APPENDIX 'A'

GEOTECHNICAL REPORT

APPENDIX 'A' - GEOTECHNICAL REPORT

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The geotechnical report is provided to aid in the Contractor's evaluation of the existing soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. However, variations in pavement structure and/or soil conditions may exist between test holes and fluctuations in groundwater levels can be expected seasonally and may occur as a result of construction activities. The nature and extent of variations may not become evident until construction commences.

2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT 1 (15-RL-01)

CORK AVENUE AND ARMSTRONG AVENUE ALLEY BETWEEN SALTER STREET AND SLY DRIVE

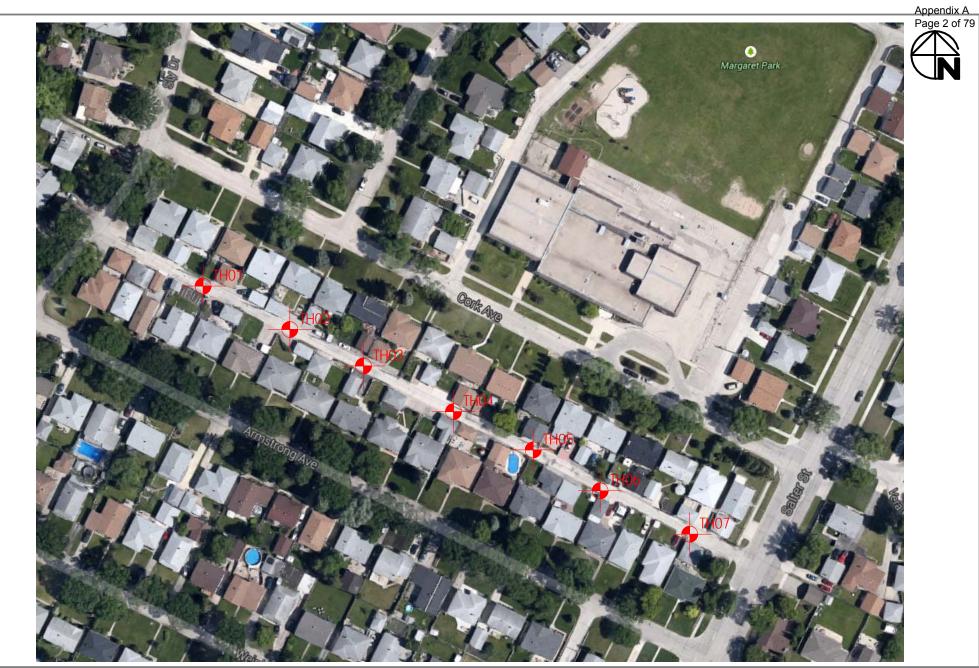
GEOTECHNICAL INVESTIGATION



Prepared for: KGS Group Inc. 3rd Floor - 865 Waverley Street Winnipeg, Manitoba R3T 5P4

Prepared by: Stantec Consulting Ltd. 199 Henlow Bay Winnipeg, Manitoba R3Y 1G4

January 22, 2015 Project No. 123311678



Stantec	Project No. 123311678	Drawn by: SB	Figure: 1	Testhole Location Plan 2015 City of Winnipeg Alley Package Contract (15-RL-01)
Stantec	Date: January 9, 2015	Reviewed by: GL	Scale: NTS	Cork Ave and Armstrong Ave Alley between Salter St and Sly Rd

TABLE 1 2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT (15-RL-01) CORK AVENUE AND ARMSTRONG AVENUE ALLEY BETWEEN SALTER STREET AND SLY DRIVE GEOTECHNICAL INVESTIGATION

Testhole	Testhole Location	Paveme	nt Surface	Pavement Strue	cture Material	Sample	Sample	Moisture	Pa	article Siz	ze Analys	sis	Att	erberg Lir	nits
ID		Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH1	41.0 m East of Sly Drive on Centreline	Concrete	150	-	-	Silt	0.9	22	0.0	2.9	83.2	13.9	25	18	7
TH2	67.0 m East of Sly Drive on Centreline	Concrete	180	-	-	-	-	-	-	-	-	-	-	-	-
ТНЗ	97.0 m East of Sly Drive on Centreline	Concrete	150	-	-	-	-	-	-	-	-	-	-	-	-
TH4	133.0 m East of Sly Drive on Centreline	Concrete	140	-	-	-	-	-	-	-	-	-	-	-	-
TH5	155.0 m East of Sly Drive on Centreline	Concrete	160	-	-	-	-	-	-	-	-	-	-	-	-
TH6	188.0 m East of Sly Drive, approximately 1.0 m South of Centreline	Concrete	150	-	-	-	-	-	-	-	-	-	-	-	-
	226.0 m East of Sly Drive, approximately 1.0 m South of Centreline	Concrete	135	-	-	-	-	-	-	-	-	-	-	-	-

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			KGS Group Inc.													No.	1		1678	
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						AMP	-													
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H (m	U U	SYMBOL		DAT/		КШ	JRE (%)		5	0kPa		10	0kPa		15	0kPa	ı	20	0kPa	H (ff)
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		SOIL		M		Ī	MOISTURE CONTENT (%)	•	U	•			Pene							
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			Silt		AS		22			0										- 2
			tan, soft, moist, low plasticitysome clay																	
			- trace fine to medium sand				22													-
- 1 -			Particle Size Analysis at 0.9 m: 0.0% Gravel,		AS		22			нон										F
			2.9% Sand, 83.2% Silt, 13.9% Clay																	
					AS		22			0										- 4
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					AS		21			0										
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					AS		23			0										- 6
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·			TESTHOLE LOCATION: 41.0 m East of Sly																	-
			Drive on Centreline.																	
			• The soil was frozen to a depth of 0.9 m.																	- 8
			• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.																	-
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		NT _ ECT	TEST KGS Group Inc. 2015 City of Winnipeg Alley Package C) JEC TUM		. 1	<u>2331</u>	1678	
			Cork Ave and Armstrong Ave Alley bet												TION				
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			- black, firm, moist, high plasticity - trace organic material		AS		39					c							
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	-		Silt - tan, soft, moist, low plasticity	-	AS		20			•									- 6
- 2 -	- ML		some claytrace fine to medium sand									· · · · · · · · · · · · · · · · · · ·							
	-		TESTHOLE LOCATION: 67.0 m East of Sly Drive on Centreline.	_	AS		24			0									-
			• The soil was frozen to a depth of 0.9 m.																- 8
	-		 No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 2.1 m. 																
	-		• resultie terminated at a depth of 2.1 m.																
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	-				AS		39					0			· · · · ·					- 2
	-	X																		-
			Clay - brown, stiff, moist, high plasticity		AS		31				0									-
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	-				AS		27				0									- 6
	-						27													-
- 2 -																				-
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	-		Drive on Centreline.																	-
			• The soil was frozen to a depth of 0.9 m.												· · · ·					- 8
	-		• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.												· · · ·					-
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				-	AS		25				o									
			TESTHOLE LOCATION: 133.0 m East of Sly Drive on Centreline.																	
			Drive on Centrenne.																	
			 The soil was frozen to a depth of 0.9 m. No groundwater seepage or soil sloughing was																	- 8
			observed during or upon completion of drilling.																	
			• Testhole terminated at a depth of 2.1 m.																	
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	-		 tan, soft, moist, low plasticity some clay trace fine to medium sand 		AS	5	25			c										- 4
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	-				AS	5	24			0										- 6
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	-		TESTHOLE LOCATION: 155.0 m East of Sly Drive on Centreline.		AS		23													
 	-		• The soil was frozen to a depth of 0.9 m.																	8
			 No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 2.1 m. 																	-
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			TESTHOLE LOCATION: 188.0 m East of Sly Drive, approximately 1.0 m South of Centreline.																	
	-		• The soil was frozen to a depth of 0.9 m.									· · · ·								- 8
			 No groundwater seepage or soil sloughing was observed during or upon completion of drilling. 																	-
	-		• Testhole terminated at a depth of 2.1 m.																	
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	-			- some clay - trace fine to medium sand		AS		25			0										-
	-			TESTHOLE LOCATION: 226.0 m East of Sly Drive, approximately 1.0 m South of Centreline.																	- 8
-	-			• The soil was frozen to a depth of 0.9 m.																	-
				• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.																	
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		iezo acki		Frype: Bentonite Drill Cuttings Sand					,						6'		JL			,77,	



Core sample from Testhole TH1



Core sample from Testhole TH2





Core sample from Testhole TH3



Core sample from Testhole TH4





Core sample from Testhole TH5



Core sample from Testhole TH6





Core sample from Testhole TH7





KGS Group Inc.

LABORATORY

199 Henlow Bay Winnipeg MB R3Y 1G4 Tel: (204) 488-6999

PARTICLE SIZE ANALYSIS ASTM D422

PROJECT: 2015 City of Winnipeg Alley Package

3rd Floor - 865 Waverley St. Contract (15-RL-01) Cork Ave and Armstrong Ave Alley Winnipeg, Manitoba R3T 5P4 between Salter St and Sly Rd PROJECT NO.: 123311678 Michael Turko Attention: SAMPLED BY: Nestor Abarca DATE RECEIVED: January 13, 2015 SAMPLE ID: TH1 @ 0.91 m TESTED BY: Sothea Bun, C.E.T. 100 90 80 ^Dercent Passing (%) 70 60 50 40 30 20 10 0 10 1 0.1 0.01 0.001 100 Particle Size (mm) PARTICLE PERCENT PARTICLE PERCENT SIZE PASSING SIZE PASSING 37.50 mm 100.0 1.18 mm 100.0 25.00 mm 100.0 0.425 mm 99.8 19.00 mm 100.0 0.250 mm 99.6 16.00 mm 100.0 0.150 mm 99.6 12.50 mm 100.0 0.075 mm 97.1 9.50 mm 100.0 0.005 mm 16.8 4.75 mm 100.0 0.002 mm 13.9 2.00 mm 100.0 0.001 mm 12.1 Sand, % Colloids, % Silt. % Gravel % Clay, % Medium Coarse Fine 75 to 4.75 mm <0.075 to 0.002 mm <0.002 mm < 0.001 mm <4.75 to 2.0 mm <2.0 to 0.425 mm <0.425 to 0.075 mm 0.0 0.2 2.7 83.2 13.9 12.1 0.0 CCil January 19, 2015 REVIEWED BY: German E. Leal, B.Sc., P. Eng.

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.

