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September 10, 2018

File No. 18-166-79

Decker Colony
88082 RR 264
Decker, Manitoba
R0M 0K0

ATTENTION: Phillip Waldner

RE: Hydraulic Conductivity Test Results, Decker Waste Water

ENG-TECH Consulting Limited (ENG-TECH) received seven (7) Shelby tube samples from the above project on August 24, 2018 and completed the requested hydraulic conductivity testing on the three samples selected by Manitoba Sustainable. The three (3) Shelby Tube samples were extracted on August 27, 2018 at ENG-TECH laboratory.

The samples labelled as ST3, ST6 and ST7 were prepared for testing in accordance with ASTM D5084-16a, *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 3.5×10^{-8} cm/sec, 3.2×10^{-8} cm/sec and 8.6×10^{-9} cm/sec were obtained for the samples identified as ST3, ST6 and ST7, respectively. The hydraulic conductivity test data is outlined in Table 1, while the graphical representations of the hydraulic conductivity versus elapsed time are shown in Figures 1 to 3. Photographs of the sample are attached.

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".

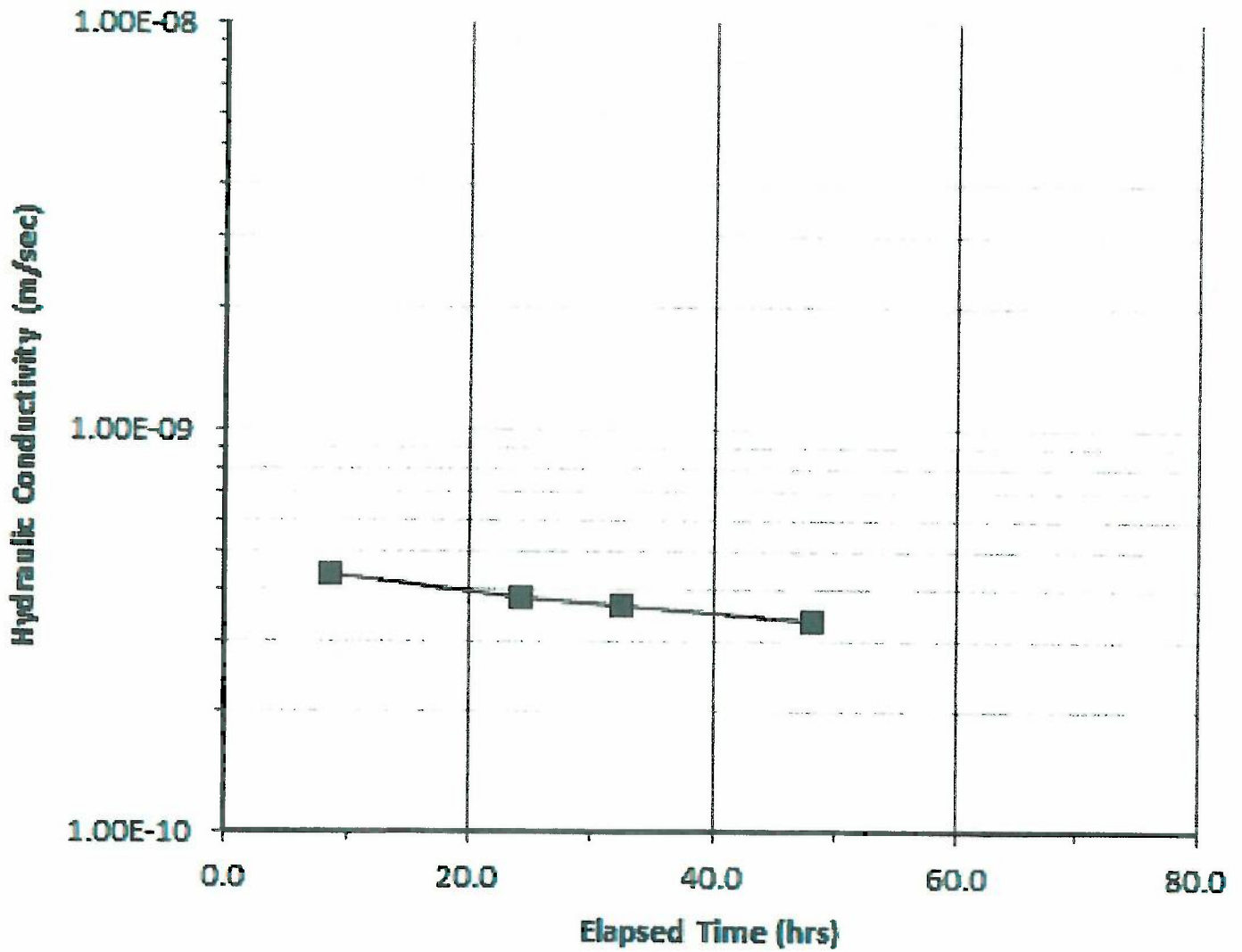
Clark Hryhoruk, M.Sc., P.Eng.
President, Geotechnical Engineer

