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October 13, 2015

File No. 14-030-02

DGH Engineering Ltd.
12 Aviation Blvd,
St. Andrews, MB
R1A 3N5

ATTENTION: Mr. Charles Liu, P.Eng.

RE: Rocklake Colony Lagoon, Manitoba

ENG-TECH Consulting Limited (ENG-TECH) received three Shelby tubes labelled ST1, ST2 and ST3 for hydraulic conductivity testing from the above site. ENG-TECH prepared two samples for hydraulic conductivity in accordance with ASTM D5084-03, *Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter*.

The final hydraulic conductivity values (k_{20}) of 7.5×10^{-9} cm/sec and 3.2×10^{-8} cm/sec were obtained for the samples identified as ST1 and ST3, respectively. The hydraulic conductivity test data is outlined in Table 1, while the graphical representation of the hydraulic conductivity versus elapsed time is shown in Figures 1 and 2 for ST1 and ST3, respectively.

ENG-TECH trusts the above is all the information you require. If you have any questions, please contact the undersigned.

Sincerely,
ENG-TECH Consulting Limited

A handwritten signature in black ink, appearing to read "Clark Hryhoruk".

Clark Hryhoruk, M.Sc., P.Eng.
President, Geotechnical Engineer

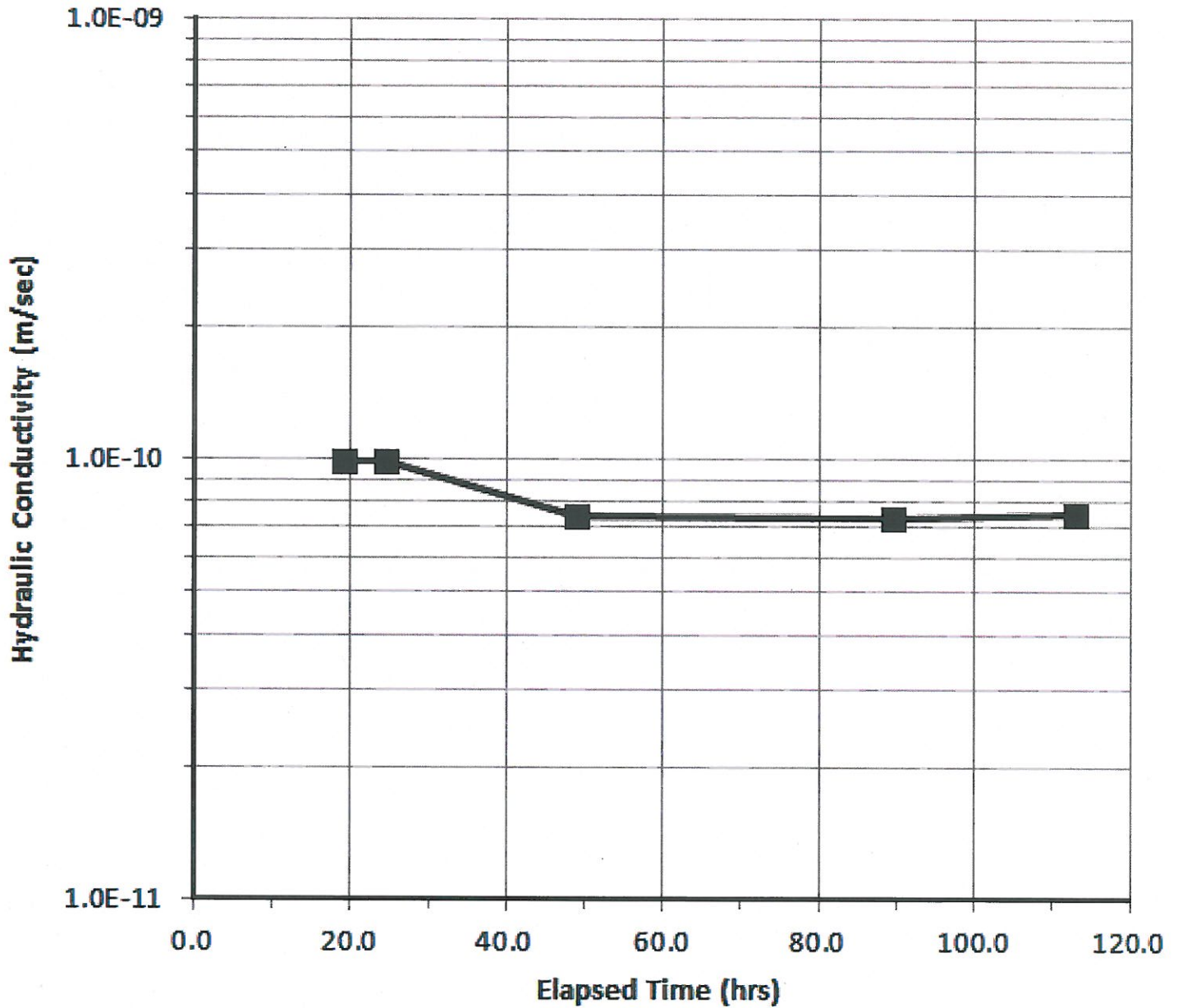
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Attachments: Table 1 – Hydraulic Conductivity Test Data
Figure 1 – Hydraulic Conductivity Versus Elapsed Time (ST1)
Figure 2 – Hydraulic Conductivity Versus Elapsed Time (ST3)

