

# **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**

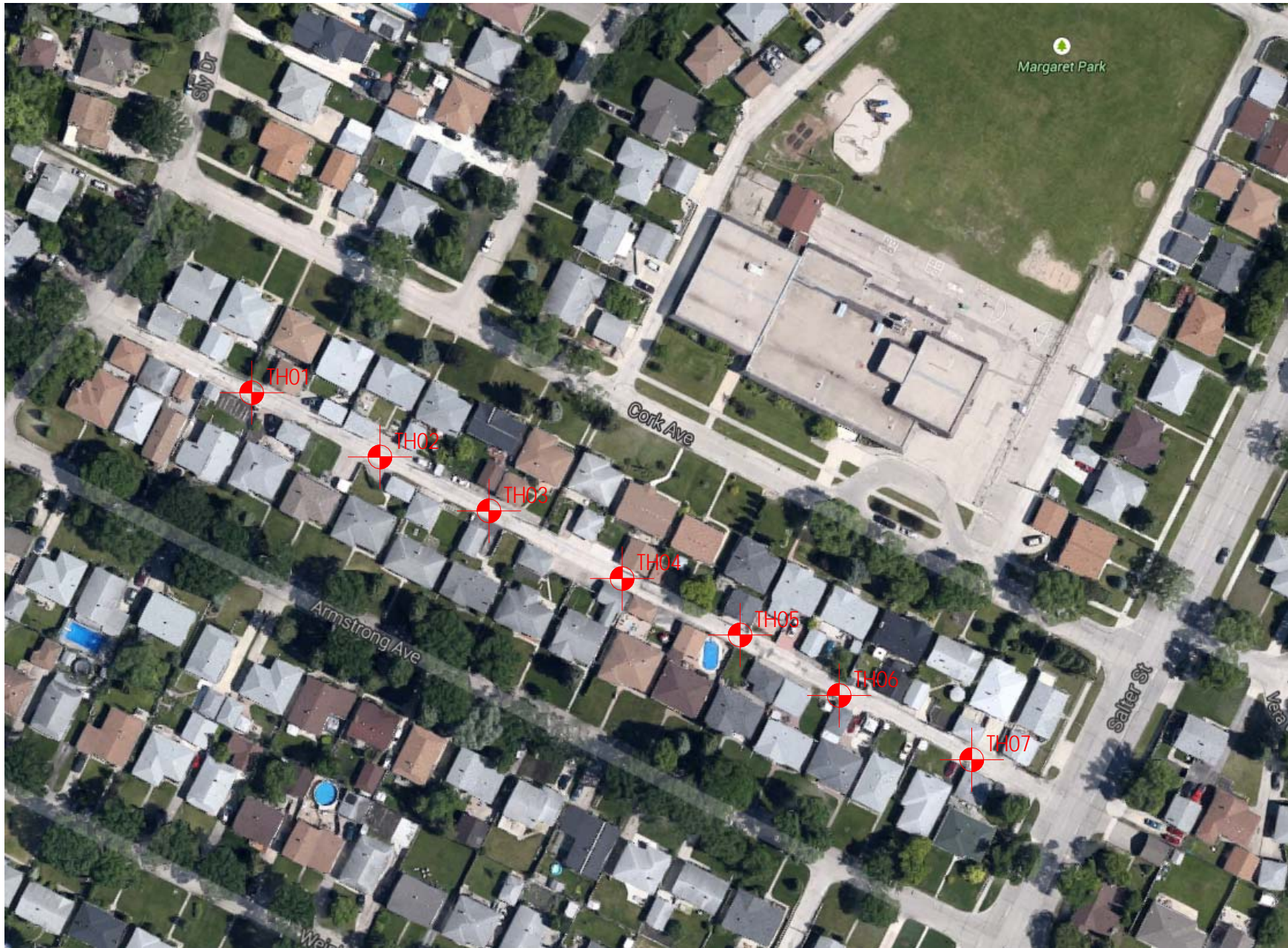
**GEOTECHNICAL INVESTIGATION**



Prepared for:  
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Prepared by:  
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199 Henlow Bay  
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January 22, 2015  
Project No. 123311678



Project No. 123311678

Drawn by: SB

Figure: 1

Date: January 9, 2015

Reviewed by: GL

Scale: NTS

Testhole Location Plan  
2015 City of Winnipeg Alley Package  
Contract (15-RL-01)  
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**

[illegible]



