Dey, Asit (SD)

From: Brett McCormac <bmccormac@jrcc.ca>
Sent: August-21-18 11:24 AM
To: Dey, Asit (SD)
Cc: 'RM of Pipestone'; Genaille, Dee (MR)
Subject: RM of Pipestone - Reston Lagoon
Attachments: 18-08-17 Reston HC Test Results.pdf; TH Location Plan.pdf; TH6-9.pdf; NTL Soils Test Report.pdf

Good morning,

Attached are the HC test results from the Shelby tube samples taken from the Reston Lagoon Expansion on July 30, 2018. Below is a summary of the results:

Sample # and Depth	Description of Location	HC Result
ST2 from 7'-9'	repaired north dike of Cell 4	6.5 x 10-8 cm/s
ST7 from 1'-3'	the floor of Cell 3	1.1 x 10-8 cm/s
ST8 from 6'-8'	south cut-off wall of Cell 3	1.4 x 10-8 cm/s
ST11 from 3.5'-5.5'	core of the east dike of existing Storage Cell 2	1.1 x 10-7 cm/s

All tests from the new Cells 3 and 4 passed the licence requirements. Please provide approval to begin using the new Cell 3 and Cell 4.

The result from the existing lagoon dike of 1.1 x 10-7 is slightly below the licence requirement of 1 x 10-7 cm/s however the exceedance is considered insignificant. The licence requirement of a 1m liner at 1x10-7 cm/s results in water taking 31.7 years to flow through the liner, a 1 m liner at 1.1 x 10-7 cm/s would take 28.9 years. The entire 3 m wide core of the dike of the existing lagoon is constructed with the same clay type material which would take water 86.5 years to pass through the 3.0 m core of the dike. Furthermore, the entire inside slope of the dike was constructed with the same clay type material which would further reduce the permeability of the dike.

Four test holes were taken in the core of the existing dikes (TH6, TH7, TH8 and TH9) during the geotechnical investigation in September of 2013. Lab analysis from that testing showed the core of the dikes were constructed with suitable clay for a liner which was confirmed with laboratory testing (TH9 0.6 – 1.2 m – 1.9 x 10-8 cm/s). Attached is a test hole location plan, TH logs and lab analysis report.

Potential leakage from the existing lagoon was discussed with the lagoon operator who has seen no signs of leakage from the lagoon and has not noticed the water level in the lagoon dropping.

In summary, based on the information above it is the opinion of JRCC that remedial works on the liner of the existing lagoon cells are unnecessary.

Please provide approval to place rip rap on the inner side slopes of the existing lagoon as per the design. The Contractor will be returning to site next week to place rip rap on the new Cell 3 and would like to place rip rap on the existing cells at that time as well so a quick response would be appreciated.

Please contact me if you would like to discuss further.

Brett McCormac, P.Eng.
Environmental Engineer

JR Cousin Consultants Ltd.
Phone: (204) 489-0474
Fax: (204) 489-0487

Stantec Consulting Ltd.
199 Henlow Bay, Winnipeg MB 3Y 1G4

August 17, 2018
File: 123313178

Attention: Mr. Allan Hanslip
A.D. Hanslip Excavating & Demolition Ltd.
739 Lockport Road
Lockport, Manitoba R1A 3J2

Good day Allan,

Reference: Reston Lagoon Upgrade

On August 1, 2018, a total of four (4) soil samples were submitted to our laboratory for analysis. The following test was conducted on select soil samples:

- *ASTM D5084 – Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter*

The resulting test data is attached.

We appreciate the opportunity to assist you on this project. Please contact the undersigned if you have any questions regarding this report.

Regards,

Stantec Consulting Ltd.

Larry Presado, C.Tech.
Senior Geotechnical Technologist

Phone: (204) 488-6999
Fax: (204) 488-6947
larry.presado@stantec.com

Jason Thompson, C.E.T
Principal – Manager, Materials Testing Services

Phone: (204) 928-4004
Fax: (204) 488-6947
jason.thompson@stantec.com

Attachment: 4 x Hydraulic Conductivity Reports

LABORATORY
199 Henlow Bay
Winnipeg MB R3Y 1G4
Tel: (204) 488-6999

HYDRAULIC CONDUCTIVITY ASTM D5084

A.D. Hanslip Excavating and Demolition Ltd.
739 Lockport Road
Lockport, MB
R1A 3J2