TABLE 1
HYDRAULIC CONDUCTIVITY TEST DATA
ROCKLAKE COLONY LAGOON, MANITOBA

SAMPLE IDENTIFICATION	ST1	ST3
INITIAL VALUES		
ENG-TECH Reference No.	15-30-2-42	14-30-2-43
Length of Sample in Tube (cm)	43.2	61.1
Length (cm)	5.61	5.82
Diameter (cm)	7.15	7.12
Area (cm ²)	40.1	39.8
Volume (cm ³)	224.7	231.8
Water Content (%)	38.7	31.5
Bulk Dry Density (kg/m ³)	1307	1450
Specific Gravity (G _s) (assumed)	2.70	2.70
Void Ratio	1.065	0.862
Degree of Saturation (%)	98.1	98.6
FINAL VALUES		
Length (cm)	5.62	5.85
Diameter (cm)	7.21	7.24
Area (cm ²)	40.8	41.1
Volume (cm ³)	229.2	240.7
Water Content (%)	39.9	34.7
Bulk Dry Density (kg/m ³)	1302	1394
Specific Gravity (G _s) (assumed)	2.70	2.70
Void Ratio	1.074	0.937
Degree of Saturation (%)	~100	99.9
CONSOLIDATION PHASE		
Confining Pressure (kPa)	103.4	103.4
Pore Water Pressure (kPa)	82.7	82.7
Effective Stress (kPa)	20.7	20.7
PERMEATION PHASE		
Confining Pressure (kPa)	103.4	103.4
Pore Water Pressure (kPa)	82.7	82.7
Effective Stress (kPa)	20.7	20.7
Hydraulic Gradient	20.0	19.2
Permeant Fluid	Distilled Water	Distilled Water
HYDRAULIC CONDUCTIVITY at TEST TEMPERATURE OF 19 °C (cm/sec)	7.3×10^{-9}	3.1×10^{-8}
HYDRAULIC CONDUCTIVITY at TEMPERATURE OF 20 °C (K₂₀) (cm/sec)	7.5×10^{-9}	3.2×10^{-8}

Hydraulic Conductivity



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DATE:

OCTOBER 2015

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FIGURE No.:

1

REV.:

PROJECT:

