & SILT
31'6" NFP B.R.

B.H. # 3 573+50 70' RT

0 - 27' BLK ORG WOODY
27 - 29' GREY LT - MED CLAY
29 - 30'6" MED SAND
30'6" NFP B.R.

B.H. # 4 573+50 15' LT

0 - 10' F GRAVEL
10 - 11' GREY Co SAND - F GRAVEL
11 - 14' F SA LOOSE WET
14 - 16'3" Co SAND
16'3" - 22'6" BLK ORG WOODY
22'6" - 23' F SAND
23 - 24'6" M SAND
24'6" NFP B.R.

HWY. NO. 62 LOCATION BANNOCK BRANCH N'LY ENGINEER W D FOX

OB-MT-161 6-74

Ministry of Transportation and Communications
Ontario

SUBGRADE CHECK FIELD SHEET

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TWP. _____ DATE SEPT 27 19 76

B.H. # 5 571+50 15' LT

0 – 7'6" F GRAVEL
7'6" – 16'6" BR SA LO TILL
16'6" – 28'5" BLK ORG WOODY
28'5" NFP B.R.

B.H. # 6 573+50 15' RT

0 – 10' F SA & F GRAVEL
10 – 17'6" F SAND & SILT
17'6" – 20' F SAND & SILT ORGANIC MIXTURE
20' REFUSUAL WITH AUGER (POINT DRIVEN TO 33'3")

B.H. # 7 596+00 14' RT

0 – 10' F GRAVEL
10 – 17' SA LO TILL
17 – 20'6" MED SAND
20'6" – 27' BLK ORG WOODY
27 – 30'8" GREY M CL
30'8" NFP B.R.

B.H. # 8 596+00 14' LT

0 – 7'6" F GRAVEL
7'6" – 30'6" SA LO TILL
30'6" – 33' BLK ORG WOODY
33' NFP B.R.

HWY. NO. 62 LOCATION BANNOCK BURN N'LY ENGINEER W D FOX

OB-MT-161 6-74

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Ontario

SUBGRADE CHECK FIELD SHEET

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TWP. _____ DATE SEPT 27 19 76

B.H. = 9

0 – 10'6"	F GRAVEL
10'6" – 13'6"	SA Lo TILL (TR OF ORG)
13'6" – 27'	SA Lo TILL
27 – 32'	BLK ORG WOODY & MARL MIXTURE
32 – 33'6"	GREY M CL
33'6"	NFD B.R.

B.H. = 10

0 – 8'	F GRAVEL
8 – 13'6"	SA Lo TILL
13'6" – 17'	SA Lo TILL (TR OF ORG)
17 – 23'	F SAND & SA Lo TILL
23 – 28'	BLK ORG WOODY
28 – 29'6"	GREY M CL
29'6"	NFD B.R.

HWY. NO. 62 LOCATION BANNOCK BARN N'LY ENGINEER W D FOX

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FORM OB-MT-161 DEPARTMENT OF HIGHWAYS ONTARIO

PAGE NO. 1

TWP. TUDOR DATE Oct 5, 1976.

W. P. 103-63-04

562+50 12' Rt.

0-36"	Br F Gr	
36"-13'	Br F Sa Lo Till	(Sat 72"+)
13'-20'	Blk Org (Firm, Woody)	
20'-25'	Gry Si Cl Lo Sat	76-LL-239 M
25'	N.F.P. B.R.	

562+60 12' Lt.

0-36"	Br F Gr	
36"-14'	Br F Sa Lo Till	(Sat 84"+) 76-LL-240M
14'-22'	Blk Org (Firm, Woody)	
22'-26'	Gry Si Cl Lo Sat.	
26'	NFP B.R.	

590+50 12' Rt.

0-36"	Br F Gr	
36"-13'	Br F Sa Lo Till (Stny)	Sat 10'+
13'-16'	Blk Org (Firm)	
16'	NFP Blds.	