PROJECT: Reston Lagoon Upgrade

REPORT NO.: 1

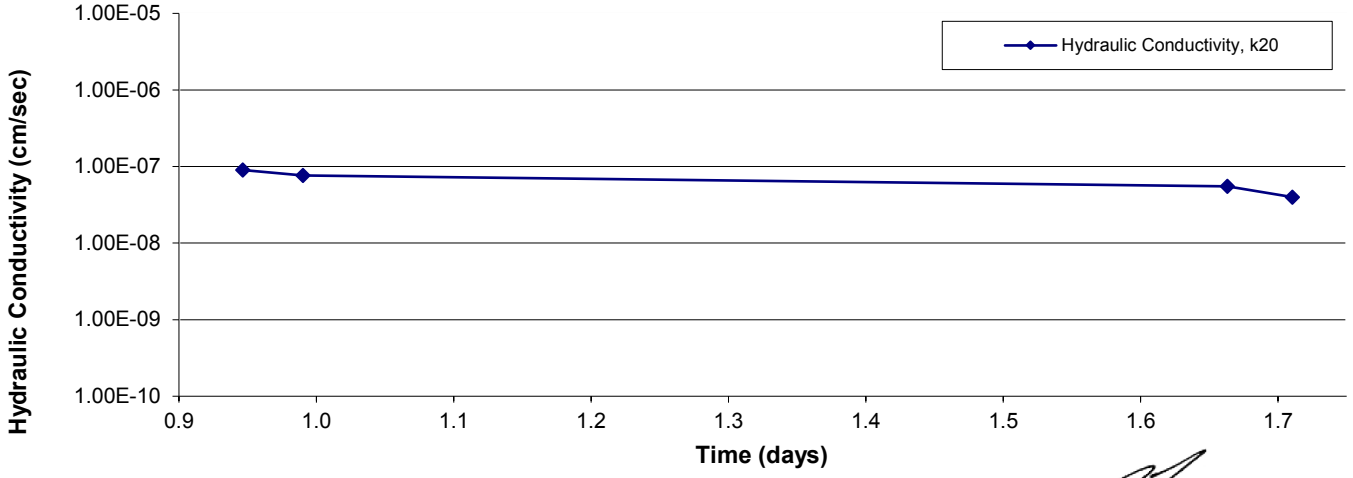
Attention: Allan Hanslip

PROJECT NO.: 123313178

SAMPLE FIELD I.D.: **ST-2 @ 7'-9'**
SOIL DESCRIPTION: clayey silt till, brown, firm, moist, medium plasticity, trace coarse sand, trace fine to coarse-grained gravel

DATE TESTED:	August 7 to August 10, 2018
CONFINING PRESSURE (kPa):	137.9
EFFECTIVE SATURATION STRESS (kPa):	34.5
ASSUMED SPECIFIC GRAVITY:	2.71
HYDRAULIC GRADIENT:	19.0
TYPE OF PERMEANT LIQUID:	De-aired Water
HYDRAULIC CONDUCTIVITY, "k" (cm/s):	7.1E-08
HYDRAULIC CONDUCTIVITY, "k_{20}" (cm/s):	**6.5E-08**

	Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm^3)	Water Content by Mass (%)	Water Content by Volume (%)	Saturation (%)
Initial Reading	78.3	71.2	675.4	1.859	16.4	30.4	96.9
Final Reading	78.3	71.7	679.6	1.837	17.1	31.5	97.9



REPORT DATE: August 17, 2018

REVIEWED BY: Jason Thompson, C.E.T.