ROCKLAKE COLONY LAGOON, MANITOBA

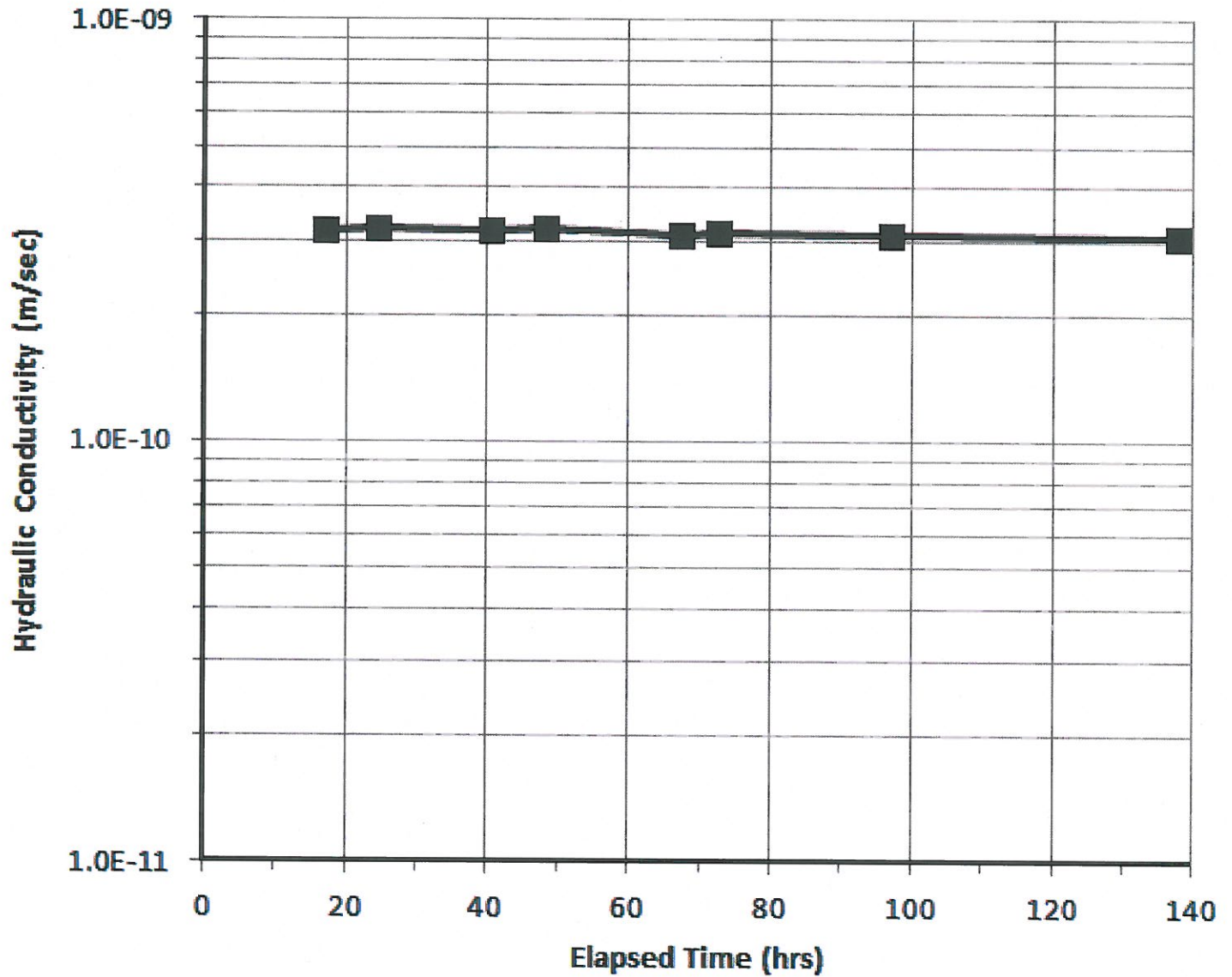
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SCALE:

N/A

HYDRAULIC CONDUCTIVITY
 VERSUS ELAPSED TIME
 (ST1)



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FIGURE No.:

2

REV.:

PROJECT:

ROCKLAKE COLONY LAGOON, MANITOBA

FILE No.:

15-030-02

SCALE:

N/A

HYDRAULIC CONDUCTIVITY
 VERSUS ELAPSED TIME
 (ST3)