# TESTHOLE RECORD TH01

CLIENT KGS Group Inc. PROJECT No. 123311678  
PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
LOCATION Cork Ave and Armstrong Ave Alley between Salter St and Sly Dr ELEVATION \_\_\_\_\_  
DRILLING DATE December 16, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			TESTS										DEPTH (ft)							
					TYPE	NUMBER	MOISTURE CONTENT (%)	Moisture Content & Atterberg Limits					Standard Penetration Test, blows/0.3m												
								<div><input type="checkbox"/> Insitu Shear Vane (kPa)    <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)    <input checked="" type="checkbox"/> X 50kPa    100kPa    150kPa    200kPa W<sub>p</sub>    W    W<sub>L</sub> 10    20    30    40    50    60    70    80    90</div>																	
0	CO		Concrete		CORE																	0			
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	30																			
	ML		Silt - tan, soft, moist, low plasticity - some clay - trace fine to medium sand  Particle Size Analysis at 0.9 m: 0.0% Gravel, 2.9% Sand, 83.2% Silt, 13.9% Clay		AS	22																2			
				AS	22																				
1				AS	22																			4	
				AS	21																				
				AS	23																				6
2					AS	25																			
			TESTHOLE LOCATION: 41.0 m East of Sly Drive on Centreline.  • 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.																				8		
3																							10		
																							12		

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test  
Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca  
Reviewed by: German Leal

**Stantec**

# TESTHOLE RECORD TH02

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cork Ave and Armstrong Ave Alley between Salter St and Sly Dr ELEVATION \_\_\_\_\_  
 DRILLING DATE December 16, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete		CORE							0
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	39						
	CH		Clay - brown, firm, moist, high plasticity		AS	37						2
1	CH				AS	34						
	CH				AS	32						4
	CH				AS	33						
2	ML		Silt - tan, soft, moist, low plasticity - some clay - trace fine to medium sand		AS	20						6
					AS	24						
			TESTHOLE LOCATION: 67.0 m East of Sly Drive on Centreline.  • 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.									8
3												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal

**TESTHOLE RECORD TH03**

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cork Ave and Armstrong Ave Alley between Salter St and Sly Dr ELEVATION \_\_\_\_\_  
 DRILLING DATE December 16, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	44						
		CH	Clay - brown, stiff, moist, high plasticity - some silt below 1.7 m		AS	39						2
1		CH			AS	31						
		CH			AS	31						4
		CH			AS	29						
		CH			AS	27						6
2		CH			AS	30						
			TESTHOLE LOCATION: 97.0 m East of Sly Drive on Centreline.									
			<ul style="list-style-type: none"> <li>The soil was frozen to a depth of 0.9 m.</li> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole terminated at a depth of 2.1 m.</li> </ul>									8
3												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☐ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal





**TESTHOLE RECORD TH04**

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cork Ave and Armstrong Ave Alley between Salter St and Sly Dr ELEVATION \_\_\_\_\_  
 DRILLING DATE December 16, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete		CORE							0
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	38						
	CH		Clay - brown, stiff, moist, high plasticity - silty		AS	31						2
1	CH				AS	29						
	CH				AS	28						4
	CH				AS	30						
2	ML		Silt - tan, soft, moist, low plasticity - some clay - trace fine to medium sand		AS	25						6
					AS	25						
			TESTHOLE LOCATION: 133.0 m East of Sly Drive on Centreline.									8
			<ul style="list-style-type: none"> <li>The soil was frozen to a depth of 0.9 m.</li> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole terminated at a depth of 2.1 m.</li> </ul>									10
3												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal

# TESTHOLE RECORD TH05

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cork Ave and Armstrong Ave Alley between Salter St and Sly Dr ELEVATION \_\_\_\_\_  
 DRILLING DATE December 16, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay - brown, stiff, moist, high plasticity		AS	36						2
		CH			AS	34						2
1		CH			AS	26						4
		ML	Silt - tan, soft, moist, low plasticity - some clay - trace fine to medium sand		AS	25						4
		ML			AS	26						6
2		ML			AS	24						6
		ML			AS	25						8
3			TESTHOLE LOCATION: 155.0 m East of Sly Drive on Centreline.  • 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.									10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



## TESTHOLE RECORD TH06

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cork Ave and Armstrong Ave Alley between Salter St and Sly Dr ELEVATION \_\_\_\_\_  
 DRILLING DATE December 16, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)	
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0	CO		Concrete		CORE							0	
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	61							
	CH		Clay - brown, stiff, moist, high plasticity		AS	33						2	
				AS	32								
				AS	33								4
				AS	30								
2	ML		Silt - tan, soft, moist, low plasticity - some clay - trace fine to medium sand		AS	26						6	
			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. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS	22							
3												10	
												12	