2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT 1 (15-RL-01)

PARTRIDGE AVENUE AND ROYAL AVENUE BETWEEN POWERS STREET AND SALTER STREET

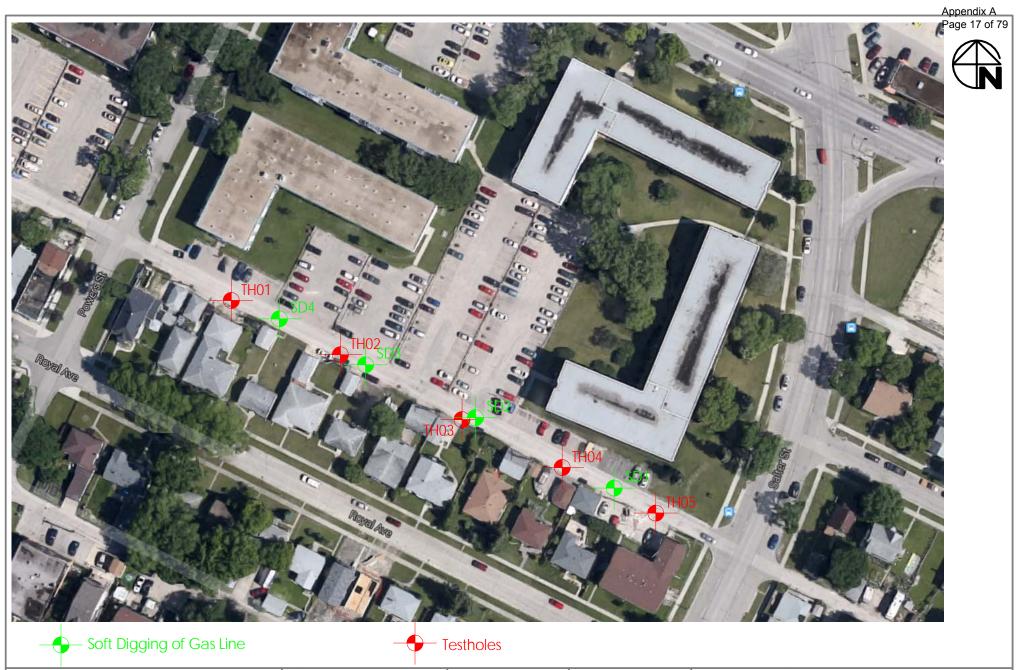
GEOTECHNICAL INVESTIGATION



Prepared for: KGS Group Inc. 3rd Floor - 865 Waverley Street Winnipeg, Manitoba R3T 5P4

Prepared by: Stantec Consulting Ltd. 199 Henlow Bay Winnipeg, Manitoba R3Y 1G4

January 23, 2015 Project No. 123311678



Stantec	Project No. 123311678	Drawn by: SB	Figure: 1	Testhole Location Plan 2015 City of Winnipeg Alley Package
	Date: January 9, 2015	Reviewed by: GL	0000101110	Contract (15-RL-01) Partridge Ave and Royal Ave Alley between Powers St and Salter St

TABLE 1 2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT (15-RL-01) PARTRIDGE AVENUE AND ROYAL AVENUE BETWEEN POWERS STREET AND SALTER STREET GEOTECHNICAL INVESTIGATION

Testhole	Testhole Location	Paveme	nt Surface	Pavement Stru	cture Material	Sample	Sample	Moisture	Pa	rticle Siz	e Analys	sis	Att	erberg Lin	nits
ID		Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH1	158.0 m West of Salter Street, approximately 2.2 m South of Centreline	Concrete	140	-	-	-	-	-	-	-	-	-	-	-	-
TH2	126.0 m West of Salter Street, approximately 1.7 m South of Centerline	Concrete	160	-	-	-	-	-	-	-	-	-	-	-	-
TH3	88.0 m West of Salter Street, approximately 1.7 m South of Centreline	Concrete	155	-	-	Clay	0.9	31	0.4	2.4	25.1	72.1	78	24	54
TH4	52.0 m West of Salter Street, approximately 1.9 m South of Centreline	Concrete	155	-	-	-	-	-	-	-	-	-	-	-	-
TH5	25.0 m West of Salter Street, approximately 1.7 m South of Centreline	Concrete	155	-	-	-	-	-	-	-	-	-	-	-	-



TABLE 2

PARTRIDGE AVENUE AND ROYAL AVENUE ALLEY BETWEEN POWERS STREET AND SALTER STREET GAS LINE SOFT DIG

Soft Dig ID	Soft Dig Location	Depth from Top of pavement to Gas Main (mm)
SD1	35.0 m West of Salter Street on Centreline	1000
SD2	80.0 m West of Salter Street on Centreline	1000
SD3	115.0 m West of Salter Street on Centreline	1000
SD4	48.0 m East of Powers Street on Centreline	1000

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			Partridge Ave and Royal Ave between P DATE December 18, 2014 DRILLING CO. 1												гюл 12		n SS/		
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			 black, stiff, moist, high plasticity brown below 0.6 m 		AS		29				o								-
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.	-		 trace fine gravel trace fine to coarse sand 		AS		29				o								- 2
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	-		Centreline.																- 8
F -			• The soil was frozen to a depth of 1.1 m.																
			• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.																
			• Testhole terminated at a depth of 2.1 m.																-
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	-		 silty trace fine gravel trace fine to coarse sand 		AS		31				o						- 2
			Particle Size Analysis at 0.9 m: 0.4% Gravel, 2.4% Sand, 25.1% Silt, 72.1% Clay														-
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	-				AS		29			o							-
	-		Silt - tan, soft, moist, low plasticity	_	AS		25			0							- - - 6
- 2 -	M	_															-
	-		TESTHOLE LOCATION: 88.0 m West of Salter Street, approximately 1.7 m South of Centreline.		AS		24			o							-
	-		 The soil was frozen to a depth of 0.9 m. No groundwater seepage or soil sloughing was 														- 8
	-		observed during or upon completion of drilling.Testhole terminated														-
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	1		TESTHOLE LOCATION: 25.0 m West of Salter Street, approximately 1.7 m South of Centreline.															-
	-		• The soil was frozen to a depth of 0.9 m.															- 8
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Core sample from Testhole TH1



Core sample from Testhole TH2





Core sample from Testhole TH3



Core sample from Testhole TH4





Core sample from Testhole TH5





KGS Group Inc.

R3T 5P4

LABORATORY

199 Henlow Bay Winnipeg MB R3Y 1G4 Tel: (204) 488-6999

PARTICLE SIZE ANALYSIS ASTM D422

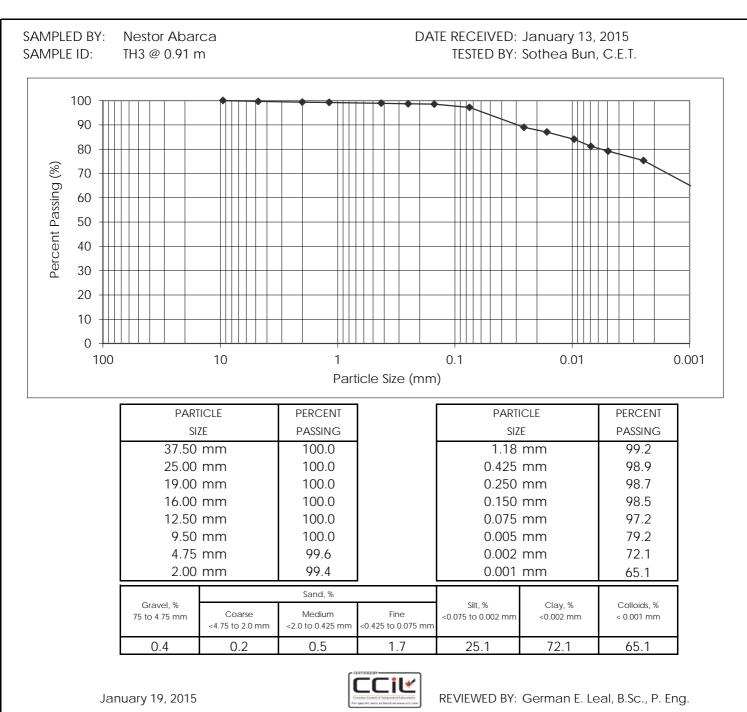
PROJECT: 2015 City of Winnipeg Alley Package Contract (15-RL-01) Partridge Ave and Royal Ave Alley between Powers St and Salter St

Attention: Michael Turko

3rd Floor - 865 Waverley St.

Winnipeg, Manitoba

PROJECT NO.: 123311678



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2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT 1 (15-RL-01)

WELLINGTON CRESCENT AND RUSKIN ROW ALLEY BETWEEN GROSVENOR AVENUE AND PALK ROAD

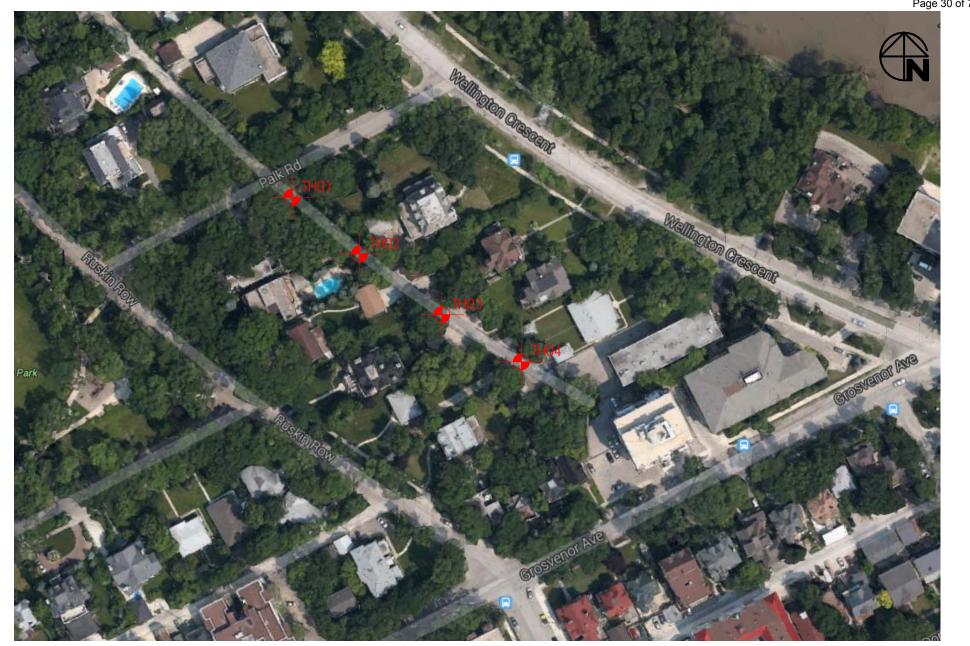
GEOTECHNICAL INVESTIGATION



Prepared for: KGS Group Inc. 3rd Floor - 865 Waverley Street Winnipeg, Manitoba R3T 5P4

Prepared by: Stantec Consulting Ltd. 199 Henlow Bay Winnipeg, Manitoba R3Y 1G4

January 23, 2015 Project No. 123311678



Stantoc		Drawn by: SB	Figure: 1	Testhole Location Plan 2015 City of Winnipeg Alley
Stantec	Date: January 8, 2014	Reviewed by: GL	Scale: NTS	Package Contract (15-RL-01) Wellington Cres and Ruskin Row Alley between Grosvenor Ave and Palk Rd

TABLE 1 2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT (15-RL-01) WELLINGTON CRESCENT AND RUSKIN ROW ALLEY BETWEEN GROSVENOR AVENUE AND PALK ROAD GEOTECHNICAL INVESTIGATION

Testhole	Testhole Location	Paveme	nt Surface	Pavement Stru	cture Material	Sample	Sample	Moisture	Pa	article Siz	ze Analys	sis	Att	terberg Lin	nits
ID		Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH1	15.0 m Southeast of Palk Road, approximately 1.0 m West of Centreline	Concrete	170	-	-	-	-	-	-	-	-	-	-	-	-
TH2	50.0 m Southeast of Palk Road, approximately 1.0 m West of Centreline	Asphalt	110			Silt	0.9	24	0.0	6.8	73.0	20.2	31	16	15
1 112	50.0 m Southeast of Paik Road, approximately 1.0 m west of Centreline	Concrete	210	-	-	511	0.9	24	0.0	0.0	73.0	20.2	31	10	15
ТНЗ	90.0 m Southeast of Palk Road, approximately 0.5 m West of Centreline	Asphalt	200		_	-		_	_	_			_		_
1113	solo in Sourieasi of Paik Road, approximately 0.5 m west of Centreline	Concrete	160	-	-	-	-	-	-	-	-	-	-	-	-
TH4	117.0 m Southeast of Palk Road on Centreline	Asphalt	55		_	-		_	_	_					_
1 🗆 4	TT7.0 In Southeast of Paik Road on Centreline	Concrete	155	-	-	-	-	-	-	-	-	-	-	-	-