HWY. NO. 62 LOCATION 8.9 mi. N of Bannockburn to 0.3 mi. N of St Ont Rd ENGINEER D. McKay

sta 561 to sta 563+50

1026.5 to 1025.5

sta 569 to sta. 576

1027 to 1028

sta. 589 to sta 591

1026

sta. 594 to sta. 598

1026 to 1028

sta 615 to sta 618

1032 to 1038.

Sta. 561+00 to Sta 563+50

$$q_u = 5c\left(1+0.2\frac{D_f}{B}\right) \qquad c \doteq 200$$
$$\doteq 1000 \text{ psf}.$$

$$q = 15 \times 125 - 8 \times 85 \doteq 1200 \text{ psf}$$

$\therefore \quad q_u \doteq q$

Sol'n. 1. reduce q.
2. provide berm, or flatten the slope.

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE Nº 1

FOUNDATIONS OFFICE

WP 103 63 04 LOCATION STA. 571+50 15' RT ORIGINATED BY W.F.

DIST ____ HWY 62 BORING DATE 21 SEPT 76 COMPILED BY M.M

DATUM GEODETIC BOREHOLE TYPE WASH BORING, NX CASING, AND CONE CHECKED BY ____

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W	BULK DENSITY γ	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	ELEV	SHEAR STRENGTH ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	W_P W W_L WATER CONTENT % 10 20 30		GR. SA. SI. CL.
1026.3 0.0	WELL GRADED SANDS, SOME GRAVEL AND FINES			SS	8	▽				
			1	SS	17					17 61 (22)
	LOOSE TO COMPACT		2	SS	17					
			3	SS	6					
			4	SS	6					
1021.3 5.0	SANDY GRAVEL SOME FINES VERY DENSE		5	SS	103					45 43 (12)
998.3 25.0	WELL GRADED SANDS SOME GRAVEL AND FINES		6	SS	24					
	COMPACT									
989.6 36.7	GRANITE		7	SS	25					23 49 24 5
			8	RC						
	END OF BOREHOLE									

E REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE Nº 2

WP 103 63 04 — LOCATION STA. 571+50 72' RT. — ORIGINATED BY W.F.

DIST ____ HWY 62 — BORING DATE 21 SEPT 76 — COMPILED BY M.M

DATUM GEODETIC — BOREHOLE TYPE HOLLOW STEM AUGER AND CONE — CHECKED BY ____

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100 — SHEAR STRENGTH: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	LIQUID LIMIT w_L — PLASTIC LIMIT w_P — WATER CONTENT w — WATER CONTENT % 10 20 30	BULK DENSITY γ	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	ELEV				GR. SA. SI. CL.
0.0 / 1022.0 / 2.0	TOP SOIL					▽				
	BLACK ORGANIC SOILS VERY SOFT		1	SS	2					ORG. = 88 % W = 683 %
			2	SS	1					
			3	SS	1					
			4	SS	1/4"					ORG. = 92 %
			5	SS	1/7"					ORG. 80 %
992.3 / 30.0	SILTY SAND VERY DENSE		6	SS	75		100/6"			9 50 36 5
	END OF BOREHOLE									

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE Nº 3

WP 103-63-04 — LOCATION STA 573+50 70' RT. — ORIGINATED BY W. F.

DIST ____ HWY 62 — BORING DATE 22 SEPT 76 — COMPILED BY M. M

DATUM GEODETIC — BOREHOLE TYPE HOLLOW STEM AUGER AND CONE — CHECKED BY ____

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w	BULK DENSITY	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	ELEV	SHEAR STRENGTH: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	WATER CONTENT % 10 20 30	γ	GR. SA. SI. CL.
102.8 / 0.0	TOPSOIL									
101.2.8 / 1.6	BLACK ORGANIC SOILS VERY SOFT		1	SS	2					W = 688 % ORG = 74 %
			2	SS	2					
			3	SS	1/2'					
			4	SS	1/3'					W = 789 % ORG = 71 %
			5	SS						
99.8 / 27.0	UNIFORM MEDIUM SAND TRACE FINES LOOSE		6	SS	5		REFUSAL			0 89 11
99.8 / 30.0	AUGER REFUSAL BEDROCK ASSUMED									

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE Nº 4

WP 103-63-04 — LOCATION STA 573+50 15' LT. — ORIGINATED BY W.F.