LABORATORY
199 Henlow Bay
Winnipeg MB R3Y 1G4
Tel: (204) 488-6999

HYDRAULIC CONDUCTIVITY
ASTM D5084

A.D. Hanslip Excavating & Demolition Ltd.
739 Lockport Road
Lockport, MB
R1A 3J2

PROJECT: Reston Lagoon Upgrade

REPORT NO.: 2

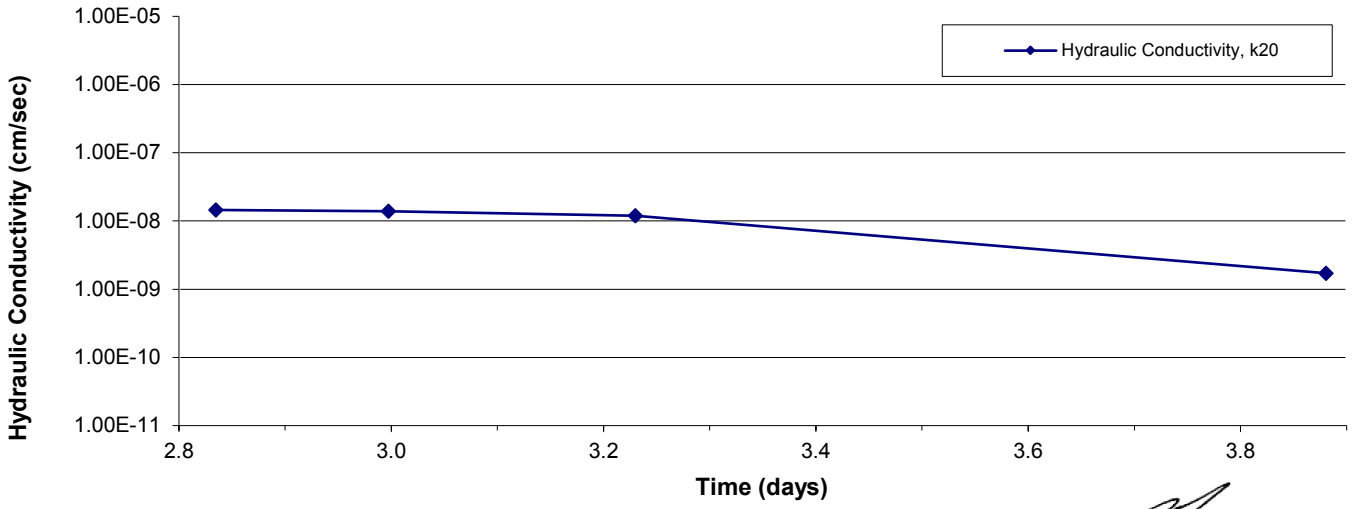
Attention: Allan Hanslip

PROJECT NO.: 123313178

SAMPLE FIELD I.D.: **ST-7 @ 1'-3'**
SOIL DESCRIPTION: clayey silt till, brown, stiff, moist, medium plasticity, trace medium to coarse-grained sand, trace fine gravel

DATE TESTED:	August 9 to August 14, 2018
CONFINING PRESSURE (kPa):	137.9
EFFECTIVE SATURATION STRESS (kPa):	34.5
ASSUMED SPECIFIC GRAVITY:	2.71
HYDRAULIC GRADIENT:	18.7
TYPE OF PERMEANT LIQUID:	De-aired Water
HYDRAULIC CONDUCTIVITY, "k" (cm/s):	1.1E-08
HYDRAULIC CONDUCTIVITY, "k_{20}" (cm/s):	**1.1E-08**

	Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm^3)	Water Content by Mass (%)	Water Content by Volume (%)	Saturation (%)
Initial Reading	79.1	71.9	696.6	1.904	14.0	26.7	89.9
Final Reading	79.4	72.1	703.1	1.871	15.9	29.8	96.3



REPORT DATE: August 17, 2018

REVIEWED BY: Jason Thompson, C.E.T.

LABORATORY
199 Henlow Bay
Winnipeg MB R3Y 1G4
Tel: (204) 488-6999

HYDRAULIC CONDUCTIVITY ASTM D5084

A.D. Hanslip Excavating and Demolition Ltd.
739 Lockport Road
Lockport, MB
R1A 3J2