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				TEST	HC	DLI	E	REC	COF	RD	T	Ή	01						-	
			T _ ECT	KGS Group Inc. 2015 City of Winnipeg Alley Package C	ontra	act 1	(15	-RL-0	1))JECT FUM	No.		11678	
	LOC	CA	TION	Wellington Cres and Ruskin Row Alley										_	ELE	VATI				
	DRI	ILI	ING	DATE December 18, 2014 DRILLING CO.	Map			-												
			OL		4	S	AMP	LES	□ Ins △ Po			•				orvane	on Gra	b Sampl	es (kPa)	
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	-		\bigotimes	- some fine to coarse sand - some fine gravel			'	20				Ŭ								
-	_		\bigotimes	- brown below 0.6 m		AS		16		c										- 2
		СН	\bigotimes	- concrete debris encountered at a depth of 0.9 m (no sample recovery)			'	10												
			\bigotimes	some siltbrown, stiff below 1.5 m																
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	-		\sum	Clay	-	AS		31					.							- 4
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	-			TESTHOLE LOCATION: 15.0 m Southeast of Palk Road, approximately 1.0 m West of		AS	2	21				v								
	-			Centreline.																- 8
-	-			• The soil was frozen to a depth of 0.9 m.																0
	-			• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.																
	-			• Testhole terminated at a depth of 2.1 m.																
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	CLIEN PROJ	√T _ ECT	KGS Group Inc. 2015 City of Winnipeg Alley Package C	ontra	act 1	(15-	-RL-0	1)							OJE ATUI	CT M	No.	_	233	11678	<u>; </u>
			Wellington Cres and Ruskin Row Alley													TIO			~~~		
I	DRILI	LING	DATE December 18, 2014 DRILLING CO.	Map				Ltd.		_ 1	DRII	LLIN	IG N	<i>M</i> ETH	IOD	1	25	mn	n SS.	A	
		Ы			S	AMP	LES	□ Ins △ Po				•	'		Forva	ane o	on Gi	ab S	Sample	es (kPa)	
DEPTH (m)	USC	SYMBOL		DATA	ш	Ш	URE T (%)			50kI	P a		100)kPa		150	0kPa	a	20	0kPa	(ff) H
DEPT	ľ	SOIL S	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	₩ _P	W O	и —	Ĺ N	loisti	ure C	Conter	nt & A	Atterb	berg	Limi	ts		DEPTH
		ŭ		S		~	ZQS		10	• 20		stand 30		Penet	ratior 50		st, bl	ows/ 7(30	90
- 0	AS		Asphalt		COR	E															
	СО	A 4 9 4 4	Concrete													· · · · · · · · · · · · · · · · · · ·					
	+		Clay Fill	-	AS		28				¢)									
_			 black, firm, moist, high plasticity trace organic material 																		
			- some fine to coarse sand		AS		22			C)										- 2
	1		Silt	_																	
	-		 tan, soft, moist, low plasticity some clay		AS		24				•	-1				· · · · ·					
- 1			- trace fine to coarse sand																		
	ML	,	Particle Size Analysis at 0.9 m: 0.0% Gravel,		AS		19			o	· · · · ·										4
	1		6.8% Sand, 73.0%Silt, 20.2% Clay																		
_]				AS		23				5										
							25														
			Clay				21														-
	СН		- brown, stiff, moist, high plasticity		AS		31														
- 2																					
	-		TESTHOLE LOCATION: 50.0 m Southeast of		AS		38				• • • • •		o								
	1		Palk Road, approximately 1.0 m West of Centreline.																		
_	_																				- 8
	-		The soil was frozen to a depth of 1.1 m.No groundwater seepage or soil sloughing was																		
	1		observed during or upon completion of drilling.Testhole terminated at a depth of 2.1 m.																		
	-															· · · ·					-
- 3																					- 10
	-																				
	1										· · · ·					· · ·					
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			-																		
			Type: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	est ir Van	ne Test		ogged by eviewed							و	6	C	;+	2	n	teo	
	Pie Ba	zome ckfill	Type: Bentonite Drill Cuttings Sand					,							6	2	ル	a			

<u> </u>																	Appendi Page 34	
			TEST	HC)Lł	E	REC	COF	RD	Т	HO	3					-	
		VT _ ECT	KGS Group Inc. 2015 City of Winnipeg Alley Package Co	ontra	act 1	(15	-RL-0	1)						JECT UM	No.	1233	11678	
I	.OCA	TION	Wellington Cres and Ruskin Row Alley	betw	veen	Gro	svenoi	Ave	and	Palk	Rd		ELE	VATIC				
1	DRILI	LING	DATE December 18, 2014 DRILLING CO.	Mapl				Ltd.		DF	RILLI	NGN	METHO	DD_1	25 m	m SSA	1	
		Ы			S	AMP	LES	□ Ins △ Por			•			rvane o	on Grab	Sample	s (kPa)	
Щ Ш	USC	SYMBOL		DATA	III	КШ	URE T (%)		5	0kPa		100)kPa	15	0kPa	20	0kPa	H (ft)
DEPTH (m)	Ĩ	SOIL S	SOIL DESCRIPTION	WELL DATA	TYPE	NUMBER	MOISTURE CONTENT (%)	₩ _P	W	W _L	Moist	ure C	Content	& Attert	berg Lin	nits		DEPTH (
		Ň		5		2	ZÕZ		0	• 20	Stand 30		Penetra 0 5				30 90	
- 0	AS		Asphalt		COR	E												0
		. D'	Concrete	-														
	- CO		Clay Fill	-	AS		20			0								
- ·	-		- brown, firm, moist, high plasticity - trace orgranic material															
		\bigotimes	- some fine to coarse sand		AS		22			o								- 2
	CH		 trace fine gravel concrete debris encountered at a depth of 0.9 m 															
- 1 -	-		(no sample recovered)															
	-	X																
			Clay - brown, stiff, moist, high plasticity		AS		31				o							- 4
	-		orown, surr, moise, ingli presidenty															
					AS		34					Э						
	СН											· · · ·						
	-				AS		35					0						- 6
- 2 -																		
	-			-	AS		35					0						
	-		TESTHOLE LOCATION: 90.0 m Southeast of Palk Road, approximately 0.5 m West of															
	-		Centreline.															- 8
			The soil was frozen to a depth of 0.9 m.No groundwater seepage or soil sloughing was															
	-		observed during or upon completion of drilling.Testhole terminated at a depth of 2.1 m.															
- 3 -	-																	- 10
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	-											· · · · · · · · · · · · · · · · · · ·						-
L .																		
	-																	12
			ype: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	st r Van	ne Tes	t ⊢	ogged by		tor Aba man Le				T	àC	4	hnf	tec	
		zomet ckfill	er Type: Bentonite Drill Cuttings Sand					<u>, 30</u>	1.4									•

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	CLIEI		TEST KGS Group Inc. 2015 City of Winnipeg Alley Package C											JECT	No.	123	311678	8
I	LOCA		Wellington Cres and Ruskin Row Alley DATE December 18, 2014 DRILLING CO.	betv	veen	Gro	sveno	r Ave	and	Palk	Rd			VATIO			SA	
							LES	🗆 Ins	itu She ket Pe	ar Var	ne (kPa	ı)	🗖 То				oles (kPa)
DEPTH (m)	USC	SYMBOL	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	Wp	50 W	0kPa <i>W</i> L		100kI	Pa	15	0kPa		200kPa	DEPTH (ft)
BE		SOIL		WEL	F	NN N	MOIS	 	-0	-1	Stand		netrat		st, blo	ws/0.3n		90 B
- 0	AS		Asphalt	-	COR	E				20	30	40	5	0	50	70	80	
	-		Clay - brown, firm, moist, high plasticity	-	AS		32				0							
_	-		- stiff below 0.9 m - trace silt below 1.8 m															
	-				AS		34				o							- 2
- 1	-				AS		34				o							
	CH						25											
					AS		35					>						- 4
-					AS		35				(>						· -
					AS		42					0						- 6
- 2	-						-12											
	-		TESTHOLE LOCATION: 117.0 m Southeast of	-	AS		40					0						
	-		Palk Road on Centreline.The soil was frozen to a depth of 1.1 m.															8
-	-		• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.															
			• Testhole terminated at a depth of 2.1 m.															
- 3																		- 10
																		· - -
	Sat	mple 7	ype: GS - Grab Sample SPT - Standard Penetration Te	st		1	.ogged by	r: Nee	for Aba	irca								12
	Pie	zome	ST - Shelby Tube PT - Piston Tube VT - Shea	r Var	ne Tes	t 🗖	eviewed						Ŋ		Sta	an	te	



Core sample from Testhole TH1



Core sample from Testhole TH2





Core sample from Testhole TH3



Core sample from Testhole TH4





199 Henlow Bay Winnipeg MB R3Y 1G4 Tel: (204) 488-6999

PARTICLE SIZE ANALYSIS ASTM D422

KGS Group Inc. PROJECT: 2015 City of Winnipeg Alley Package 3rd Floor - 865 Waverley St. Contract (15-RL-01) Wellington Cres And Ruskin Row Alley between Winnipeg, Manitoba R3T 5P4 Palk Rd and Grosvenor Ave PROJECT NO.: 123311678 Michael Turko Attention: SAMPLED BY: Nestor Abarca DATE RECEIVED: January 13, 2015 SAMPLE ID: TH2 @ 0.91 m TESTED BY: Sothea Bun, C.E.T. 100 90 80 ^Dercent Passing (%) 70 60 50 40 30 20 10 0 100 10 1 0.1 0.01 0.001 Particle Size (mm) PARTICLE PERCENT PARTICLE PERCENT SIZE PASSING SIZE PASSING 37.50 mm 100.0 1.18 mm 99.5 25.00 mm 100.0 0.425 mm 98.5 19.00 mm 100.0 0.250 mm 98.0 16.00 mm 100.0 0.150 mm 97.6 12.50 mm 100.0 0.075 mm 93.2 9.50 mm 100.0 0.005 mm 26.5 4.75 mm 100.0 0.002 mm 20.2 2.00 mm 99.9 0.001 mm 18.3 Sand, % Silt. % Gravel % Clay, % Colloids % Medium Coarse Fine 75 to 4.75 mm <0.075 to 0.002 mm <0.002 mm < 0.001 mm <4.75 to 2.0 mm <2.0 to 0.425 mm <0.425 to 0.075 mm 5.3 73.0 20.2 18.3 0.0 0.1 1.4 CCil≝ January 19, 2015 REVIEWED BY: German E. Leal, B.Sc., P. Eng.