DIST ____ HWY 62 — BORING DATE 23 SEPT 76 — COMPILED BY M.M

DATUM GEODETIC — BOREHOLE TYPE WASH BORING, NX CASING AND CONE — CHECKED BY ____

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT W_L / PLASTIC LIMIT W_P / WATER CONTENT W	BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	ELEV	SHEAR STRENGTH ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	W_P W W_L WATER CONTENT % 10 20 30	γ	GR. SA. SI. CL.
1026.2 0.0										
	WELL GRADED SANDS SOME GRAVEL AND FINES VERY LOOSE TO COMPACT		1	SS	22					16 65 [19]
			2	SS	15					
			3	SS	10					4 82 [14]
			4	SS	4					
1002.2 17.0			5	SS	4					
	BLACK ORGANIC SOIL SOFT UNIFORM MEDIUM SAND TRACE FINES LOOSE.		6	S	4					W = 122% ORG. = 17%
1000.7 21.5							100/0"			
1000.7 24.5	AUGER REFUSAL BEDROCK ASSUMED									

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE Nº 5

WP 103 - 63 - 04 — LOCATION STA 571+50 15' LT. — ORIGINATED BY W F.

DIST ____ HWY 62 — BORING DATE 23 SEPT. 76 — COMPILED BY M.M.

DATUM GEODETIC — BOREHOLE TYPE WASH BORING, NX CASING, AND CONE — CHECKED BY ____

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (20 40 60 80 100) SHEAR STRENGTH ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W (W_P W W_L) WATER CONTENT % (10 20 30)	BULK DENSITY γ	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	ELEV				GR. SA. SI. CL.
1026.3	WELL GRADED SANDS SOME GRAVEL AND FINES LOOSE TO DENSE		1	SS	25					
			2	SS	25					23 60 17
			3	SS	44					
1012.3 14.0			4	SS	4					6 60 34
	GRAVELLY SANDS SOME FINES COMPACT		5	SS	17		100/6"			41 44 15
1008.3 18.0										
	BLACK ORGANIC SOIL		6	SS	9					W = 355 % ORG = 83 %
			7	SS	11					W = 441 % ORG = 89 %
997.8 28.5	AUGER REFUSAL BEDROCK ASSUMED									

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE Nº 6

WP 103 63 04 — LOCATION STA. 573 + 50 15' RT. — ORIGINATED BY W.P.

DIST ____ HWY 62 — BORING DATE 23 SEPT. 72 — COMPILED BY M.M.

DATUM GEODETIC — BOREHOLE TYPE HOLLOW STEM AUGER AND CONE — CHECKED BY ____

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT W_L / PLASTIC LIMIT W_P / WATER CONTENT W	BULK DENSITY	REMARKS
ELEV. / DEPTH (1026.2)	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	ELEV	SHEAR STRENGTH: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	WATER CONTENT % 10 20 30	γ	GR. SA. SI. CL.
0.0	WELL GRADED SANDS SOME GRAVEL AND FINES		1	SS	6					
			2	SS	16					
	COMPACT		3	SS	14					16 74 10
			4	SS	13					
1008.7 17.5			5	SS	14					17 61 22
1006.2 20.0	FINE SILTY SAND SOME ORGANICS									
	AUGER REFUSAL						100/3"			

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE Nº 7

WP 103-63-04 — LOCATION STA 596+00 14' RT. — ORIGINATED BY W.F.

DIST ____ HWY 62 — BORING DATE 24 SEPT. 76 — COMPILED BY M.M

DATUM GEODETIC — BOREHOLE TYPE WASH BORING, NX CASING, AND CONE — CHECKED BY ____

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (20 40 60 80 100) SHEAR STRENGTH ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W (W_P W W_L) WATER CONTENT % (10 20 30)	BULK DENSITY γ	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	ELEV				GR. SA. SI. CL.
1025.6 / 0.0	WELL GRADED SANDS SOME GRAVEL AND FINES		1	SS	12					14 71 13
	VERY LOOSE TO COMPACT		2	SS	16					
			3	SS	15					
			4	SS	1					17 62 21
			5	SS	3					
1007.6 / 18.0	SILTY SAND LOOSE		6	SS	9					
1005.1 / 20.5	BLACK ORGANIC SOILS FIRM CLAYEY SILTS		7	SS	7					w = 321 %
994.9 / 30.7'	AUGER REFUSAL BEDROCK ASSUMED		8	SS	16/5"		100/6"			

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE Nº 8

WP 103-63-04 — LOCATION STA 596+00 14' LT. — ORIGINATED BY W.F.