PROJECT: Reston Lagoon Upgrade

REPORT NO.: 3

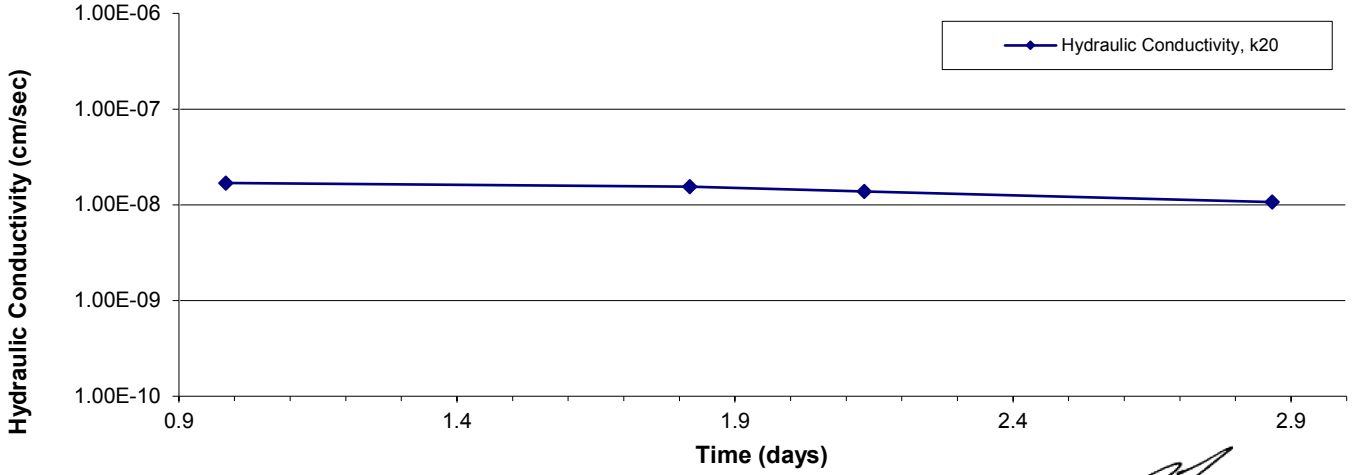
Attention: Adrian Hanslip

PROJECT NO.: 123313178

SAMPLE FIELD I.D.: **ST-8 @ 6'-8'**
SOIL DESCRIPTION: silty clay till, brown, stiff, moist, high plasticity, trace medium to coarse-grained, trace fine gravel, trace coarse gravel

DATE TESTED:	August 10 to August 14, 2018
CONFINING PRESSURE (kPa):	137.9
EFFECTIVE SATURATION STRESS (kPa):	34.5
ASSUMED SPECIFIC GRAVITY:	2.71
HYDRAULIC GRADIENT:	18.8
TYPE OF PERMEANT LIQUID:	De-aired Water
HYDRAULIC CONDUCTIVITY, "k" (cm/s):	1.5E-08
HYDRAULIC CONDUCTIVITY, "k_{20}" (cm/s):	**1.4E-08**

	Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm^3)	Water Content by Mass (%)	Water Content by Volume (%)	Saturation (%)
Initial Reading	78.8	71.9	690.0	1.883	14.7	27.7	90.7
Final Reading	78.8	71.9	690.0	1.857	16.3	30.3	96.2



REPORT DATE: August 17, 2018

REVIEWED BY: Jason Thompson, C.E.T.

LABORATORY
199 Henlow Bay
Winnipeg MB R3Y 1G4
Tel: (204) 488-6999

HYDRAULIC CONDUCTIVITY ASTM D5084

A.D. Hanslip Excavating and Demolition Ltd.
739 Lockport Road
Lockport, MB
R1A 3J2

