Groundwork Engineering Limited

Appendix D

Compressive Strength Test Results

3443 Princess St, Kingston, ON K7P 3A5
613-634-1789(tel)
mburger@groundengineer.ca
www.groundengineer.ca

SNC·LAVALIN

SNC-Lavalin GEM Ontario Inc.
1164 Clyde Court
Kingston, Ontario, Canada, K7P 2E4
613.389.1781 613-.389-4204

August 21, 2017

Martin Burger P.Eng M.Eng
Project Manager
Groundwork Engineering
3443 Princess Street
Kingston, ON
K7P 3A5

Our reference: 17-2694-02

Subject: Project # 17004-13 Olympic Harbour

Dear Sir:

As requested, SNC-Lavalin conducted Compressive Strength testing on 2 cores in accordance with CSA 14-C, that were delivered to our office on August 18, 2017.

Results are as follows:

Bore Hole- 3 55.6 mPa

Bore Hole- 4 62.4 mPa

We trust this information meets your requirements at this time. Should you have any further questions please contact our office.

Jon Ubdegrove
Manager Inspection Testing
Environment & Geoscience
Infrastructure Engineering

Groundwork Engineering Limited

Appendix D

Soil Analysis Test Results

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CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G65839

REPORT No. B17-22841 (i)

Report To:

Groundwork Engineering LTD
3443 Princess St,
Kingston Ontario K7P3A5 Canada
Attention: Martin Burger

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 10-Aug-17
DATE REPORTED: 16-Aug-17
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 17004-13
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Core 1	Core 2		
			Sample I.D.		B17-22841-1	B17-22841-2		
			Date Collected		09-Aug-17	09-Aug-17		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Sulphate	µg/g	10	SM4110C	11-Aug-17/O	180	1010		
Antimony	µg/g	0.5	EPA 6020	15-Aug-17/O	7.1	1.2		
Arsenic	µg/g	0.5	EPA 6020	15-Aug-17/O	15.8	21.2		
Barium	µg/g	1	EPA 6010	15-Aug-17/O	173	244		
Beryllium	µg/g	0.2	EPA 6010	15-Aug-17/O	0.6	0.5		
Boron	µg/g	0.5	EPA 6010	15-Aug-17/O	12.6	9.8		
Boron (HWS)	µg/g	0.02	MOE3470	15-Aug-17/O	0.12	0.20		
Cadmium	µg/g	0.5	EPA 6010	15-Aug-17/O	0.7	0.6		
Chromium	µg/g	1	EPA 6010	15-Aug-17/O	20	22		
Chromium (VI)	µg/g	0.5	EPA3060A	14-Aug-17/R	< 0.5	< 0.5		
Cobalt	µg/g	1	EPA 6010	15-Aug-17/O	14	21		
Copper	µg/g	1	EPA 6010	15-Aug-17/O	1020	89		
Lead	µg/g	5	EPA 6010	15-Aug-17/O	454	437		
Molybdenum	µg/g	1	EPA 6010	15-Aug-17/O	1	< 1		
Mercury	µg/g	0.005	EPA7471A	15-Aug-17/R	0.163	0.120		
Nickel	µg/g	1	EPA 6010	15-Aug-17/O	26	31		
Selenium	µg/g	0.5	EPA 6020	15-Aug-17/O	1.1	1.0		

Michelle Dubien
Lab Manager

R.L. = Reporting Limit
Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill,B-Barrie
Uncertainty values available upon request

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SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 17004-13
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Core 1	Core 2		
			Sample I.D.		B17-22841-1	B17-22841-2		
			Date Collected		09-Aug-17	09-Aug-17		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Silver	µg/g	0.2	EPA 6010	15-Aug-17/O	< 0.2	< 0.2		
Thallium	µg/g	0.1	EPA 6020	15-Aug-17/O	0.2	0.2		
Uranium	µg/g	0.1	EPA 6020	15-Aug-17/O	0.5	0.5		
Vanadium	µg/g	1	EPA 6010	15-Aug-17/O	28	32		
Zinc	µg/g	3	EPA 6010	15-Aug-17/O	844	215		

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.
If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC
QC will be made available upon request.

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Site Analyzed: K-Kingston, W-Windsor, O-Ottawa, R-Richmond Hill,B-Barrie
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Michelle Dubien
Lab Manager

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Final Report

C.O.C.: G65839

REPORT No. B17-22841 (ii)

Report To:

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Fax: 613-544-2770

DATE RECEIVED: 10-Aug-17
DATE REPORTED: 16-Aug-17
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 17004-13
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Core 1	Core 2		
			Sample I.D.		B17-22841-1	B17-22841-2		
			Date Collected		09-Aug-17	09-Aug-17		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Benzene	µg/g	0.02	EPA 8260	11-Aug-17/R	0.13	< 0.02		
Toluene	µg/g	0.2	EPA 8260	11-Aug-17/R	0.4	< 0.2		
Ethylbenzene	µg/g	0.05	EPA 8260	11-Aug-17/R	0.09	< 0.05		
Xylene, m,p-	µg/g	0.03	EPA 8260	11-Aug-17/R	0.25	< 0.03		
Xylene, o-	µg/g	0.03	EPA 8260	11-Aug-17/R	0.17	< 0.03		
Xylene, m,p,o-	µg/g	0.03	EPA 8260	11-Aug-17/R	0.42	< 0.03		
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	11-Aug-17/R	< 10	< 10		
PHC F2 (>C10-C16)	µg/g	5	CWS Tier 1	14-Aug-17/K	20	19		
PHC F3 (>C16-C34)	µg/g	10	CWS Tier 1	14-Aug-17/K	37	41		
PHC F4 (>C34-C50)	µg/g	10	CWS Tier 1	14-Aug-17/K	< 10	< 10		
% moisture	%			16-Aug-17/K	6.50	9.70		

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
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nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
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Lab Manager

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Final Report

C.O.C.: G65839 **REPORT No. B17-22841 (iii)**

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Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 10-Aug-17
DATE REPORTED: 16-Aug-17
SAMPLE MATRIX: Soil

JOB/PROJECT NO.: 17004-13
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Core 1	Core 2		
			Sample I.D.		B17-22841-1	B17-22841-2		
			Date Collected		09-Aug-17	09-Aug-17		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Acenaphthene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	< 0.05		
Acenaphthylene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	< 0.05		
Anthracene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	< 0.05		
Benzo(a)anthracene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.06		
Benzo(a)pyrene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.06		
Benzo(b)fluoranthene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.08		
Benzo(b+k)fluoranthene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.11		
Benzo(g,h,i)perylene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	< 0.05		
Benzo(k)fluoranthene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	< 0.05		
Chrysene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.07		
Dibenzo(a,h)anthracene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	< 0.05		
Fluoranthene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.09		
Fluorene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	< 0.05		
Indeno(1,2,3,-cd)pyrene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	< 0.05		
Methylnaphthalene,1-	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.13		
Methylnaphthalene,2-	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.15		
Methylnaphthalene 2-(1-)	µg/g	0.05	EPA 8270	16-Aug-17/K	0.08	0.28		

Michelle Dubien
Lab Manager

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			Date Collected		09-Aug-17	09-Aug-17		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Naphthalene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.12		
Phenanthrene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.13		
Pyrene	µg/g	0.05	EPA 8270	16-Aug-17/K	< 0.05	0.08		

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F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
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