DIST ____ HWY 62 — BORING DATE 24 SEPT. 76 — COMPILED BY MM

DATUM GEODETIC — BOREHOLE TYPE WASH BORING, NX CASING, AND CONE — CHECKED BY ____

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	'N' VALUES	GROUND WATER ELEV	REMARKS
1025.6 / 0.0							
	WELL GRADED SANDS SOME GRAVEL AND FINES		1	SS	17	▽	14 67 19
			2	SS	24		
				SS	11		
	VERY LOOSE TO COMPACT		3	SS	2		
			4	SS	3		16 72 12
			5	SS	10		
995.1 / 30.5	BLACK ORGANIC SOILS FIRM		6	SS	12		W: 205% ORG: 37%
992.6 / 33.0	AUGER REFUSAL BEDROCK ASSUMED						

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT
20 40 60 80 100

SHEAR STRENGTH
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE

100/0"

LIQUID LIMIT ——— W_L
PLASTIC LIMIT ——— W_P
WATER CONTENT ——— W
W_P W W_L
WATER CONTENT %
10 20 30

BULK DENSITY γ

GR. SA. SI. CL.

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE Nº 9

WP 103-63-04 LOCATION STA 615+00 14' RT. ORIGINATED BY W.F.

DIST ____ HWY 62 BORING DATE 24 & 27 SEPT 76 COMPILED BY M.M.

DATUM GEODETIC BOREHOLE TYPE HOLLOW STEM AUGER AND CONE CHECKED BY ____

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES 'N' VALUES	GROUND WATER ELEV
1032.6 / 0.0						
	WELL GRADED SAND SOME GRAVEL AND FINES		1	SS	3	
			2	SS	1	
			3	SS	10	
	VERY LOOSE TO COMPACT		4	SS	14	
			5	SS	6	
			6	SS	15	
			7	SS	6	
1004.1 / 28.5	BLACK ORGANIC SOILS FIRM		8	SS	8	
1000.6 / 32.0	SILT TRACE OF ORGANICS		9	SS		
999.1 / 33.5	AUGER REFUSAL BEDROCK ASSUMED					

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (20 40 60 80 100)

SHEAR STRENGTH: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE

100 / 0"

LIQUID LIMIT w_L — PLASTIC LIMIT w_P — WATER CONTENT w

w_P w w_L

WATER CONTENT % (10 20 30)

BULK DENSITY γ

REMARKS — GR. SA. SI. CL.

36 56 8

23 56 21

w = 158 %
org = 37 %
w = 47 %
org = 5 %

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

RECORD OF BOREHOLE Nº 10

WP 103-63-04 — LOCATION STA. 615+00 14' LT. — ORIGINATED BY W. F.

DIST ____ HWY 62 — BORING DATE 24 & 27 SEPT 76 — COMPILED BY M.M.

DATUM GEODETIC — BOREHOLE TYPE WASH BORING, NX CASING AND CONE — CHECKED BY ____

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (20 40 60 80 100) SHEAR STRENGTH ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W (W_P W W_L) WATER CONTENT % (10 20 30)	BULK DENSITY γ	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	ELEV				GR. SA. SI. CL.
1032.6										
	WELL GRADED SANDS SOME GRAVEL AND FINES		1	SS	23					18 70 12
			2	SS	5					
			3	SS	10					
	VERY LOOSE TO COMPACT		4	SS	4					21 65 14
			5	SS	2					
1012.6 / 20.0			6	SS	6					
	BLACK ORGANIC SOILS VERY STIFF		7	SS	19					W = 152.5% ORG = 37%
1003.1 / 29.5	AUGER REFUSAL BEDROCK ASSUMED						100/0"			