CDH/pfpc

Attachments: Table 1 – Hydraulic Conductivity Test Data (Decker Waste Water)
Figure 1 – Hydraulic Conductivity Versus Elapsed Time (ST3)
Figure 2 – Hydraulic Conductivity Versus Elapsed Time (ST6)
Figure 3 – Hydraulic Conductivity Versus Elapsed Time (ST7)
Photographs (1 to 6)

**TABLE 1
HYDRAULIC CONDUCTIVITY TEST DATA
DECKER WASTE WATER**

SAMPLE IDENTIFICATION	ST3	ST6	ST7
INITIAL VALUES			
ENG-TECH Reference No.	18-166-79-1	18-166-79-2	18-166-79-3
Length of Sample in Tube (cm)	48.2	45.7	53.3
Length (cm)	6.96	6.75	6.99
Diameter (cm)	7.25	7.24	7.24
Area (cm ²)	41.3	41.1	41.1
Volume (cm ³)	287.2	277.7	287.6
Water Content (%)	16.7	17.7	17.7
Bulk Dry Density (kg/m ³)	1802	1799	1792
Specific Gravity (G _s) (assumed)	2.70	2.70	2.70
Void Ratio	0.499	0.501	0.507
Degree of Saturation (%)	90.3	95.1	94.3
FINAL VALUES			
Length (cm)	6.97	6.73	7.01
Diameter (cm)	7.28	7.27	7.26
Area (cm ²)	41.6	41.5	41.4
Volume (cm ³)	290.0	279.2	290.0
Water Content (%)	18.6	18.5	19.0
Bulk Dry Density (kg/m ³)	1784	1790	1772
Specific Gravity (G _s) (assumed)	2.70	2.70	2.70
Void Ratio	0.513	0.509	0.523
Degree of Saturation (%)	97.8	98.4	97.8
CONSOLIDATION PHASE			
Confining Pressure (kPa)	103.4	103.4	103.4
Pore Water Pressure (kPa)	82.7	82.7	82.7
Effective Stress (kPa)	20.7	20.7	20.7
PERMEATION PHASE			
Confining Pressure (kPa)	103.4	103.4	103.4
Pore Water Pressure (kPa)	82.7	82.7	82.7
Effective Stress (kPa)	20.7	20.7	20.7
Hydraulic Gradient	16.1	16.7	16.0
Permeant Fluid	Potable Tap Water	Potable Tap Water	Potable Tap Water
HYDRAULIC CONDUCTIVITY AT TEST TEMPERATURE OF 24 °C (cm/sec)	3.9 x 10 ⁻⁸	3.5 x 10 ⁻⁸	9.4 x 10 ⁻⁹
HYDRAULIC CONDUCTIVITY AT TEMPERATURE OF 20 °C (K ₂₀) (cm/sec)	3.5 x 10 ⁻⁸	3.2 x 10 ⁻⁸	8.6 x 10 ⁻⁹



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ENG. STAMP:



CLIENT:

DECKER COLONY

PROJECT:

DECKER WASTE WATER

DATE:

SEPTEMBER 2018

FILE No

18-166-79

DRAWN BY:

PFPC

FIGURE No

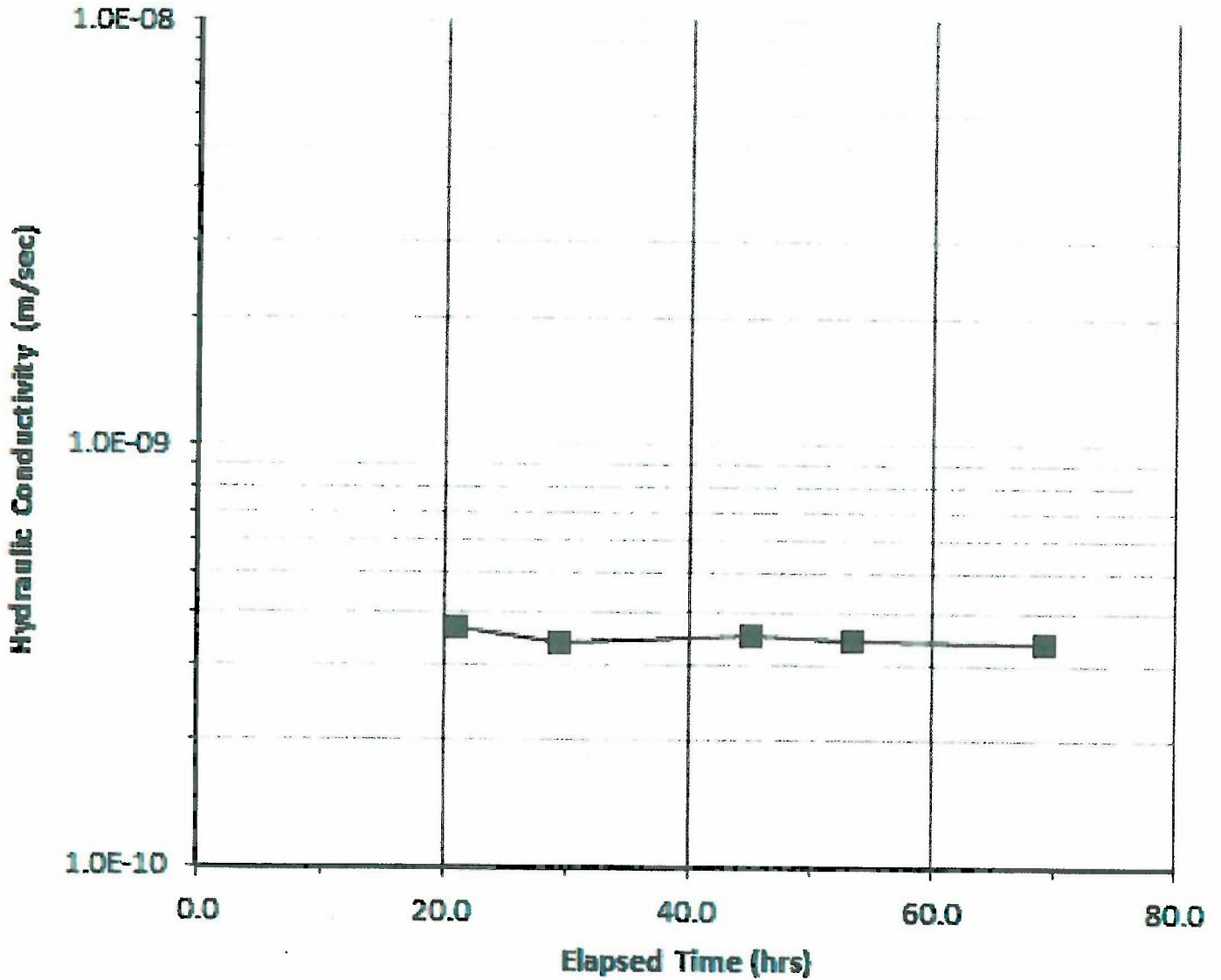
1

REV

SCALE:

N/A

HYDRAULIC CONDUCTIVITY
 VERSUS ELAPSED TIME
 (ST3)