2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT 1 (15-RL-01)

CORDOVA STREET AND CAMPBELL STREET ALLEY BETWEEN KINGSWAY AND GROSVENOR AVENUE

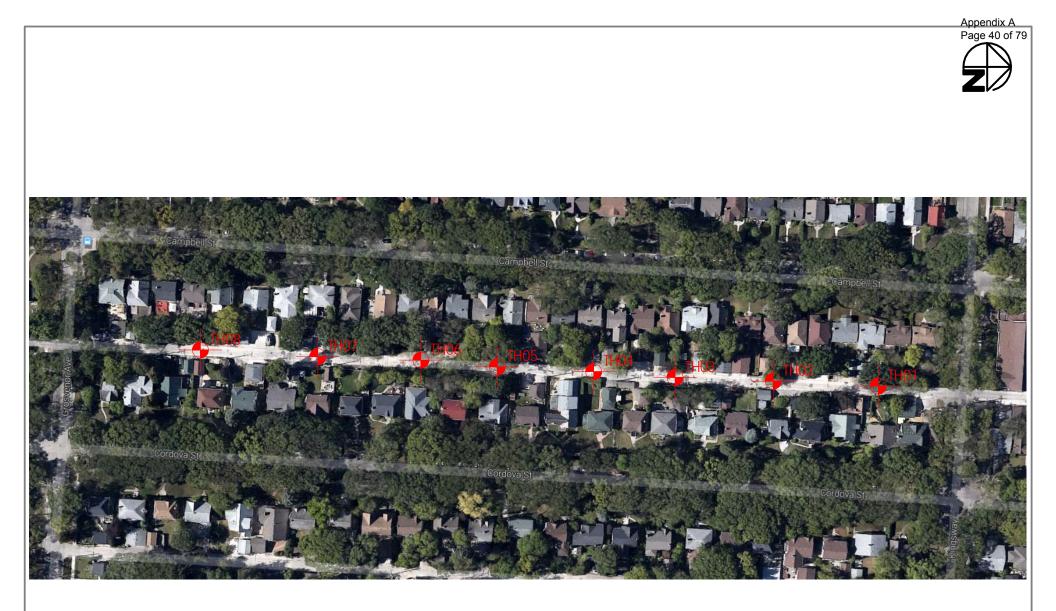
GEOTECHNICAL INVESTIGATION



Prepared for: KGS Group Inc. 3rd Floor - 865 Waverley Street Winnipeg, Manitoba R3T 5P4

Prepared by: Stantec Consulting Ltd. 199 Henlow Bay Winnipeg, Manitoba R3Y 1G4

January 22, 2015 Project No. 123311678



Stant	toc	Project No. 123311678	Drawn by: SB	Figure: 1	Testhole Location Plan 2015 City of Winnipeg Alley Package Contract (15-RL-01)
Juli		Date: January 9, 2015	Reviewed by: GL	Scale: NTS	Cordova St and Campbell St Alley between Kingsway and Grosvenor Ave

TABLE 1 2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT (15-RL-01) CORDOVA STREET AND CAMPBELL STREET ALLEY BETWEEN KINGSWAY AND GROSVENOR AVENUE GEOTECHNICAL INVESTIGATION

Testhole	Testhole Location	Paveme	nt Surface	Pavement Strue	cture Material	Sample	Sample	Moisture	Pa	rticle Siz	ze Analys	sis	Att	erberg Lin	nits
ID		Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
	41.0 m South of Kingsway, approximately 1.0 m West of Centreline	Concrete	200	-	-	-	-	-	-	-	-	-	-	-	-
	62.0 m South of Kingsway, approximately 1.0 m West of Centreline	Concrete	200	-	-	-	-	-	-	-	-	-	-	-	-
ТНЗ	130.0 m South of Kingsway on Centreline	Concrete	200	-	-	-	-	-	-	-	-	-	-	-	-
TH4	170.0 m South of Kingsway on Centreline	Concrete	210	-	-	-	-	-	-	-	-	-	-	-	-
TH5	195.0 m South of Kingsway on Centreline	Concrete	190	-	-	-	-	-	-	-	-	-	-	-	-
TH6	240.0 m South of Kingsway on Centreline	Concrete	160	-	-	-	-	-	-	-	-	-	-	-	-
TH7	112.0 m North of Grosvenor Avenue on Centreline	Concrete	220	-	-	Silt	0.9	18	0.0	15	75.4	9.6	20	16	4
TH8	62.0 m North of Grosvenor Avenue on Centreline	Concrete	200	-	-	-	-	-	-	-	-	-	-	-	-

																	Appendi Page 42	
			TEST	H(DLF	E	REC	COF	RD	T]	H01						age 42	. 01 7 3
	CLIE	NT . ECT	KGS Group Inc. 2015 City of Winnipeg Alley Package C	ontr	act 1	(15	-RL-0	1)					PROJ DATU	ECT M	No.	1233	11678	
1	LOCA	ATIO	N Cordova St and Campbell St Alley betw	een	King	swa	y and	Gros	venor	Ave		– E	ELEV	ATIC				
	ORIL	LING	DATE December 17, 2014 DRILLING CO.	Map	le Le	af D	rilling	Ltd.		DR	ILLINC	6 MET	ГНОІ	D_1	25 m	m SSA	1	
		Ы			S	AMP	LES				e (kPa) neter (kF			vane c	on Grab	Sample	s (kPa)	
DEPTH (m)	nsc	SYMBOL		DATA	ш	ER	URE T (%)		5	0kPa	1	00kP	a	15	0kPa	20	0kPa	DEPTH (ft)
DEPI	Ĭ	SOIL S	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	₩ _P	W 0		Moisture Standar							DEPI
- 0							ŏ		10	20	30	40	50				<u> </u>	0
	CC		Concrete		COR	E												-
	-		Clay Fill - black, firm, moist, high plasticity		AS		28				0							-
			- trace organic material - trace fine to coarse sand															-
	CI	H			AS		32				o							2
	-																	_
- 1	-				AS		24			0								-
		\square	Silt - tan, soft, moist, low plasticity	-			10											-
	M		- trace clay - some fine to medium sand		AS		18		0	2								- 4
	_				AS		21			o								-
			Clay	-			21											-
	CH		- brown, stiff, moist, high plasticity		AS		41					o						- - 6
- 2																		-
	-		TESTHOLE LOCATION: 41.0 m South of	-	AS		42					0						_
	-		Kingsway, approximately 1.0 m West of Centreline.															-
-	_		• The soil was frozen to a depth of 1.1 m.															- 8
	-		 No groundwater seepage or soil sloughing was observed during or upon completion of drilling. 															-
	-		• Testhole terminated at a depth of 2.1 m.															-
- 3																		- 10
																		-
	1																	
-	-																	
	-					 .												- 12
		mple	Type: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	est ir Var	ne Test	+ -	ogged by eviewed		stor Aba rman Lea			ي	T		it:	nf	ec	•
	Ba	ckfill	Type: Bentonite Drill Cuttings Sand										Ŀ					1

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			TEST	H(DLF	Ē	REC	COF	RD	TI	H02				0	
	ROJ	NT ECT	KGS Group Inc. 2015 City of Winnipeg Alley Package C	ontr	act 1	(15	-RL-0	1)				PRO. DAT	JECT No. UM	12331		
		ATIO											ATION			
Ι	DRIL	LINC	DATE December 17, 2014 DRILLING CO.	Map	le Le	af D	rilling	Ltd.		DRI	LLING	METHO	D <u>125</u>	mm SSA	<u> </u>	
		oL		4	S	amp 	LES		itu Shea cket Per		e (kPa) eter (kPa		rvane on Gr	ab Samples	; (kPa)	
DEPTH (m)	USC	SYMBOL	SOIL DESCRIPTION	WELL DATA	Щ	NUMBER	TURE NT (%			kPa	10	0kPa	150kPa	a 200)kPa 	DEPTH (ft)
DEF		SOIL		WELI	ТҮРЕ	NUN	MOISTURE CONTENT (%)	₩ _P ⊢	W -0				& Atterberg ion Test, blo			DEP
- 0		. <i>6</i> . 14	Concrete				0		10 2	20	30 4	40 50	0 60	70 80	0 90	0
	CC		· #		COR	E										-
	-		Clay Fill - black, firm, moist, high plasticity		AS		28			•	>					_
	CI	Į	- trace organic material - trace fine to coarse sand													-
					AS		27			c						- 2
	_	\mathbb{X}	Silt													-
- 1 -	-		 tan, soft, moist, low plasticity trace clay		AS		21			o						
			- some fine to medium sand		AS		20			•						- 4
	MI	_														-
	-				AS		20			•						-
			Clay													
	CH		- brown, stiff, moist, high plasticity		AS		39				c)				- 6
- 2																-
	-		TESTHOLE LOCATION: 62.0 m South of		AS		41					o				-
			Kingsway, approximately 1.0 m West of Centreline.													8
	-		The soil was frozen to a depth of 0.9 m.No groundwater seepage or soil sloughing was													
			 observed during or upon completion of drilling. Testhole terminated at a depth of 2.1 m. 													-
	-		resultie commuted at a deput of 2.1 m.													
- 3	-															- 10
																-
																-
																12
	Sa	mple	Type: GS - Grab Sample SPT - Standard Penetration To ST - Shelby Tube PT - Piston Tube VT - Shea	est ar Var	ne Test	. –	ogged by		tor Abar			T.) C1			
		ckfill				R	eviewed	by: Ger	man Leal	I			5 3	ant	ec	ľ

																			ppendi age 44	
			TEST	HC	DLF	E]	REC	COF	RD]	Ή	03							-	
	LIEN ROJ	NT _ ECT	KGS Group Inc. 2015 City of Winnipeg Alley Package Co	ontra	act 1	(15-	-RL-0	1)						'ROJ DATI	ECT UM	No.	12	331	1678	
L	OCA	TION	Cordova St and Campbell St Alley betwee										- E	LEV	ATIC					
	DRILI T	LING	DATE December 17, 2014 DRILLING CO.	Mapi																
- -		OL		A	5/	AMP		□ Ins △ Poo	cket P	enetr	omet	er (kP	a) 🕽	٢			b Sar		(kPa)	.
DEPTH (m)	USC	SYMBOL	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	TURE NT (%			50kPa		1	00kP	a	15	0kPa		200	kPa	DEPTH (ft)
DEF		SOIL		WELI	∣≿	NUN	MOISTURE CONTENT (%)	₩ _P ⊢	W 0		Mc				Attert			Rm		DEF
- 0		·					ŏ	::::	10	20	3		40	50		50	70	80) 9(0
	co		Concrete		COR	E							· · · · · · · · · · · · · · · · · · ·		······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······ ······· ······ ······ ······ ······					-
	CH	ı	Clay Fill - black, firm, moist, high plasticity		AS		26				0	· · · ·								-
L .		\bigotimes	- trace organic material - trace fine to coarse sand	-																-
	-		Clay - brown, stiff, moist, high plasticity		AS		23			c										2
			- silty to a depth of 0.9 m																	-
- 1 ·					AS		28				0									-
							20								····································					
	СН				AS		28				o									- 4
					AS		35					0								-
																				-
	-				AS		40						0							- 6
- 2 -																				
			TESTHOLE LOCATION: 130.0 m South of	-	AS		41						o							-
			Kingsway on Centreline.																	-
	-		 The soil was frozen to a depth of 0.9 m. No groundwater seepage or soil sloughing was																	- 8
	-		observed during or upon completion of drilling.Testhole terminated at a depth of 2.1 m.																	-
																				-
- 3 -	-																			- 10
																				+
																				-
- .	-														· · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · ·					
	Sai	 nple T	ype: GS - Grab Sample SPT - Standard Penetration Te	st	 	L	ogged by	: Nes	tor Ab	arca				::: 7						12
	Pie Ba	zomet ckfill	ST - Shelby Tube PT - Piston Tube VT - Shea er Type: Bentonite Drill Cuttings Sand	r Van	ie Test	R	eviewed	by: Ger	man Le	al				J	§ 5	jt	ar	It	ec	1