Ministry of Transportation and Communications
Ontario

VISUAL CLASSIFICATION SHEET

SOILS MECHANICS OFFICE

PROJECT 103-63-04 SITE _____ BOREHOLE NO. 1 GROUND ELEVATION _____

SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION: LARGEST GRAIN SIZE	SHAPE	PERCENTAGE: GRAVEL	SAND	SILT AND CLAY	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
1	10'-11'6"	5/8"	SUB ANG.	15	75	10	SLIGHT	NIL	QUICK	NIL	EARTHY	BROWN	STRONG	–	GRAVELLY SAND - TRACE OF FINES	SU
2	11-11'6"	1"	S.A.	25	70	5	NIL	"	"	"	"	GREY	"	–	" " " " "	"
3	15-16.5	1/2	"	5	90	5	"	"	"	"	"	BROWN	"	–	" " " " "	"
4	20-21.5	1"	"	30	50	20	SLIGHT	"	"	"	SLIGHTLY ORG.	DARK BROWN	"	–	" " - SOME FINES	SP
6	30-31.5	1/2	"	5	90	5	NIL	"	"	"	EARTHY	CHARCOAL GREY	"		" " - TRACE OF FINES	SU

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

M.T.–3

Ministry of Transportation and Communications
Ontario

VISUAL CLASSIFICATION SHEET

SOILS MECHANICS OFFICE

PROJECT 103-63-05 SITE _____ BOREHOLE NO. 1 GROUND ELEVATION _____

SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION: LARGEST GRAIN SIZE	SHAPE	PERCENTAGE: GRAVEL	SAND	SILT AND CLAY	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
5	25-26.5	1½	SA	60	35	5	NIL	NIL	QUICK	NIL	EARTHY	BROWN	STRONG	—	SANDY GRAVEL - TRACE OF FINES	GW

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

REMARKS:—

M.T.—3

Ministry of Transportation and Communications
Ontario

VISUAL CLASSIFICATION SHEET

SOILS MECHANICS OFFICE

PROJECT 103-63-02 SITE _____ BOREHOLE NO. 1 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										
7	35'-36'	3/4	SR	20	30	50	SLIGHT	DULL	SLOW-QUICK	NIL	EARTHY	GREY	STRONG	—	GRAVELLY SAND - WITH EXCESS OF FINES (SILT)	SF

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

REMARKS:—

M.T.—3

Ministry of Transportation and Communications
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VISUAL CLASSIFICATION SHEET

SOILS MECHANICS OFFICE

PROJECT 103-63-04 SITE BOREHOLE NO. 2 GROUND ELEVATION

SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION: LARGEST GRAIN SIZE	SHAPE	PERCENTAGE: GRAVEL	SAND	SILT AND CLAY	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
1	3'-6'														MUSKEG (PEAT)	Pt
2	6'-8'6"														" "	"
3	10'-14'														" "	"
4	15'-19'														" "	"
5	20'-27'														" "	"
6	30'-32'	3/8"	SA	5	55	40	LOW	NIL	SLO.	NIL	EARTHY	GREY	STRONG		SILTY FINE SAND - TRACE OF GRAVEL	SF

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

REMARKS:-

M.T.-3

Ministry of Transportation and Communications
Ontario

VISUAL CLASSIFICATION SHEET

SOILS MECHANICS OFFICE

PROJECT 103-63-04 SITE BOREHOLE NO. 3 GROUND ELEVATION

SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION: LARGEST GRAIN SIZE	SHAPE	PERCENTAGE: GRAVEL	SAND	SILT AND CLAY	DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
1	3'-5'														MUSKEG (PEAT) - (WOOD CHIPS)	Pt.
2	5-8														"	"
3	10-14														"	"
4	15-18														"	"
5	20-28														"	"
5	20-28	1/2	ANG.	5	55	40	LOW	NIL	QU.	NIL	EARTHY	GREY	STRONG		SILTY FINE SAND - TRACE OF GRAVEL	SF
6	29-30	#60	—	—	95	5	NIL	"	"	"	"	"	"		UNIFORM FINE SAND - TRACE OF SILT	SU