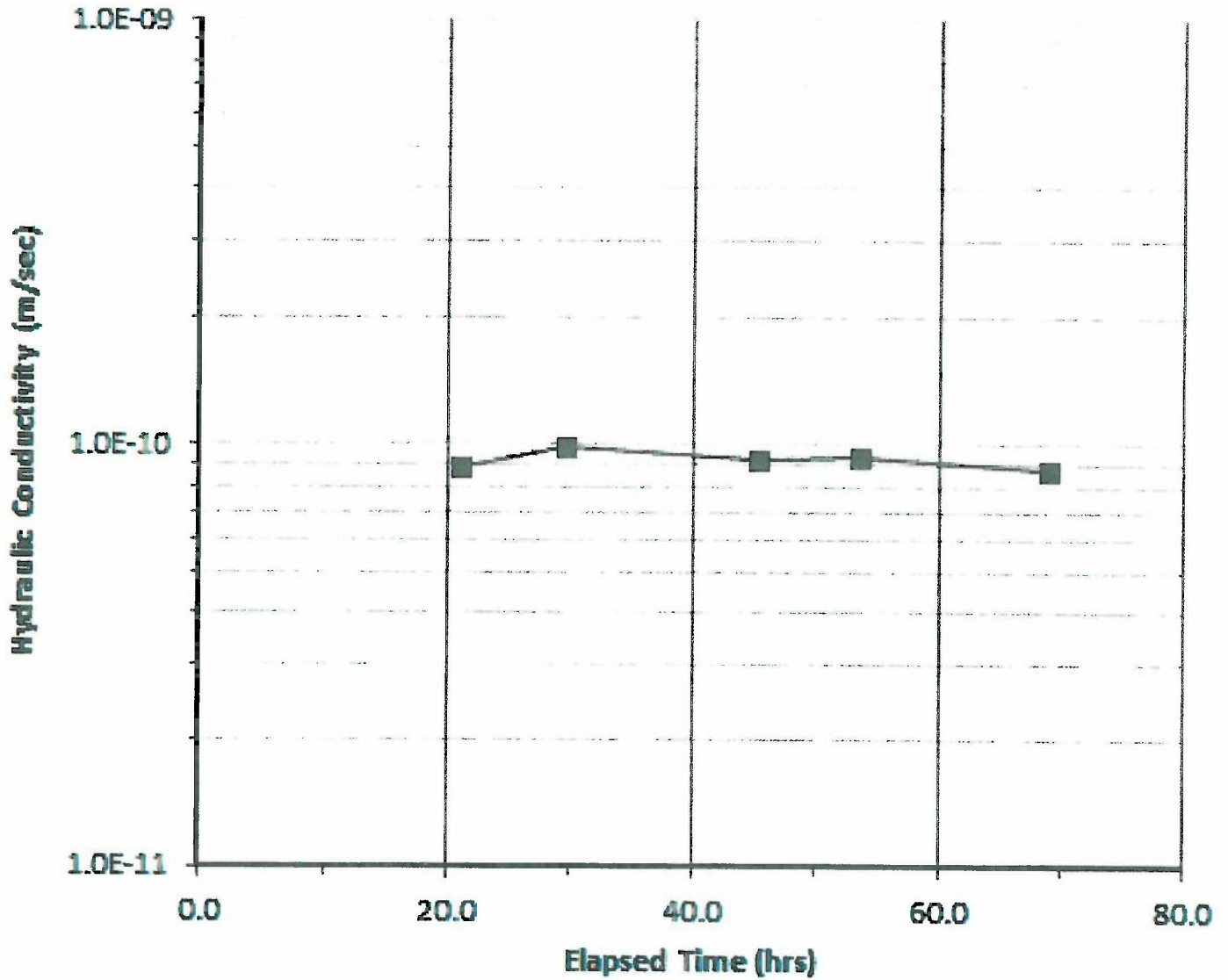
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CLIENT: DECKER COLONY
 DATE: SEPTEMBER 2018
 DRAWN BY: PFPC
 FIGURE No.: 2
 REV.:

PROJECT: DECKER WASTE WATER
 FILE No.: 18-166-79
 SCALE: N/A
 HYDRAULIC CONDUCTIVITY VERSUS ELAPSED TIME (ST6)



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DATE:
 SEPTEMBER 2018

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FIGURE No.:
 3

REV:

PROJECT:
 DECKER WASTE WATER

FILE No.:
 18-166-79

SCALE:
 N/A

HYDRAULIC CONDUCTIVITY
 VERSUS ELAPSED TIME
 (ST7)



PHOTOGRAPH #1: Sample ST3 upon completion of test.



PHOTOGRAPH #2: Sample ST3 after breaking apart.



PHOTOGRAPH #3: Sample ST6 upon completion of test.



PHOTOGRAPH #4: Sample ST6 after breaking apart.



PHOTOGRAPH #5: Sample ST7 upon completion of test.



PHOTOGRAPH #6: Sample ST7 after breaking apart.