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal

**TESTHOLE RECORD TH07**

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cork Ave and Armstrong Ave Alley between Salter St and Sly Dr ELEVATION \_\_\_\_\_  
 DRILLING DATE December 16, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	31						
			Clay - brown, stiff, moist, high plasticity		AS	36						2
1					AS	34						
	CH				AS	30						4
					AS	30						
					AS	30						6
2	ML		Silt - tan, soft, moist, low plasticity - some clay - trace fine to medium sand		AS	25						
			TESTHOLE LOCATION: 226.0 m East of Sly Drive, approximately 1.0 m South of Centreline.									8
			<ul style="list-style-type: none"> <li>The soil was frozen to a depth of 0.9 m.</li> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole terminated at a depth of 2.1 m.</li> </ul>									10
3												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☐ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal





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



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

**PARTICLE SIZE ANALYSIS  
ASTM D422**

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3rd Floor - 865 Waverley St.  
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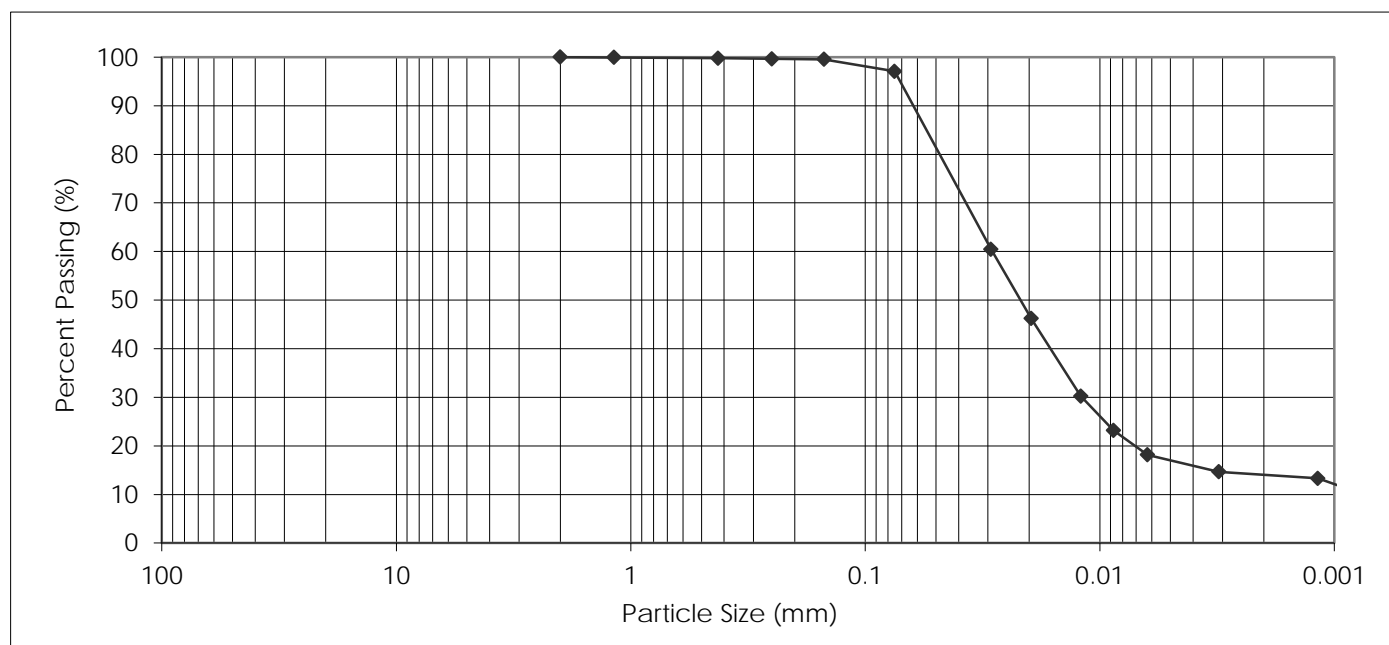
PROJECT: 2015 City of Winnipeg Alley Package  
Contract (15-RL-01)  
Cork Ave and Armstrong Ave Alley  
between Salter St and Sly Rd

Attention: Michael Turko

PROJECT NO.: 123311678

SAMPLED BY: Nestor Abarca  
SAMPLE ID: TH1 @ 0.91 m

DATE RECEIVED: January 13, 2015  
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING	PARTICLE SIZE	PERCENT 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

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.0	0.2	2.7	83.2	13.9	12.1

January 19, 2015



REVIEWED BY: German E. Leal, B.Sc., P. Eng.

