April 28, 2017
Project No. EM1343

Via e-mail: joshuas@softlinesolutions.net
Original will remain on file

Softline Solutions Inc.
4611 Morris Road
Edmonton, Alberta
T6B 2V9

ATTN: Mr. Joshua Skinner

RE: Terraflex Permeable Paving System
          Permeability Testing Results - Sample 1

Dear Mr. Skinner:

1.0   INTRODUCTION

Parkland Geo-Environmental Ltd. (ParklandGEO) was commissioned by Softline Solutions to test the permeability of a sample of their Terraflex product, a permeable paving system.

2.0   TEST SETUP

The cylindrical Terraflex sample was supplied by Softline Solutions on April 25, 2017 (Sample 1). The sample parameters were:

SAMPLE PARAMETERS (Sample 1)

Parameter	Measured Value
Diameter	7.43 cm
Height	5.28 cm
Weight	204.5 g

The sample was then placed in a 7.62 cm diameter ABS pipe and sealed in place with no gaps between the pipe and sample, with a mesh cap placed on the end of the pipe to hold the sample in followed by a 5.08 cm valve. A 10.16 cm diameter ABS pipe was then added ontop of the sample as a standpipe. The test was conducted by filling the pipe with water, measuring the starting height of water in the standpipe and opening the valve while recording the time required for the water to pass through the sample using a stopwatch. The valve was then closed and the

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final height of water in the standpipe was measured. The test was conducted eight times in order to reproduce the results.

3.0   CALCULATIONS

The permeability of the sample was calculated using the following formula;

$k = 2.3(aL/At)*\log(h_1/h_2)$

Where: k = coefficient of permeability (cm/sec)
               a = cross sectional area of the pipe (cm^2)
               L = average height of the sample (cm)
               A = cross-sectional area of the sample (cm^2)
               t = elapsed time (sec)
               h_1 = height of water at the start of test (cm)
               h_2 = height of water at the end of test (cm)

4.0   RESULTS

The following table presents the results of the eight trials that were completed. The average k value was taken as the average of the values after the highest and lowest values were discounted.

TESTING RESULTS

Trial #	1	2	3	4	5	6	7	8
Time (sec)	15.88	11.48	11.2	11.16	10.9	10.77	10.85	11.19
h_1 (cm)	166.1	166.3	165.6	166.2	161.9	161.7	165.7	163.2
h_2 (cm)	3.5	33	33.9	33.4	32.9	32.1	33.5	29.1
k (cm/s)	2.40	1.39	1.40	1.42	1.44	1.48	1.45	1.52
Average k, cm/s (minus highest and lowest outlier)						1.45		

Based on this testing, the Terraflex sample had a coefficient of permeability (k) of 1.45 cm/s (1.45 x 10^{-2} m/s).

The flow rate through an area of the Terraflex would be:

Flow = k (m/s) X A (m^2)

For a 1 m x 1 m area, the flow rate would be 0.0145 m^3/s/m^2, or 0.871 m^3/minute/m^2. This is equivalent to 21.38 gallons/minute/$foot^2$.

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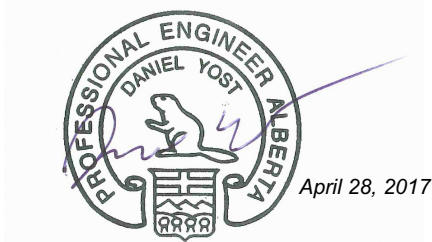Project EM1343
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5.0   LIMITATIONS AND CLOSURE

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We trust that this report meets with your current requirements.   If there are any questions, please contact the undersigned at 780.416.1755.

Respectfully Submitted,

PARKLAND GEO-ENVIRONMENTAL LTD.
APEGA Permit to Practice No. P - 8867

April 28, 2017

Daniel Yost, P. Eng.
Manager, Geo-Environmental Engineering

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