

## Webb, Bruce (CWS)

---

**From:** Delbert Friesen [delbert@earthmax.ca]  
**Sent:** July-23-15 3:47 PM  
**To:** Webb, Bruce (CWS)  
**Cc:** 'Randal'; 'Watt, Lin'; 'Burgess, Bill'; Genaille, Dee (MMG)  
**Subject:** FW: Wawanesa Perm Results  
**Attachments:** 11609-35 Hydraulic Conductivity.pdf; 11609-34 Hydraulic Conductivity.pdf

Hi Bruce,  
Here are 2 of the sample results for the Wawanesa Hydraulic Conductivity test.

Yours truly,  
Delbert Friesen



Box 4236  
Arborg, MB  
ROCOAO  
T 204-641-1641  
F 204-480-1683  
E [delbert@earthmax.ca](mailto:delbert@earthmax.ca)

---

**From:** Johnson, Randell [<mailto:randell.johnson@amecfw.com>]  
**Sent:** July-23-15 3:31 PM  
**To:** Delbert Friesen; [randal@earthmax.ca](mailto:randal@earthmax.ca)  
**Subject:** Wawanesa Perm Results

Please see attached.

Regards,

Randell Johnson, C.E.T.  
Lab Supervisor, Technical Services

Amec Foster Wheeler Environment & Infrastructure  
440 Dovercourt Drive, Winnipeg, MB Canada R3Y1N4  
Tel (office): (204) 488-2997  
Cell: (204) 232-6605; Fax: (204) 489-8261  
E-mail: [randell.johnson@amecfw.com](mailto:randell.johnson@amecfw.com) ; [www.amecfw.com](http://www.amecfw.com)



This message is the property of Amec Foster Wheeler plc and/or its subsidiaries and/or affiliates and is intended only for the named recipient(s). Its contents (including any attachments) may be confidential, legally privileged or otherwise protected from disclosure by law. Unauthorised use, copying, distribution or disclosure of any of it may be unlawful and is strictly prohibited. We assume no responsibility to persons other than the intended named recipient(s) and do not accept liability for any errors or omissions which are a

# ASTM D5084 - HYDRAULIC CONDUCTIVITY REPORT



TO: Delbert Friesen  
 Earthmax Construction  
 Box 4226 - 300St. Peters Street  
 Arborg, MB ROC 0A0

PROJECT NO: WX11609  
 CLIENT: Earthmax Construction  
 DATE SUBMITTED: 07-Jul-15

PROJECT: Lagoon Project

TEST HOLE: ST02  
 SAMPLE NO.: S01  
 SAMPLE DEPTH: 1-3ft

PERMEANT: De-Aired Tap Water  
 HYDRAULIC GRADIENT: 29.12

## CONSTANT HEAD METHOD ( $K = cQL/thA$ )

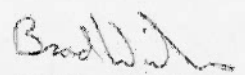
	Sample Height, L (cm)	Sample Dia. (cm)	Water Content (%)	Dry Density (kg/m <sup>3</sup> )	Degree of Saturation (%)	Cell Pressure (kPa)	Back Pressure (kPa)	Differential Pressure, h (kPa)
Initial	7.24	7.26	17.8%	1826	96.7%	241.4	196.5	20.7
Final	7.29	7.28	19.0%	1811	101.0%			

Date & Time		Time, t (seconds)	Flow (Q)		Temp. Corr, c	Hyd. Cond. Corrected, K (cm/s)
Start	End		Influent (ml)	Effluent (ml)		
7/13/15 3:30 PM	7/14/15 7:30 AM	57600	1.05	0.90	1.238	1.74E-08
7/14/15 7:30 AM	7/14/15 3:30 PM	28800	0.50	0.50	0.980	1.41E-08
7/14/15 3:30 PM	7/15/15 7:32 AM	57720	0.95	0.90	0.980	1.30E-08
7/15/15 7:32 AM	7/15/15 3:30 PM	28680	0.50	0.55	0.980	1.49E-08
7/15/15 3:30 PM	7/16/15 7:24 AM	57240	0.90	0.90	0.980	1.28E-08
7/16/15 7:24 AM	7/16/15 5:05 PM	34860	0.65	0.55	0.980	1.40E-08
7/16/15 5:05 PM	7/17/15 7:34 AM	52140	0.85	0.80	0.980	1.29E-08

Soil Description: CLAY- silty, trace sand, trace gravel, high plastic,  
 moist, stiff (PP= 3.5 ), greyish brown

Average Temperature  
 Corrected Value (cm/s): 1.36E-08

A Division of Amec Foster Wheeler Americas Limited

Per:   
 Brad Wiebe, M.Sc., P.Eng.  
 Associate Geotechnical Engineer

*Reporting of these results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.*

# ASTM D5084 - HYDRAULIC CONDUCTIVITY REPORT



**TO:** Delbert Friesen  
Earthmax Construction  
Box 4226 - 300St. Peters Street  
Arborg, MB ROC 0A0

**PROJECT NO:** WX11609  
**CLIENT:** Earthmax Construction  
**DATE SUBMITTED:** 07-Jul-15

**PROJECT:** Lagoon Project

**TEST HOLE:** ST04  
**SAMPLE NO.:** S01  
**SAMPLE DEPTH:** 1-3ft

**PERMEANT:** De-Aired Tap Water  
**HYDRAULIC GRADIENT:** 29.85

## CONSTANT HEAD METHOD ( $K = cQL/thA$ )

	Sample Height, L (cm)	Sample Dia. (cm)	Water Content (%)	Dry Density (kg/m <sup>3</sup> )	Degree of Saturation (%)	Cell Pressure (kPa)	Back Pressure (kPa)	Differential Pressure, h (kPa)
Initial	7.07	7.22	18.8%	1755	94.1%	241.4	196.5	20.7
Final	7.08	7.29	22.5%	1684	100.4%			

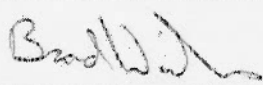
Date & Time		Time, t (seconds)	Flow (Q)		Temp. Corr, c	Hyd. Cond. Corrected, K (cm/s)
Start	End		Influent (ml)	Effluent (ml)		
7/14/15 7:31 AM	7/15/15 7:33 AM	86520	0.30	0.30	1.238	3.51E-09
7/15/15 7:33 AM	7/16/15 7:25 AM	85920	0.30	0.30	0.980	2.80E-09
7/16/15 7:25 AM	7/17/15 7:35 AM	87000	0.30	0.30	0.980	2.76E-09
7/17/15 7:35 AM	7/20/15 8:15 AM	261600	0.90	0.90	0.980	2.76E-09
7/20/15 8:15 AM	7/21/15 7:40 AM	84300	0.30	0.30	0.980	2.85E-09
7/21/15 7:40 AM	7/22/15 7:20 AM	85200	0.30	0.30	0.980	2.82E-09
7/22/15 7:20 AM	7/23/15 7:45 AM	87900	0.30	0.30	0.980	2.73E-09

**Soil Description:** CLAY- silty, trace sand, trace gravel, high plastic, moist, stiff (PP = 4.0), greyish brown

**Average Temperature**  
**Corrected Value (cm/s):** 2.79E-09

Amec Foster Wheeler Environment & Infrastructure  
A Division of Amec Foster Wheeler Americas Limited

Per:

  
Brad Wiebe, M.Sc., P.Eng.  
Associate Geotechnical Engineer

*Reporting of these results constitutes a testing service only.  
Engineering interpretation or evaluation of the test results is provided only on written request.*