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				TEST	H(DLF	Ē	REC	COI	RD	T	I04				F	age 45	0179
	CLI PR(T_ CT	KGS Group Inc. 2015 City of Winnipeg Alley Package C	ontr	act 1	(15	-RL-0	1)				PR	OJECI ATUM	No.	12331	1678	
	LO	CA	TION	Cordova St and Campbell St Alley betw	een	King	swa	y and	Gros	venor	Ave		EL	EVATI				
	DR	ILL	ING	DATE December 17, 2014 DRILLING CO.	Map				Ltd.		DR	LLING	METH	HOD	125 m	ım SSA	<u> </u>	
			Ы		_	S	AMP	LES				e (kPa) ieter (kP		Torvane	on Grat	Sample	₃ (kPa)	
DEPTH (m)	-	USC	SYMBOL	SOIL DESCRIPTION	DAT/	щ	BER	URE JT (%)		5	0kPa	10	00kPa	1	50kPa	20)kPa ⊣	DEPTH (ft)
DEP			SOIL S		WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	₩ _P	W 0					rberg Lir			DEP
- 0								- 8		10	20	30	40	50	est, blow 60		0 90	0 0
	-	co		Concrete		COR	Е											
			\bigotimes	Clay Fill - black, firm, moist, high plasticity		AS		40					0					-
-	-	СН	\bigotimes	 trace organic material some silt 														-
			\bigotimes			AS		30				0						- 2
		ML		Silt - tan, soft, moist, low plasticity - trace clay		AS		20			•							-
- 1				- some fine to medium sand														-
	-			- brown, stiff, moist, high plasticity - trace silt below 1.2 m		AS		26			c							- 4
-	_					AS		29				0						-
	- (СН																-
	-					AS		38					>					- 6
- 2						AS		40					0					
	-			TESTHOLE LOCATION: 170.0 m South of Kingsway on Centreline.		110												-
_	_			The soil was frozen to a depth of 1.1 m.No groundwater seepage or soil sloughing was														- 8
	-			 To groundwater scepage of soil stoughing was observed during or upon completion of drilling. Testhole terminated at a depth of 2.1 m. 														-
																		-
- 3	_																	- 10
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				Type: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	est ir Var	ne Test	. –	ogged by		stor Aba rman Lea			2		Ct :	ant	'0	
]	Piez Bac	zomet kfill	Type: Bentonite Drill Cuttings Sand										6	JU			1

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	CLI	EN	Т	TEST KGS Group Inc.	Ή	DLF	Ē	REC	C O	R	D]	ΓH	[05		PRO	DIEO	СТ	No	1		<u>1167</u>		
1	PRC)JE	СТ	2015 City of Winnipeg Alley Package C												DA	ΓUN	M						
				Cordova St and Campbell St Alley between December 17, 2014 DRILLING CO.																		A		
								LES			u She											es (kPa		_
Γ E			30L		A						ket P	enet	ome	ter (k	Pa)	X	orva				·	,	<i>`</i>	2
DEPTH (m)		USC USC	SYMBOL	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	NT (%	u	7		0kP			100	kPa		150	0kPa	l	20	00kPa ⊣	DEPTH (ft)	
DEI			SOIL		WEL		NUN	MOISTURE CONTENT (%)	ŀ	P	- o		Mo			ontent Penetra							DEI	i 1
- 0			<i>B</i> 14 (Ormanita				0	::	1	0	20	3	30	40	0	50	6	0	70) ;	80	90 1 0	D
	-C	Ö		Concrete		COR	Е						· · · ·										-	
			\bigotimes	Clay Fill - black, firm, moist, high plasticity		AS		34					· · · ·	0									-	
			\bigotimes	 trace organic material silty below 0.6 m									· · · ·											
		Н	\bigotimes			AS		43					· · · · ·			o							- 2	2
			\bigotimes			AS		27					0											
	-		Ĭ	Clay - brown, stiff, moist, high plasticity		AS		37			• • • •				0									
- 1	-												· · · ·											
	-					AS		31						0									- 4	4
													· · · ·											
-	- C	Н				AS		35			· · · ·		· · · ·	с										
	-												· · · ·											
						AS		39							0								- 6	5
- 2	-												· · · ·											
	1			TESTHOLE LOCATION: 195.0 m South of	-	AS		41							¢	o								
				Kingsway on Centreline.																				
_	_			The soil was frozen to a depth of 1.1 m.No groundwater seepage or soil sloughing was							· · · · ·												- 8	3
				observed during or upon completion of drilling.Testhole terminated at a depth of 2.1 m.																			: _ 	
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	1																						- 1 -	U
													· · · ·											
																							1	2
	S	am	ple T	Type: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	est ir Var	ne Test	. –	logged by			or Ab					Ţ		•	1	-				2
	P E	iez Bac	omet kfill					leviewed	oy: (Jern	ian Le	ai					5	3		d		te		

<u> </u>																		Append Page 47	
	LIEN	JT	TEST KGS Group Inc.	ΉC	DLF	E]	REC	COF	RD	Τ	Ή	06	PR	OJEC	TN	Jo		11678	
		ECT		ontr	act 1	(15-	-RL-0	1)					DA	TUN		10.	1200		
			Cordova St and Campbell St Alley betw DATE December 17, 2014 DRILLING CO.															Δ	
			DATEDRILLINGCO																
Ê		30L		A	S				itu She cket Pe	enetro	mete	er (kPa) 🗙					es (kPa)	
DEPTH (m)	USC	SYMBOL	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	STURE ENT (9	Wp	W	0kPa W_L		100)kPa		150	кра	20	0kPa	DEPTH (ft)
		SOIL		WEI	Ĥ	NN	MOISTURE CONTENT (%)	ŕ	0	•		sture (ndard					nits s/0.3m		Ш
- 0			Concrete						10	20	30) 4	0	50	60) ' 	70 8	30 9	0
	CO		Clay Fill	-	COR	E													
	-		 black, firm, moist, high plasticity trace organic material 		AS		28				0								
	СН		- trace fine to coarse sand																-
		\bigotimes			AS		41						o						- 2
	 		Silt - tan, soft, moist, low plasticity	_			07												
- 1 -	-		 trace clay some fine to medium sand 		AS		27				0								
	ML				AS		23			o									- 4
																			-
	-		Clay	_	AS		38					o							-
	СН		- brown, stiff, moist, high plasticity																-
	ML		Silt - tan, soft, moist, low plasticity		AS		23			0									- 6
- 2 -			- some clay	_	AS		22			0									-
			TESTHOLE LOCATION: 240.0 m South of Kingsway on Centreline.																-
			• The soil was frozen to a depth of 0.9 m.																8
			 No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 2.1 m. 																-
- 3 -																			- 10
-																			
	San	nple]	Type: GS - Grab Sample SPT - Standard Penetration To ST - Shelby Tube PT - Piston Tube VT - Shea	est ur Var	ne Test		ogged by		stor Aba			· · · · ·	S			.			12
	Pie: Bac	zome kfill		u val	ie rest	R	eviewed	by: Gei	man Le	al			Y	6	3	57	n	tec	
		лтни.	i ypt.																

—																		Appe		x A of 79
			TEST	H(DLF	Ē	REC	COF	RD	Τ	HO	7						U		0178
	LIEN ROJI		KGS Group Inc. 2015 City of Winnipeg Alley Package C	ontr	act 1	(15	-RL-0	1))JEC TUM	T N		1233			—
I	.OCA	TION	Cordova St and Campbell St Alley betw	een	King	swa	y and	Grosv	enor	Ave)		ELF	VAT	FION	í _				_
I	ORILI	LING	DATE <u>December 17, 2014</u> DRILLING CO.	Map	le Le	af D	rilling	Ltd.		DF	RILLI	NG M	1ETH	OD _	12	5 mr	n SS	<u>A</u>		
		F			S	AMP	LES		itu Shea cket Pe		•	'		orvan	e on	Grab	Sample	es (kF	'a)	
E (m)	USC	SYMBOL		DATA		R	URE 1 (%)		50)kPa		100	kPa		150k	Pa	20	00kPa	a	H (ft)
DEPTH (m)	۳ ۲	SOIL S'	SOIL DESCRIPTION	WELL DATA	TYPE	NUMBER	MOISTURE CONTENT (%)	W _P ⊢	W O	₩ _L	Mois	ture C	ontent	& Att	terber	g Lim	its			DEPTH (ft)
		Ň		5		2	ZÕ		10	• 20	Stan 30	dard F 4	Penetra	ation ⁻ 50	Test, 60			80	90	
- 0		4 4 4 4 4 4 4 4 4	Concrete		COR	E														0
			Clay Fill																	-
	СН		- black, firm, moist, high plasticity		AS		20			o										-
	_		- trace organic material Silt																	-
			 tan, soft, moist, low plasticity trace clay		AS		23			0										- 2
	-		- some fine to medium sand																	-
- 1	ML		Particle Size Analysis at 0.9 m: 0.0% Gravel,		AS		18		ıе	н										-
	-		15.0% Sand, 75.4% Silt, 9.6% Clay																	
					AS		16		o											- 4
	-		Clay	-																
-			- brown, stiff, moist, high plasticity		AS		35					o								-
																				-
	СН				AS		39					o								- 6
- 2																				-
	-				AS		40					¢)							-
	-		TESTHOLE LOCATION: 112.0 m North of Grosvenor Avenue on Centreline.																	-
	-		• The soil was frozen to a depth of 1.1 m.																	- 8
			• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.																	-
	-		• Testhole terminated at a depth of 2.1 m.																	-
																				-
- 3 -																				- 10
																				-
	-																			L
																				F
																				12
			Type: GS - Grab Sample SPT - Standard Penetration To ST - Shelby Tube PT - Piston Tube VT - Shea	est ar Var	ne Test	. –	.ogged by eviewed		tor Abai man Lea				Ą		C	•-	n			
	Pie Bac	zome kfill	Type: Bentonite Drill Cuttings Sand				e rie weu	-J. UCI					J	5	3	La		IC		

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	TIFI	JT	TEST KGS Group Inc.	Ή(DLF	E]	REC	COF	RD	T	Ή	08	PR	DJECT	No		11678	
		ECT	2015 City of Winnipeg Alley Package C	Contr	act 1	(15-	-RL-0	1)					DA	TUM		1233		
			Cordova St and Campbell St Alley betw DATE December 17, 2014 DRILLING CO.													m SS/	<u> </u>	
			DATE December 17, 2017 DRILLINGCO.															
Ĵ.		BOL		TA	- 5/		LES		itu She cket Pe		omete	er (kPa			on Grab 50 <u>k</u> Pa	Sample	s (kPa) OkPa	
DEPTH (m)	USC	L SYMBOL	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	Wp		WL			+		-		-	DEPTH (ft)
		SOIL		ME		Z	CONT		10	• 20		Indard	Penetr	& Atter ation Te 50	st, blow	s/0.3m	30 90	
- 0	-co		Concrete		COR	E				20		,	+0					
	CH		Clay Fill - black, firm, moist, high plasticity		AS		28				0							
			- trace organic material Silt	_														
			 tan, soft, moist, low plasticity trace clay		AS		27				o							- 2
	ML		- some fine to medium sand		AS		21			n								
- 1 ·			Clay				21			Č								-
			- brown, stiff, moist, high plasticity		AS		31)						4
																		-
	СН				AS		31)						
	-				AS		37					o						- 6
- 2 -																		
			TESTHOLE LOCATION: 62.0 m North of Grosvenor Avenue on Centreline.	_	AS		40						o					
			• The soil was frozen to a depth of 1.1 m.															- 8
			• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.															
			• Testhole terminated at a depth of 2.1 m.															
- 3 -																		- - - 10
	-																	
- ·																		12
	Sai	nple 7	Ype: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Sheat	est ar Var	ne Test	. –	ogged by		tor Aba				9		71-	ا مد		
	Pie Ba	zomet ckfill		, ul		R	eviewed	by: Ger	man Lea	al				6	Dlâ	IUI	tec	