PROJECT: Reston Lagoon Upgrade

REPORT NO.: 4

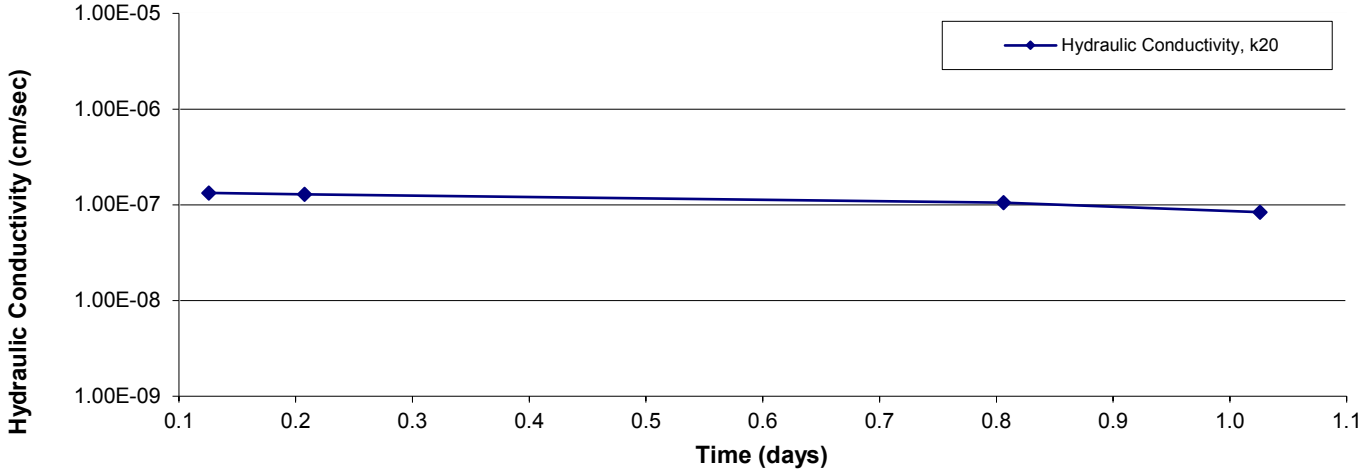
Attention: Adrian Hanslip

PROJECT NO.: 123313178

SAMPLE FIELD I.D.: **ST-11 @ 3.5'-5.5'**
SOIL DESCRIPTION: silt till, brown, stiff, moist, medium plasticity, clayey, trace medium to coarse-grained sand, trace fine to coarse-grained gravel

DATE TESTED:	August 10 to August 14, 2018
CONFINING PRESSURE (kPa):	137.9
EFFECTIVE SATURATION STRESS (kPa):	34.5
ASSUMED SPECIFIC GRAVITY:	2.65
HYDRAULIC GRADIENT:	18.8
TYPE OF PERMEANT LIQUID:	De-aired Water
HYDRAULIC CONDUCTIVITY, "k" (cm/s):	1.2E-07
HYDRAULIC CONDUCTIVITY, "k_{20}" (cm/s):	**1.1E-07**

	Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm^3)	Water Content by Mass (%)	Water Content by Volume (%)	Saturation (%)
Initial Reading	78.5	71.6	697.5	1.956	12.9	25.3	96.4
Final Reading	78.8	72.1	704.8	1.922	14.0	26.8	97.7



REPORT DATE: August 17, 2018

REVIEWED BY: Jason Thompson, C.E.T.

J. R. Cousin Consultants Ltd.

TEST HOLE LOGS

SYMBOL INDEX


GW. : Well graded gravels and gravel sand mixtures, little or no fines


GP. : Poorly graded gravels, gravel - sand mixtures, little or no fines


GM. : Silty gravels, gravel-sand-silt mixtures


GC. : Clayey gravels, gravel-sand-clay mixtures


SW. : Well graded sands, gravelly sands, little or no fines


SP. : Poorly graded sands, or gravelly sands, little or no fines


SM. : Silty sands, sand-silt mixtures


SC. : Clayey sands, sand-clay mixtures


ML. : Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity


CL. : Inorganic clays of low plasticity, gravelly clays, sandy or silty clays, lean clays


OL. : Organic silts and organic silty clays of low plasticity


CI. : Inorganic clays of medium or intermediate plasticity


MH. : Inorganic silts, fine sandy or silty soils


CH. : Inorganic clays of high plasticity, fat clays


OH. : Organic clays of medium to high plasticity, organic silts


Pt. : Peat, humus, swamp soils with high organic contents


TOPSOIL

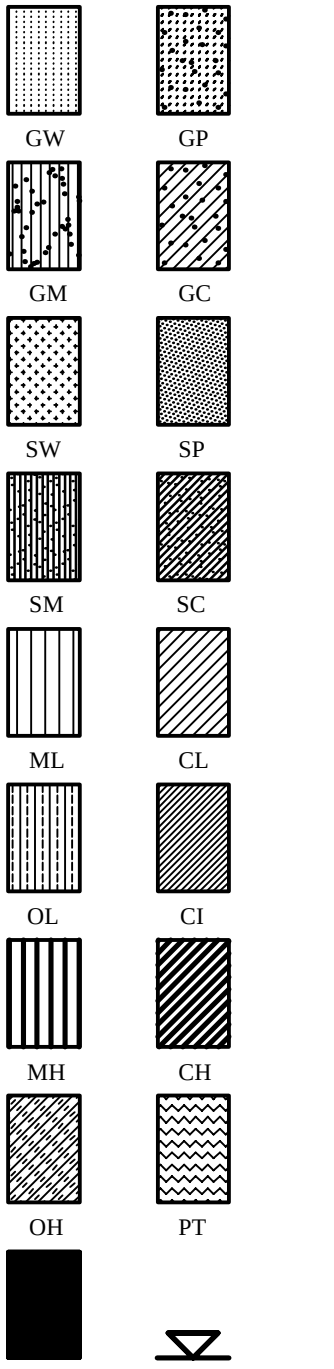
The soil logs are based upon objective data available to us at the time of forming our opinions. The soil logs indicate site specific soil characteristics and must not be generalized over larger areas due to the limited number of test holes as compared to that of an unlimited number of test holes. Every effort is made to evaluate the information by methods generally recognized. The soil logs represent our opinions. J. R. Cousin Consultants Ltd. cannot be responsible for actual site conditions proved to be materially at variance from our analysis or from the data generalization over untested areas.