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

REMARKS:-

M.T.-3

Ministry of Transportation and Communications
Ontario

VISUAL CLASSIFICATION SHEET

SOILS MECHANICS OFFICE

PROJECT 103-63-0K SITE BOREHOLE NO. 4 GROUND ELEVATION

SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION: LARGEST GRAIN SIZE	SHAPE	PERCENTAGE: GRAVEL	SAND	SILT AND CLAY	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
1	2'6"-4'	1/2	SA	5	90	5	NIL	NIL	QU	NIL	EARTHY	BROWN	STRONG		GRAVELLY FINE SAND - TRACE OF FINES	SU
2	6'-7'6"	3/4	SR	10	85	5	"	"	"	"	"	"	"		" " " "	"
3	9'-11'	1	Ang.	20	75	5	"	"	"	"	"	"	"		" " " "	SP
4	12'-14'	1/8"	—	—	90	10	"	"	"	"	"	GREY - BROWN	"		UNIFORM FINE SAND	SU
5	15'-16'6"	1	Ang.	30	65	5	"	"	"	"	"	BROWN	"		GRAVELLY SAND - TRACE OF FINES	SP
6	20'-21'6"														PEAT	PT

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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PROJECT 103-C3-04 SITE _____ BOREHOLE NO. 5 GROUND ELEVATION _____

SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION: LARGEST GRAIN SIZE	SHAPE	PERCENTAGE: GRAVEL	SAND	SILT AND CLAY	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
1	3'-4'6"	1	Ang.	20	75	5	NIL	NIL	QU.	NIL	EARTHY	BROWN	STRONG		GRAVELY FINE SAND - TRACE OF FINES	SP
2	6'-7'6"	1	S. Ang.	10	85	5	"	"	"	"	"	"	"		" " " - "	"
3	9'-10'6"	1	"	35	45	20	"	"	"	"	"	GREY BROWN	"		" " " - SOME FINES	GF
4	12'-13'6"	5/8	"	5	35	60	"	"	"	"	"	"	"		SANDY SILT - TRACE OF GRAVEL	ML
5	15-16'6"	1 1/2	Ang	50	30	20	"	"	"	"	"	DARK BROWN	"		SANDY GRAVEL - SOME SILT	GF
6	20-21'6"														Peat	Pt
7	25-26'6"														"	"

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REMARKS:—

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PROJECT 103-63-04 SITE BOREHOLE NO. 6 GROUND ELEVATION

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 AND CLAY										
1	3'-5'	3/4	S.Ang.	10	85	5	NIL	NIL	QU.	NIL	EARTHY	BROWN	STRONG	-	GRAVELY FINE SAND - TRACE OF FINES	SP
2	6'-7½"	1	"	5	80	15	"	"	"	"	"	"	"		" " " - SOME FINES	SP
3	9'-11'	1⅛	"	10	85	5	"	"	"	"	"	GREY BROWN	"		" " " - TRACE OF FINES	SP
4	12'-14'	3/4	"	5	90	5	"	"	"	"	"	"	"		" " " - "	"
5	16'-18'	1	"	10	60	30	"	"	"	"	"	"	"		GRAVELY SAND - WITH FINES	SF

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REMARKS:-

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PROJECT 103-G3-04 SITE BOREHOLE NO. 7 GROUND ELEVATION

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 AND CLAY										
1	3'-4'6"	1/2	S. Ang	10	85	5	NIL	NIL	QU.	NIL	EARTHY	BROWN	STRONG		GRAVELY FINE SAND - TRACE OF FINES	SU
2	6'-7'6"	1 1/4	"	15	60	25	"	"	"	"	"	"	"		" " " - SOME FINES	SF
3	9'-11'	3/4	S. Round	5	85	10	"	"	"	"	"	"	"		" " " - TRACE OF FINES	SP
4	12'-13'6"	1	S. Ang.	30	60	10	"	"	"	"	"	"	"		" " " - "	SU
5	15'-17'	1	"	15	65	20	"	"	"	"	"	"	"		" " " - SOME FINES	SU
6	20'-22'			-	60	40	SLIGHT	"	SLOW TO QUICK	"	SLIGHTLY ORG.	GREY BROWN	MILD		SILTY SAND	SF
6	20'-22'														PEAT	PT
7	25'-27'														PEAT	PT
8	30'3"-30'8"				5	95	MED.	DULL	SLOW	MED	EARTHY	GREY	MILD		CLAY SILT	CL