Core sample from Testhole TH1



Core sample from Testhole TH2





Core sample from Testhole TH3



Core sample from Testhole TH4





Core sample from Testhole TH5



Core sample from Testhole TH6





Core sample from Testhole TH7



Core sample from Testhole TH8





199 Henlow Bay Winnipeg MB R3Y 1G4 Tel: (204) 488-6999

PARTICLE SIZE ANALYSIS ASTM D422

KGS Group Inc. PROJECT: 2015 City of Winnipeg Alley Package 3rd Floor - 865 Waverley St. Contract (15-RL-01) Cordova St and Campbell St Alley between Winnipeg, Manitoba R3T 5P4 Kingsway St and Grosvenor Ave PROJECT NO.: 123311678 Michael Turko Attention: SAMPLED BY: Nestor Abarca DATE RECEIVED: January 13, 2015 SAMPLE ID: TH7 @ 0.91 m TESTED BY: Sothea Bun, C.E.T. 100 90 80 ^Dercent Passing (%) 70 60 50 40 30 20 10 0 10 1 0.1 0.01 0.001 100 Particle Size (mm) PARTICLE PERCENT PARTICLE PERCENT SIZE PASSING SIZE PASSING 37.50 mm 100.0 1.18 mm 99.9 25.00 mm 100.0 0.425 mm 99.1 19.00 mm 100.0 0.250 mm 98.6 16.00 mm 100.0 0.150 mm 98.3 12.50 mm 100.0 0.075 mm 85.0 9.50 mm 100.0 0.005 mm 11.4 4.75 mm 100.0 0.002 mm 9.6 2.00 mm 100.0 0.001 mm 8.8 Sand, % Silt. % Colloids % Gravel % Clay, % Medium Coarse Fine 75 to 4.75 mm <0.075 to 0.002 mm <0.002 mm < 0.001 mm <4.75 to 2.0 mm <2.0 to 0.425 mm <0.425 to 0.075 mm 0.0 0.9 14.1 75.4 9.6 8.8 0.0 CCil≝ January 19, 2015 REVIEWED BY: German E. Leal, B.Sc., P. Eng.

2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT 1 (15-RL-01)

RENFREW BAY ALLEY BETWEEN TAYLOR AVENUE AND CNR TRACKS

GEOTECHNICAL INVESTIGATION



Prepared for: KGS Group Inc. 3rd Floor - 865 Waverley Street Winnipeg, Manitoba R3T 5P4

Prepared by: Stantec Consulting Ltd. 199 Henlow Bay Winnipeg, Manitoba R3Y 1G4

January 23, 2015 Project No. 123311678



TABLE 1 2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT (15-RL-01) RENFREW BAY ALLEY BETWEEN TAYLOR AVENUE AND CNR TRACKS GEOTECHNICAL INVESTIGATION

Testhole	Testhole Location	Paveme	ent Surface	Pavement Mate		Sample	Sample	Moisture	Pa	article Siz	ze Analys	sis	Att	erberg Lin	nits
ID		Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
	153.0 m South of Taylor Avenue,	Asphalt	160	_	-		-	-	-		-				_
	approximately 18.0 m West from property line 966 / 968 and 970 / 972 Renfrew Bay on Centreline	Concrete	135												
	153.0 m South of Taylor Avenue, approximately 9.0 m East from property line 964 and 966 / 968 Renfrew Bay on Centreline	Concrete	165	-	-	Clayey Silt	0.9	28	0.0	6.9	67.9	25.2	33	16	17
	153.0 m South of Taylor Avenue, approximately 7.0 m West from property line 946 / 948 and 950 Renfrew Bay on Centreline	Concrete	180	-	-	-	-	-	-	-	-	-	-	-	-
TH4	90.0 m South of Taylor Avenue on East side of Renfrew Bay Alley on Centreline	Concrete	210	-	-	-	-	-	-	-	-	-	-	-	-
TH5	70.0 m South of Taylor Avenue on East side of Renfrew Bay Alley on Centreline	Concrete	195	-	-	-	-	-	-	-	-	-	-	-	-
TH6	40.0 m South of Taylor Avenue on East side of Renfrew Bay Alley on Centreline	Concrete	160	-	-	-	-	-	-	-	-	-	-	-	-
TH7	15.0 m South of Taylor Avenue on East side of Renfrew Bay Alley on Centreline	Concrete	165	-	-	-	-	-	-	-	-	-	-	-	-

			TEST	н()I I	<u>ק</u>	DF(n	Т	'HI	1					ppendi age 58	
C	LIEN	JT _	KGS Group Inc.										PRO	DJECT	No.	12331	1678	
	RОЛ		2015 City of Winnipeg Alley Package Concernment Renfrew Bay Alley between Taylor Ave					1)						TUM VATIO				
			DATE December 17, 2014 DRILLING CO.															
					S	AMP	LES	🗆 Insi			· ·	'		orvane	on Grab	Samples	(kPa)	
(u		SYMBOL		ATA		R	RE (%)	∆ Poo		enetro 0kPa		•) 🗙)kPa	1:	50kPa	200	kPa	(ft)
DEPTH (m)	USC		SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	ISTU	Wp	W	WL							1	DEPTH (
		SOIL		WE		ž	MOISTURE CONTENT (%)		-	•	Stan	dard	Penetra	ation Te	berg Lir st, blow	s/0.3m		
- 0	AS		Asphalt		COR	F			0	20	30	4	0 5	50	60	70 80) 9(0
	co	- N. 9	Concrete	-		ľ												-
			Clay Fill	-	AS		28				o							-
			black, firm, moist, high plasticitytrace organic material									· · · · · · · · · · · · · · · · · · ·						_
		\bigotimes	- some silt below 0.6 m		AS		34					o						- 2
	СН																	
- 1 -		\bigotimes			AS		34					0						_
1	-	\bigotimes																-
		\bigotimes		_	AS		36					o						- 4
			Clayey Silt - tan, soft, moist, medium plasticity															
	CL ML		- trace fine to medium sand		AS		29				o							_
												· · · ·						
	1		Clay - brown, stiff, moist, high plasticity		AS		38					o						- 6
- 2 -	СН																	
	-		TESTHOLE LOCATION: 153.0 m South of	-	AS		46						0					-
	-		Taylor Avenue, approximately 18.0 m West from property line 966 / 968 and 970 / 972 Renfrew															
			Bay on Centreline.															- 8
	-		• The soil was frozen to a depth 1.2 m.															L
	1		• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.															-
	1		• Testhole terminated at a depth of 2.1 m.															L
- 3 -	1																	- 10
	1																	
	1																	F
	1																	L
	Sar	 nple T	ype: GS - Grab Sample SPT - Standard Penetration Te	st			.ogged by	: Nes	tor Aba	arca						<u> :::: </u> 		12
	Pie	zomet	ST - Shelby Tube PT - Piston Tube VT - Shea	r Van	ne Test	t R	eviewed	by: Geri	nan Le	al			Ĭ	a	Sta	ant	ec	
	Бас	лкни.	Type: Bentonne Drin Cuttings Sand															

																	Append Page 59	
	LIEN		TEST KGS Group Inc. 2015 City of Winnipeg Alley Package C								'H0)JECT	No.		11678	
		ECT TION	Renfrew Bay Alley between Taylor Ave					·					DAT ELE	FUM VATI(DN .			
D	RILI	LING	DATE December 17, 2014 DRILLING CO.	Map	le Le	af D	rilling	Ltd.		D	RILLI	NG N	/IETHO	DD	125 m	ım SSA	4	
я ш		BOL		LA	S		LES		itu She ket Pe		meter	(kPa				Sample	s (kPa) 0kPa	(ft)
DEPTH (m)	USC	SYMBOL	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	STURI ENT (9	Wp				100	Kra	1.	50kPa	20		DEPTH (
В		SOIL		MEL		ŊN	MOISTURE CONTENT (%)	-	-0	•	Star	dard	Penetra	ition Te		s/0.3m		
- 0	со		Concrete		COR	E			0	20	30	4	0 3	50	60	70 8	80 9	0
	-		Clay Fill - black, firm, moist, high plasticity		AS		43						0					
L -	СН		- trace organic material															-
	-	\bigotimes			AS		36					o						2
		X	Clayey Silt	_			20											-
- 1 -	-		 tan, soft, moist, medium plasticity trace fine to medium sand		AS		28				0	1						-
	CL		Particle Size Analysis at 0.9 m: 0.0% Gravel		AS		29				o							- 4
	ML		6.9% Sand, 67.9% Silt, 25.2% Clay															
	-				AS		28				O							-
	-		Clay - brown, stiff, moist, high plasticity		AS		39					0						- 6
- 2 -	СН																	-
	-		TESTHOLE LOCATION: 153.0 m South of	_	AS		40					•	•					
			Taylor Avenue, approximately 9.0 m East from property line 964 and 966 / 968 Renfrew Bay on															- - - 8
	-		Centreline.															
			 The soil was frozen to a depth 1.1 m. No groundwater seepage or soil sloughing was observed during or upon completion of drilling. 															
- 3 -			• Testhole terminated at a depth of 2.1 m.															
- 3 -																		- 10 -
																		-
	Sar	 nple 7	ype: GS - Grab Sample SPT - Standard Penetration Te	est			.ogged by	: Nes	tor Aba	rca								12
	Pie	zome	ST - Shelby Tube PT - Piston Tube VT - Shea	r Var	ne Test	. –	leviewed						Ĩ	à !	Sta	ant	tec	
	Bac	kfill	Type: Bentonite Drill Cuttings Sand															

			TEST	Ч) I I	7	BL('nDD	חי	Т	H03						Append Page 60	
С	LIEN	JT _	KGS Group Inc.										PRO	JECT	No.	1233	11678	
		ECT	2015 City of Winnipeg Alley Package C Renfrew Bay Alley between Taylor Ave										DAT					
			DATE December 17, 2014 DRILLING CO.											VATIO				
					S	AMP	LES				ne (kPa	<i>,</i>		rvane o	on Grat	Sample	s (kPa)	
(E		SYMBOL		ATA		2	RE (%)			netror)kPa	neter (ł	Pa) 100k		15	0kPa	20	0kPa	(£
DEPTH (m)	USC		SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	Wp	W	WL							7	DEPTH
		SOIL		M		ž	CON	•		•		ard Pe	enetra	tion Te	st, blow	s/0.3m		
- 0			Concrete						0	20	30	40	5	0 6	50	70 8	30 9	0
			Clay Fill	-	COR	E												
		\bigotimes	- black, firm, moist, high plasticity - trace organic material		AS		39					0						
	СН		- trace organic material															
	-	\bigotimes			AS		27				o							- 2
		\bigotimes																
- 1 -			Clay - brown, firm, moist, high plasticity		AS		30				0							
- 1 -			- some silt															
					AS		30				•							- 4
	СН				AS		35				c)						
					AS		43						Э					- 6
- 2 -																		
				-	AS		39					0						
			TESTHOLE LOCATION: 153.0 m South of Taylor Avenue, approximately 7.0 m East from															
			property line 946 / 948 and 950 Renfrew Bay on Centreline.															- 8
			• The soil was frozen to a depth 1.1 m.															
			• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.															
	-		• Testhole terminated at a depth of 2.1 m.															
- 3 -																		- - 10
	1																	
	500	mle	mai CS Crob Samula SDT Standard Danaturetica T			т	.ogged by	- NT	tor A1									12
	Pie	zomet	ype: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	est ir Var	ne Test	. –	ogged by eviewed		tor Aba man Lea				T		St a	ant	er	
	Bac	kfill	Type: Bentonite Drill Cuttings Sand															-