J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : NE 5-7-27W
CODE : P-118.07
DATE : September 19, 2013
COORDINATES: N 5490107, E 347414
PROJECT : Reston Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 6

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	TOPSOIL - Black, silty, dry
2'	CLAY FILL - Brown, medium plastic, silty, fine grain sand, damp, very stiff
1m / 4'	
6'	
2m / 8'	
	SANDY CLAY - Brown, medium plastic, stoney, silty, moist, stiff to very stiff
3m / 10'	
12'	
4m / 14'	
	- Standing water at 3.9m below the surface
16'	
5m / 18'	
6m / 20'	



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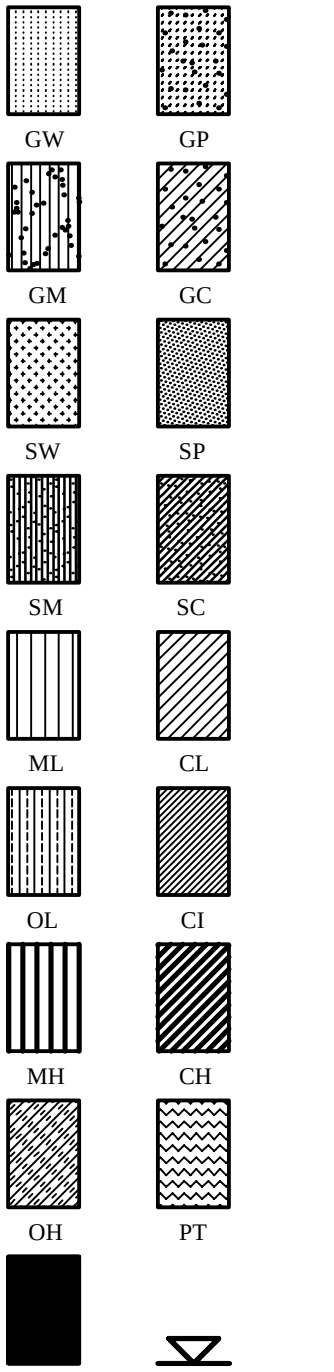
J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : NE 5-7-27W
CODE : P-118.07
DATE : September 19, 2013
COORDINATES: N 5490257, E 347398
PROJECT : Reston Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 7

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	TOPSOIL - Black, silty, dry
2'	CLAY FILL - Brown, medium plastic, silty, fine grain sand, damp, very stiff
1m / 4'	
6'	
2m / 8'	
	SANDY CLAY - Brown, medium plastic, stoney, silty, moist, stiff to very stiff
3m / 10'	
12'	
4m / 14'	
	- Standing water at 2.7m below the surface
16'	
5m	
18'	
6m / 20'	



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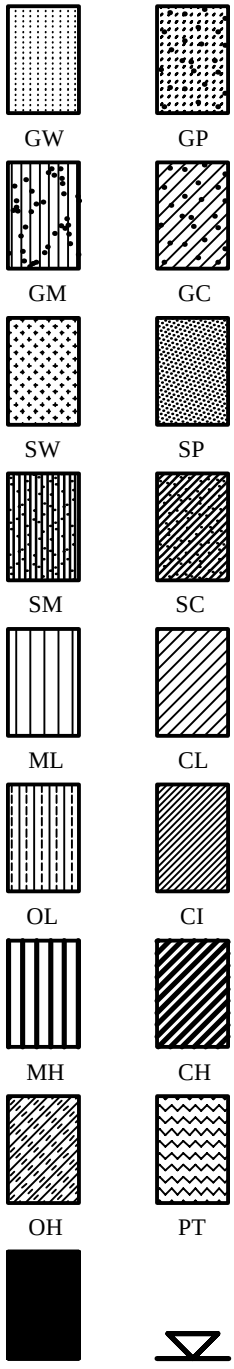
J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : NE 5-7-27W
CODE : P-118.07
DATE : September 19, 2013
COORDINATES: N 5490253, E 347526
PROJECT : Reston Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 8