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PROJECT 103-63-04 SITE BOREHOLE NO. 8 GROUND ELEVATION

SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION: LARGEST GRAIN SIZE	SHAPE	PERCENTAGE: GRAVEL	SAND	SILT AND CLAY	DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
1	3'-4'6"	3/4	S. Ang.	10	85	5	NIL	NIL	Q.D.	NIL	EARTHY	BROWN	STRONG		GRAVELY FINE SAND - TRACE OF FINES	SU
2	6'-7'6"	5/8	"	15	75	10	"	"	"	"	"	"	"		" " " "	SU
3	13'6"-15'	1/2	"	20	65	15	"	"	"	"	"	"	"		" " " - SOME FINES	SP
4	20'-21'6"	5/8	"	10	80	10	"	"	"	"	"	GREY BROWN	"		" " " - TRACE OF FINES	SU
5	25'-26'6"	1	S. Round	10	85	5	"	"	"	"	"	"	"		" " " - "	SU
6	30'6"-31'6"														Peat	Pt

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REMARKS:—

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PROJECT 103-63-04 SITE _____ BOREHOLE NO. 9 GROUND ELEVATION _____

SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION: LARGEST GRAIN SIZE	SHAPE	PERCENTAGE: GRAVEL	SAND	SILT AND CLAY	DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
1	3'-5'	3/4	S. Ang.	20	75	5	NIL	NIL	QU.	NIL	EARTHY	BROWN	STRONG		GRAVELY FINE SAND - TRACE OF FINES	SP
2	6'-8½"	3/4	"	25	70	5	"	"	"	"	"	"	"		" " " "	"
3	9'-10'6"	1¼	S. Round	30	65	5	"	"	"	"	"	"	"		" " " "	"
4	12'-13'6"	½	S. Ang.	5	55	40	"	"	"	"	"	"	"		" " " - WITH FINES & TRACE OF ORG.	SF
5	15'-17'	1	"	20	50	30	"	"	"	"	"	GREY BROWN	"		" " " - WITH FINES	SF
6	20'-22'	1	"	10	95	5	"	"	"	"	"	"	"		" " " - TRACE OF FINES	SP
7	25'-27'	¼	"	5	90	5	"	"	"	"	"	"	"		" " " "	SU
8	30'-32'														PEAT & MARL	Pt
9	32'-33'				5	95	MED.	DULL	SLOW	LOW	ORGANIC	GREY	NIL		ORGANIC SILT	ML OH

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PROJECT 103-63-04 SITE BOREHOLE NO. 10 GROUND ELEVATION

SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION		PERCENTAGE			DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	GRAVEL	SAND	SILT AND CLAY										
1	3'-5'	1	S. Ang.	15	80	5	NIL	NIL	QU.	NIL	EARTHY	BROWN	STRONG		GRAVELLY FINE SAND - TRACE OF FINES	SU
2	6'-8'	3/8	"	25	70	5	"	"	"	"	"	"	"		" " " "	SP
3	9'-10'6"	5/8	"	20	70	10	"	"	"	"	"	"	"		" " " "	SP
4	12'-13'6"	5/8	Ang.	20	65	15	"	"	"	"	"	"	"		" " " - SOME FINES	SP
5	15'-17'	5/8	S. Ang.	20	70	10	"	"	"	"	"	GREY BROWN	"		" " " - TRACE OF FINES	SP
6	18'-20'	1"	Ang.	25	70	5	"	"	"	"	"	"	"		" " " "	SP
7	25'-27'														PEAT	Pt

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REMARKS:—

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