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

**PARTRIDGE AVENUE AND  
ROYAL AVENUE BETWEEN  
POWERS STREET AND SALTER  
STREET**

**GEOTECHNICAL INVESTIGATION**

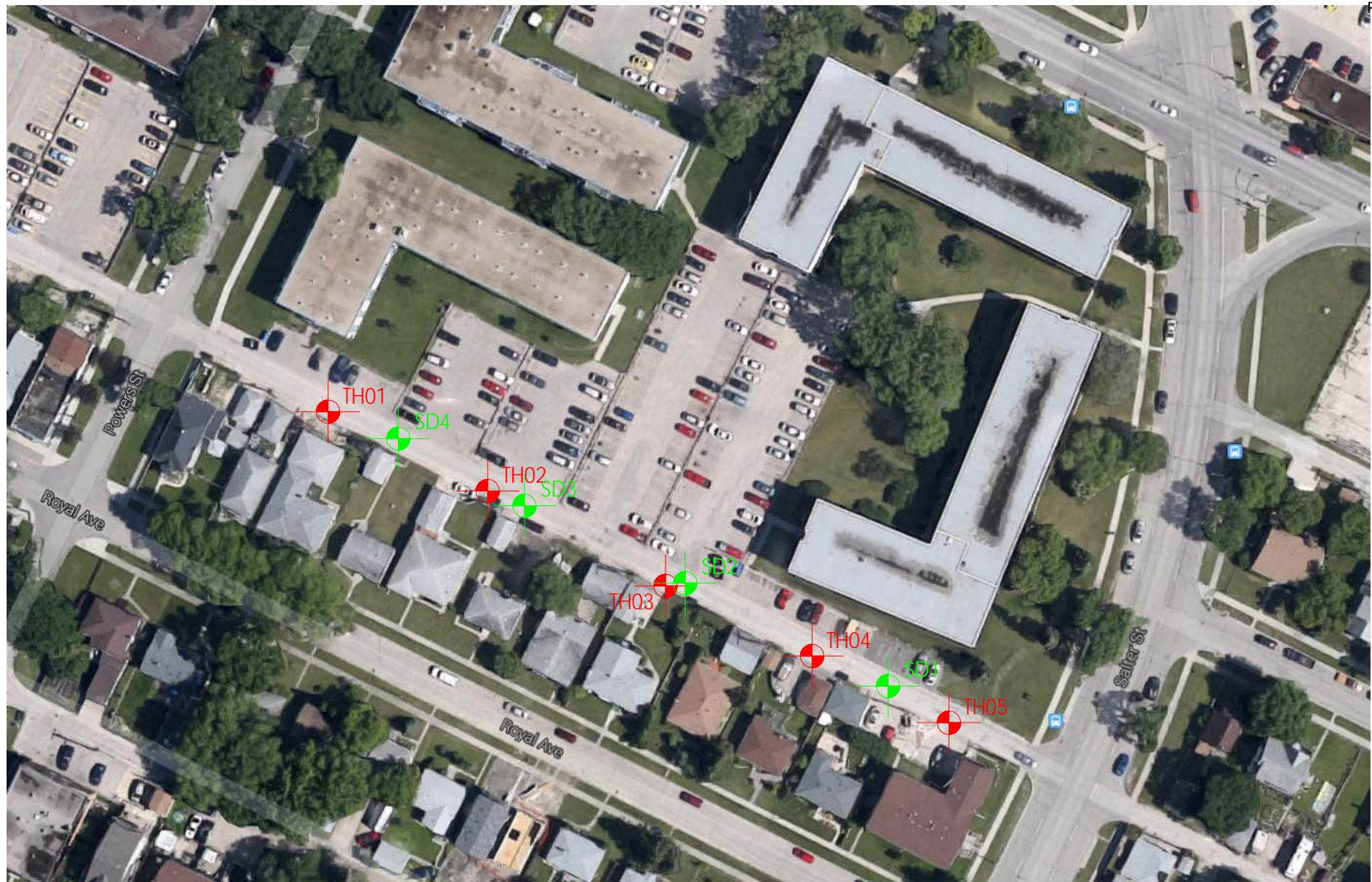



Prepared for:  
KGS Group Inc.  
3rd Floor - 865 Waverley Street  
Winnipeg, Manitoba  
R3T 5P4