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	TOPSOIL - Black, silty, dry
2'	CLAY FILL - Brown, medium plastic, silty, fine grain sand, damp, very stiff
1m / 4'	
6'	
2m / 8'	
	SANDY CLAY - Brown, medium plastic, stoney, silty, moist, stiff to very stiff
3m / 10'	
12'	
4m / 14'	
	- Standing water at 2.7m below the surface
16'	
5m / 18'	
6m / 20'	



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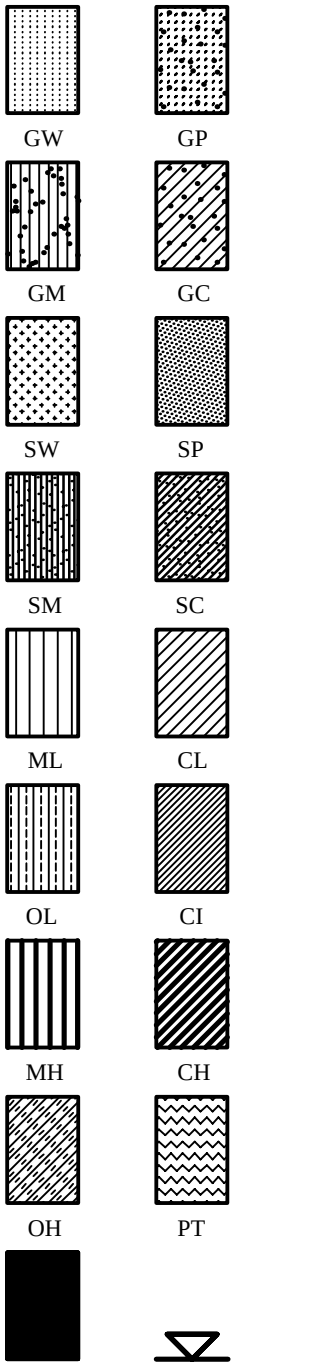
J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : NE 5-7-27W
CODE : P-118.07
DATE : September 19, 2013
COORDINATES: N 5490322, E 347581
PROJECT : Reston Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 9

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	TOPSOIL - Black, silty, dry
2'	CLAY FILL - Brown, medium plastic, silty, fine grain sand, damp, very stiff
1m / 4'	
6'	
2m / 8'	
3m / 10'	SANDY CLAY - Brown, medium plastic, stoney, silty, moist, stiff to very stiff
12'	
4m / 14'	
16'	
5m / 18'	
6m / 20'	



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SCALE BAR
(IN METRES)
20 0 10 20 40 60 80 100
1:1000

No.	REVISIONS	DATE	INITIALS

B.M. EL.

LOCATIONS OF UNDERGROUND STRUCTURES/UTILITIES AS SHOWN ARE BASED ON AVAILABLE INFORMATION BUT NO GUARANTEE IS GIVEN OR IMPLIED THAT ALL EXISTING UNDERGROUND STRUCTURES/UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL UNDERGROUND STRUCTURES/UTILITIES MUST BE OBTAINED FROM THE APPROPRIATE AUTHORITY/OWNER, BY THE CONTRACTOR, BEFORE PROCEEDING WITH CONSTRUCTION.

ENGINEER'S SEAL

PRELIMINARY

JRCC ENGINEERING CONSULTANTS

JR Cousin Consultants Ltd.
91A Scurfield Blvd. Winnipeg MB R3Y 1G4
p. (204) 489-0474
f. (204) 489-0487
www.jrcc.ca

ENGINEERING EXCELLENCE SINCE 1981

CODE: P–118.09
DESIGNED BY: JRC
DRAWN BY: BM
REVIEWED BY: JRC

PROJECT:
RM OF PIPESTONE – GEOTECHNICAL INVESTIGATION FOR THE RESTON LAGOON EXPANSION AND PIPESTONE PIPELINE

TITLE:
RESTON LAGOON
TEST HOLE LOCATION PLAN

SCALE:	DATE:	PLAN:	SHEET:
1:1000	16/06/21	1	1 of 2