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			KGS Group Inc.								HC			DJECT	No.	12331	<u>1678</u>	
		ECT TION	2015 City of Winnipeg Alley Package C Renfrew Bay Alley between Taylor Ave											FUM VATIO)N			
			DATE December 17, 2014 DRILLING CO.															_
		٦			S	AMP	LES	□ Ins	itu She ket Pe		``	'		orvane	on Grat	Samples	; (kPa)	
L (E)	0	SYMBOL		ATA		Ř	JRE (%)			0kPa		•) kPa	15	0kPa	200)kPa	T (ff
DEPTH (m)	nsc	SOIL SY	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	₩ _P ⊢	W O					& Atter			I	DEPTH
- 0	_	. D. K. S	Concrete					1	0	20	30	4	0 5	50	50	70 80	90	0
	co			_	COR	E												-
			Clay Fill - black, firm, moist, high plasticity - trace organic material		AS		40						•					-
	СН				AS		35					0						- 2
	_	\bigotimes	Clay	_			55					·						-
- 1 -			- brown, firm, moist, high plasticity - some silt below		AS		34					0						-
	-																	-
	-				AS		34					0						- 4
	Сн				AS		35					o						-
	-																	-
					AS		40					(>					- 6
- 2 -					AS		40					(>					_
			TESTHOLE LOCATION: 90.0 m South of Taylor Avenue on East side of Renfrew Bay Alley on Centreline.															-
			• The soil was frozen to a depth 0.9 m.															- 8
	-		• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.															-
			• Testhole terminated at a depth of 2.1 m.															_
- 3 -																		- 10
																		-
.																		-
																		12
			Type: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	est ir Var	ne Test		ogged by eviewed		tor Aba man Le				T		:t=	ant		
	Pie Bao	zomet ckfill	Type: Bentonite Drill Cuttings Sand			F									710		CL	1

					<u> </u>												Appendi Page 62	
			TEST KGS Group Inc. 2015 City of Winnipeg Alley Package C								Ή()JECT	No.	12331	1678	
		ECT	Renfrew Bay Alley between Taylor Ave											ΓUM VATI				
			DATE December 17, 2014 DRILLING CO.															
		۲ ۲			S	AMP	LES	□ Ins △ Poo	itu She ket Pe		•	'		orvane	on Grat	Samples	s (kPa)	
(m) T	Q	SYMBOL		DATA		ĸ	JRE (%)		5	0kPa		10	0kPa	15	0kPa	200)kPa	H (ff)
DEPTH (m)	nsc	SOIL SY	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	₩ _P	-0		Star	ndard	Penetra		st, blow	/s/0.3m		DEPTH
- 0			Concrete		COR	E			0	20	30	4	40	50	60	70 8	090	0
			Clay Fill	-			24											
	СН		 black, firm, moist, high plasticity trace organic material 		AS		34					0						
					AS		35					o						- 2
			Clay															
- 1 -			- brown, stiff, moist, high plasticity		AS		35					o						
					AS		38					0						
	-						50					Ŷ						
	СН				AS		37					o						
	-																	
					AS		42						0					- 6
- 2 -					AS		40)					
	-		TESTHOLE LOCATION: 70.0 m South of Taylor Avenue on East side of Renfrew Bay															
			Alley on Centreline.The soil was frozen to a depth 1.1 m.															- 8
	-		• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.															
	-		• Testhole terminated at a depth of 2.1 m.															
- 3 -																		- 10
																		12
			Sype: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	est ir Var	ne Test	. –	.ogged by .eviewed		tor Aba man Le				Z		5+=	ant		
	Pie Bao	zomet ckfill	Type: Bentonite Drill Cuttings Sand)	JU	111		•

			трот		יזר	י ה	DF			Т	H0	6					age 63	
			KGS Group Inc.											DJECT	No.	12331	1678	
		ECT	2015 City of Winnipeg Alley Package C Renfrew Bay Alley between Taylor Ave											FUM VATIO				
			DATE December 17, 2014 DRILLING CO.															
		2			S	AMP	LES	□ Ins △ Poo			•	'		orvane	on Gral	o Samples	s (kPa)	
DEPTH (m)	USC	SYMBOL		DATA	ш	ER	URE T (%)			0kPa			kPa	15	50kPa	200)kPa	(#) H
DEPT	۳ ۲	SOIL S	SOIL DESCRIPTION	WELL DATA	TYPE	NUMBER	MOISTURE CONTENT (%)	₩ _P ⊢	-0		Stand	ard F	Penetra		st, blov	/s/0.3m		DEPTH
- 0	cc		Concrete		COR	E		1	0	20	30	40	0 5	50	60	70 8	0 90	0
	-		Clay Fill															
			 black, firm, moist, high plasticity trace organic material 		AS		26			(5							
-	CF				AS		30											2
	-	×					50				Ţ							
	-		Clay - brown, stiff, moist, high plasticity		AS		37					0						
- 1	_																	
	-				AS		39					0						- 4
	CE																	
- ·	-				AS		40					c)					
	-																	
					AS		43						0					- 6
- 2	-				AS		48						0					
			TESTHOLE LOCATION: 40.0 m South of Taylor Avenue on East side of Renfrew Bay		AS		40						v					
	-		Alley on Centreline.															- 8
_ ·	_		The soil was frozen to a depth 1.1 m.No groundwater seepage or soil sloughing was															
	-		observed during or upon completion of drilling.Testhole terminated at a depth of 2.1 m.															
_	-																	
- 3	-																	- 10
	-																	
	Sa	nple 7	Ype: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	est ar Var	ne Test	. –	ogged by		tor Aba				T		71.			
	Pie Ba	zome ckfill				R	eviewed	oy: Gen	man Le	ai			Ĩ	?		ant	ec	

				117	י דר <u>-</u>	ייק	DF			T	H07					pendi: ge 64	
			TEST KGS Group Inc. 2015 City of Winnipeg Alley Package C										DJECT	No.	123311	678	
	ROJ. OCA		Renfrew Bay Alley between Taylor Ave					·					TUM EVATIO	N _			_
Γ	RIL	LING	DATE December 17, 2014 DRILLING CO.	Map	le Le	af D	rilling	Ltd.		DR	ILLINC	6 METH	OD <u>1</u>	25 mr	n SSA		
					S	AMP	LES				ne (kPa) neter (kF		orvane o	n Grab	Samples ((kPa)	
H (m	U U	SYMBOL		DATA		R	JRE (%)			0kPa		00kPa	150)kPa	200	Pa	H (ft)
DEPTH (m)	nsc	SOIL SY	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	₩ _P	W O	₩ _L			& Atterb ation Tes				DEPTH
- 0			Concrete					1	0	20	30	40	50 6	0 7	0 80	90	0
			Clay Fill		COR	E											-
			black, firm, moist, high plasticitytrace organic material		AS		37					>					
	-																-
	CH				AS		40					0					- 2
					AS		31				o						-
- 1 ·		X	Clayey Silt	-													-
			- tan, soft, moist, medium plasticity - trace fine to medium sand		AS		24			o							- 4
	-																-
	CL MI				AS		26			C)						-
					AS		22			0							- 6
- 2 -																	-
			TESTHOLE LOCATION: 15.0 m South of	_	AS		22			0							-
	-		Taylor Avenue on East side of Renfrew Bay Alley on Centreline.														- 8
- ·			The soil was frozen to a depth 1.1 m.No groundwater seepage or soil sloughing was														-
			 No groundwater seepage of son stodyning was observed during or upon completion of drilling. Testhole terminated at a depth of 2.1 m. 														-
- 3 -																	-
																	- 10
	-																_
- .]																_
	Sai	 nple 7	ype: GS - Grab Sample SPT - Standard Penetration Te	est			ogged by	: Nes	tor Aba	urca							12
	Pie	zomet	ST - Shelby Tube PT - Piston Tube VT - Shea	r Var	ne Test	. –	eviewed						à S	ita	nt	90	1
	Ba	ckfill	Type: Drin Cuttings Sand														



Core sample from Testhole TH1



Core sample from Testhole TH2





Core sample from Testhole TH3



Core sample from Testhole TH4





Core sample from Testhole TH5



Core sample from Testhole TH6





Core sample from Testhole TH7





199 Henlow Bay Winnipeg MB R3Y 1G4 Tel: (204) 488-6999

PARTICLE SIZE ANALYSIS ASTM D422

KGS Group Inc. PROJECT: 2015 City of Winnipeg Alley Package Contract (15-RL-01) 3rd Floor - 865 Waverley St. Renfrew Bay Alley between Winnipeg, Manitoba R3T 5P4 Taylor Avenue and CNR Tracks PROJECT NO.: 123311678 Michael Turko Attention: SAMPLED BY: Nestor Abarca DATE RECEIVED: January 13, 2015 SAMPLE ID: TH2 @ 0.91 m TESTED BY: Sothea Bun, C.E.T. 100 90 80 ^Dercent Passing (%) 70 60 50 40 30 20 10 0 100 10 1 0.1 0.01 0.001 Particle Size (mm) PARTICLE PERCENT PARTICLE PERCENT SIZE PASSING SIZE PASSING 37.50 mm 100.0 1.18 mm 99.9 25.00 mm 100.0 0.425 mm 99.7 19.00 mm 100.0 0.250 mm 99.4 16.00 mm 100.0 0.150 mm 99.1 12.50 mm 100.0 0.075 mm 93.1 9.50 mm 100.0 0.005 mm 34.1 4.75 mm 100.0 0.002 mm 25.2 2.00 mm 100.0 0.001 mm 21.6 Sand, % Silt. % Colloids, % Gravel % Clay, % Medium Coarse Fine 75 to 4.75 mm <0.075 to 0.002 mm <0.002 mm < 0.001 mm <4.75 to 2.0 mm <2.0 to 0.425 mm <0.425 to 0.075 mm 0.0 0.3 67.9 25.2 21.6 0.0 6.6 CCil≝ January 19, 2015 REVIEWED BY: German E. Leal, B.Sc., P. Eng.

2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT 1 (15-RL-01)

CHANCELLOR DRIVE AND WAVERLEY STREET ALLEY BETWEEN LAKE LINDERO ROAD AND LAKE CREST ROAD

GEOTECHNICAL INVESTIGATION



Prepared for: KGS Group Inc. 3rd Floor - 865 Waverley Street Winnipeg, Manitoba R3T 5P4

Prepared by: Stantec Consulting Ltd. 199 Henlow Bay Winnipeg, Manitoba R3Y 1G4

January 23, 2015 Project No. 123311678



TABLE 1 2015 CITY OF WINNIPEG ALLEY PACKAGE CONTRACT (15-RL-01) CHANCELLOR DRIVE AND WAVERLEY STREET BETWEEN LAKE LINDERO ROAD AND LAKE CREST ROAD GEOTECHNICAL INVESTIGATION

Testhole	Testhole Location	Paveme	ent Surface	Pavement Stru	cture Material	Sample		Moisture	Pa	article Siz	ze Analys	sis	At	terberg Lim	nits
ID		Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH1	125.0 m West of Chancellor Drive on Centreline	Concrete	150	-	-	-	-	-	-	-	-	-	-	-	-
TH2	90.0 m West of Chancellor Drive on Centreline	Concrete	160	-	-	Clayey Silt	0.9	19	0.0	10.0	63.9	26.1	36	15	21
TH3	55.0 m West of Chancellor Drive on Centreline	Asphalt	90	_	_	_	_	_	_	_	_	_	_	_	_
1115		Concrete	130	_	_	_			-	-	-	-	-		_
TH4	15.0 m West of Chancellor Drive on Centreline	Asphalt	80	_		_		_			_		_		_
1 🗆 4		Concrete	170	-	-	-	-	-	-	-	-	-	-	-	-

			трот			יק				т	цл	1					oppendi Page 73	
С	LIEI	νT _	TEST KGS Group Inc.										PRO	DJECT	No.	12331	1678	
		ECT						·						ΓUM				
			Chancellor Dr and Waverley St Alley be DATE December 19, 2014 DRILLING CO.													m SSA		
					S	AMP	LES	□ Insi △ Poo			•	'		orvane	on Grab	Samples	s (kPa)	
(m) T	0	SYMBOL		ATA		R.	IRE (%)			0kPa	neter	` '	kPa	1:	50kPa	200)kPa	H (ff
DEPTH (m)	NSC	SOIL SY	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	₩ _P	W O						rberg Lir est, blow		I	DEPTH (
- 0			Company				Ö	1	0	20	30	4				70 8	0 90	0
	CC		Concrete Clay Fill	_	COR	E												-
	CF	ı	brown, firm, moist, high plasticitytrace fine to coarse sand		AS		29				o							-
	-	\bigvee	Clay		AS		31				o							- - - 2
	-		- brown, stiff, moist, high plasticity															-
- 1 -					AS		31				o							_
					AS		28				0							- 4
	СН																	-
					AS		29				o							-
					AS		34				(Э						- - 6 -
- 2 -					AS		39					0						-
			TESTHOLE LOCATION: 125.0 m West of Chancellor Drive on Centreline.															-
			 The soil was frozen to a depth of 0.9 m. No groundwater seepage or soil sloughing was 															- 8
			observed during or upon completion of drilling.Testhole terminated at a depth of 2.1 m.															-
- 3 -																		-
																		- 10 - -
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 																		- 12
		nple 7 zomet	ype: GS - Grab Sample SPT - Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	est ir Var	ne Test	+ -	ogged by eviewed		tor Aba man Lea				Z		St:	nnt	'P	•
	Ba	ckfill	Frype: Bentonite Drill Cuttings Sand												710			

																	Appendi Page 74	
			TEST	H(DLF	E]	REC	COF	RD	Τ	Ή()2					age 74	0175
	ROU	NT _ ECT	KGS Group Inc. 2015 City of Winnipeg Alley Package C	ontr	act 1	(15-	-RL-0	1))JECT FUM	No.	1233	1678	
L	OCA	TION	Chancellor Dr and Waverley St Alley be	etwe	en La	ke I	linder	o Rd	and l	Lake	e Cro	<u>est R</u>	d ele	VATI				
1	RILI	LING	DATE <u>December 19, 2014</u> DRILLING CO. <u>N</u>	Map	le Le	af D	rilling	Ltd.		D	RILL	ING I	METH	OD	125 m	m SSA	<u>۱ </u>	
		Ы			S	AMP	LES		situ She cket Pe		•			orvane	on Grab	Sample	s (kPa)	
DEPTH (m)	USC	SYMBOL	SOIL DESCRIPTION	DATA	ш	ER	URE T (%)		5	0kPa		10	OkPa	1:	50kPa	20	0kPa	DEPTH (ft)
DEPI	٦ ت	SOIL S	SOIL DESCRIPTION	WELL DATA	TYPE	NUMBER	MOISTURE CONTENT (%)	W _P ⊢	W O	<i>W</i> _L					rberg Lin			DEPI
		S		>			200		10	• 20	Star 30				est, blows 60		0 90	0
- 0	со		Concrete		COR	E												0
			Clay Fill - black, firm, moist, high plasticity				20											_
	CH	۱ K	- trace organic material		AS		30				0							-
		X	Clayey Silt															-
			- tan, soft, moist, medium plasticity		AS		19			0								- 2
	-		- trace fine to medium sand															-
- 1 -	CL		Particle Size Analysis at 0.9 m: 0.0% Gravel, 10.0% Sand, 63.9% Silt, 26.1% Clay		AS		19			0	· · · ·	1						-
	ML																	-
					AS		17		c)								- 4
																		-
			Clay - brown, stiff, moist, high plasticity		AS		29				o							-
			- some silt below 2.0 m															_
	CH				AS		33					0						- 6
- 2 -																		_
	-		TESTHOLE LOCATION: 90.0 m West of		AS		32					>						_
	-		Chancellor Drive on Centreline.															_
ļ .			• The soil was frozen to a depth of 1.1 m.															- 8
	-		• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.															_
			• Testhole terminated at a depth of 2.1 m.															_
	-																	_
- 3 -																		- 10
	-																	
	1																	
	1																	
	Sar	 nple 7	Sype: GS - Grab Sample SPT - Standard Penetration Te	est			.ogged by	: Ne	stor Aba	arca								- 12
	Pie	zome	ST - Shelby Tube PT - Piston Tube VT - Shea	ar Var	ne Test	. –	eviewed						Ĩ		Sta	n	ec	1
	Bao	ckfill	Type: Bentonite Drift Cuttings Sand															

			TEST	чи	<u>л</u> г	7	DE(τ Ο Γ	חי	т	'H(13					Append Page 75	
	CLIE	NT _	KGS Group Inc.										PRO	JECT	No.	1233	1678	
		ECT				·		·						ГUM				
			Chancellor Dr and Waverley St Alley be DATE December 19, 2014 DRILLING CO.															
					S	AMP	LES	□ Ins			``	'		orvane	on Grat	Sample	s (kPa)	
٦ ٤		SYMBOL		ATA		2	RE (%)			enetro 0kPa		•) 🗙 OkPa	15	0kPa	20	0kPa	(#)
DEPTH (m)	nsc		SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	ISTU	Wp	W	WL							7	DEPTH
		SOIL		WE		ž	MOISTURE CONTENT (%)			•	Sta	ndard	Penetra		st, blow	/s/0.3m		
- 0	AS	5	Asphalt		COR	F			0	20	30		10 :	50	60	70 8	0 9	0
	СС		Concrete		COR	E												
	-		Clay - brown, firm, moist, high plasticity		AS		31				c							
			- stiff below 0.9 m - some silt below 2.0 m															
					AS		34					o						- 2
	-																	
- 1	-				AS		36					0						_
	-																	
	CH	I			AS		38					o						- 4
	-																	
-					AS		40)					
	-																	
					AS		42						o					- 6
- 2																		
	-		TESTHOLE LOCATION: 55.0 m West of	_	AS		38					0						
	-		Chancellor Drive on Centreline.															
			• The soil was frozen to a depth of 1.1 m.															- 8
	-		• No groundwater seepage or soil sloughing was observed during or upon completion of drilling.															
	1		• Testhole terminated at a depth of 2.1 m.															
	-																	
- 3	1																	- 10
	-																	
<u> </u>	-																	
	Sa	 mple '	Sype: GS - Grab Sample SPT - Standard Penetration Ta	est		1	.ogged by	: Nec	tor Aba	arca								12
	Pie	ezome	ST - Shelby Tube PT - Piston Tube VT - Shea	ar Var	ne Test		eviewed						I.		Sta	ant	:ec	
	Ba	ıckfill	Type: Bentonite Drill Cuttings Sand															-

			TEST	Ч) I F	וי	RFC	IO E	2D	т	Ή(1					Append Page 76	
С	LIEN	JT _	KGS Group Inc.										PRO	JECT	No.	12331	1678	
		ECT	2015 City of Winnipeg Alley Package C Chancellor Dr and Waverley St Alley be			·		/					DAT					
			DATE December 19, 2014 DRILLING CO.															
					S	٩MP	LES	□ Ins			•			rvane c	n Grab	Sample	s (kPa)	
(E)	0	SYMBOL		ATA		К	IRE (%)			0kPa		•) 🗖)kPa	15	0kPa	200	0kPa	H (ff
DEPTH (m)	nsc	SOIL SY	SOIL DESCRIPTION	WELL DATA	ТҮРЕ	NUMBER	MOISTURE CONTENT (%)	₩ _P	W O				Content a				1	DEPTH
- 0	AS		Asphalt				0		0	20	30		0 5			70 8	0 9	0
			Concrete		COR	E												-
	-	A . A . C	Clay		AS		38					o						
			 brown, firm, moist, high plasticity stiff below 0.9 m 															
			- trace silt below 1.4 m		AS		40						>					2
	-				AS		39					с						
- 1 -																		
	СН				AS		41						o					- 4
					AS		44						0					-
																		-
	-				AS		49						0					- 6
2 -																		
-					AS		51							0				
			TESTHOLE LOCATION: 15.0 m West of Chancellor Drive on Centreline.															
			• The soil was frozen to a depth of 1.1 m.															8
	1		 No groundwater seepage or soil sloughing was observed during or upon completion of drilling. 															
	-		 Testhole terminated at a depth of 2.1 m. 															
	1																	
- 3 -	-																	- 10
	1																	
	{																	
-	1																	
	1																	- 12
			Standard Penetration Te ST - Shelby Tube PT - Piston Tube VT - Shea	est ar Var	ne Test		ogged by eviewed		tor Aba man Le				T		ł	ant		
	Pie Bac	zomet ckfill	Type: Bentonite Drill Cuttings Sand						-								, CL	



Core sample from Testhole TH1



Core sample from Testhole TH2





Core sample from Testhole TH3



Core sample from Testhole TH4





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PARTICLE SIZE ANALYSIS ASTM D422

KGS Group Inc. 3rd Floor - 865 Waverley St. Winnipeg, Manitoba R3T 5P4			PROJECT: 2015 City of Winnipeg Alley Package Contract (15-RL-01) Chancellor Dr and Waverley St Alley between Lake Lindero Rd and Lake Crest Rd						
Attention:	ttention: Michael Turko			PROJECT NO.: 123311678					
SAMPLED BY: Nestor Abarca SAMPLE ID: TH2 @ 0.91 m		DATE RECEIVED: January 13, 2015 TESTED BY: Sothea Bun, C.E.T.							
100 90 80 70 60 40 40 40 40 10 100		10	1 Part	icle Size (mm	0.1	0.01	0.001	1	
	PARTICLE SIZE 37.50 mm 25.00 mm 19.00 mm 16.00 mm 12.50 mm 9.50 mm 4.75 mm 2.00 mm Gravel, % 75 to 4.75 mm 0.0 0.0		PERCENT PASSING 100.0 100.0 100.0 100.0 100.0 100.0 100.0 Sand, % Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm 8.9) PARTICLE SIZE 1.18 mm 0.425 mm 0.250 mm 0.250 mm 0.150 mm 0.075 mm 0.005 mm 0.005 mm 0.002 mm 0.001 mm SIIT, % <0.075 to 0.002 mm 63.9 26.1		PERCENT PASSING 99.7 98.9 98.3 97.8 90.0 35.8 26.1 22.0 Colloids, % < 0.001 mm 22.0		
Jani	uary 19, 2015			ration Council of Information Laborations specific tests as Elizabet on survey.col. Loss	REVIEWED BY:	German E. Le	al, B.Sc., P. Eng.		