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

January 23, 2015  
Project No. 123311678





 Soft Digging of Gas Line

 Testholes



Project No. 123311678

Drawn by: SB

Figure: 1

Date: January 9, 2015

Reviewed by: GL

Scale: NTS

**Testhole Location Plan**  
**2015 City of Winnipeg Alley Package**  
**Contract (15-RL-01)**  
**Partridge Ave and Royal Ave Alley**  
**between Powers St and Salter St**

[illegible]



**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

## TESTHOLE RECORD TH01

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Partridge Ave and Royal Ave between Powers St and Salter St ELEVATION \_\_\_\_\_  
 DRILLING DATE December 18, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay - black, stiff, moist, high plasticity - brown below 0.6 m - silty - trace fine gravel - trace fine to coarse sand		AS	29						
		CH			AS	29						2
1		CH			AS	29						
		CH			AS	29						4
		CH			AS	29						
2		ML	Silt - tan, soft, moist, low plasticity		AS	26						6
		ML			AS	24						
3			TESTHOLE LOCATION: 158.0 m West of Salter Street, approximately 2.2 m South of Centreline.  • 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.									8
												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Sothea Bun

Reviewed by: German Leal





## TESTHOLE RECORD TH02

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Partridge Ave and Royal Ave between Powers St and Salter St ELEVATION \_\_\_\_\_  
 DRILLING DATE December 18, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete	CORE								0
	CH		Clay - black, stiff, moist, high plasticity - brown below 0.6 m - silty - trace fine gravel - trace fine to coarse sand	AS	32							
	CH			AS	30							2
1	CH			AS	29							
	ML		Silt - tan, soft, moist, low plasticity	AS	25							4
	ML			AS	25							
2	ML			AS	25							6
	ML			AS	23							
3			TESTHOLE LOCATION: 126.0 m West of Salter Street, approximately 1.7 m South of Centreline.  • 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.									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Sothea Bun

Reviewed by: German Leal

## TESTHOLE RECORD TH03

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Partridge Ave and Royal Ave between Powers St and Salter St ELEVATION \_\_\_\_\_  
 DRILLING DATE December 18, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete	CORE								0
	CH		Clay - black, stiff, moist, high plasticity - brown below 0.6 m - silty - trace fine gravel - trace fine to coarse sand  Particle Size Analysis at 0.9 m: 0.4% Gravel, 2.4% Sand, 25.1% Silt, 72.1% Clay		AS	34						
					AS	31						2
1					AS	31						
					AS	30						4
					AS	29						
2	ML		Silt - tan, soft, moist, low plasticity		AS	25						6
					AS	24						
3			TESTHOLE LOCATION: 88.0 m West of Salter Street, approximately 1.7 m South of Centreline.  • 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									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Sothea Bun

Reviewed by: German Leal



## TESTHOLE RECORD TH04


CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Partridge Ave and Royal Ave between Powers St and Salter St ELEVATION \_\_\_\_\_  
 DRILLING DATE December 18, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay - black, stiff, moist, high plasticity - brown below 0.6 m - silty - trace fine gravel - trace fine to coarse sand		AS	37						
					AS	30						2
1					AS	29						
					AS	30						4
		ML	Silt - tan, soft, moist, low plasticity		AS	26						
2					AS	28						6
					AS	24						
			TESTHOLE LOCATION: 52.0 m West of Salter Street, approximately 1.9 m South of Centreline.  • 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									8
3												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Sothea Bun  
 Reviewed by: German Leal



## TESTHOLE RECORD TH05

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Partridge Ave and Royal Ave between Powers St and Salter St ELEVATION \_\_\_\_\_  
 DRILLING DATE December 18, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay - black, stiff, moist, high plasticity - brown below 0.6 m - silty - trace fine gravel - trace fine to coarse sand		AS	26						
					AS	32						2
1					AS	32						
					AS	32						4
					AS	30						
2		ML	Silt - tan, soft, moist, low plasticity		AS	25						6
					AS	29						
3			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. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated									10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Sothea Bun

Reviewed by: German Leal





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





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

**PARTICLE SIZE ANALYSIS  
ASTM D422**

KGS Group Inc.  
3rd Floor - 865 Waverley St.  
Winnipeg, Manitoba  
R3T 5P4

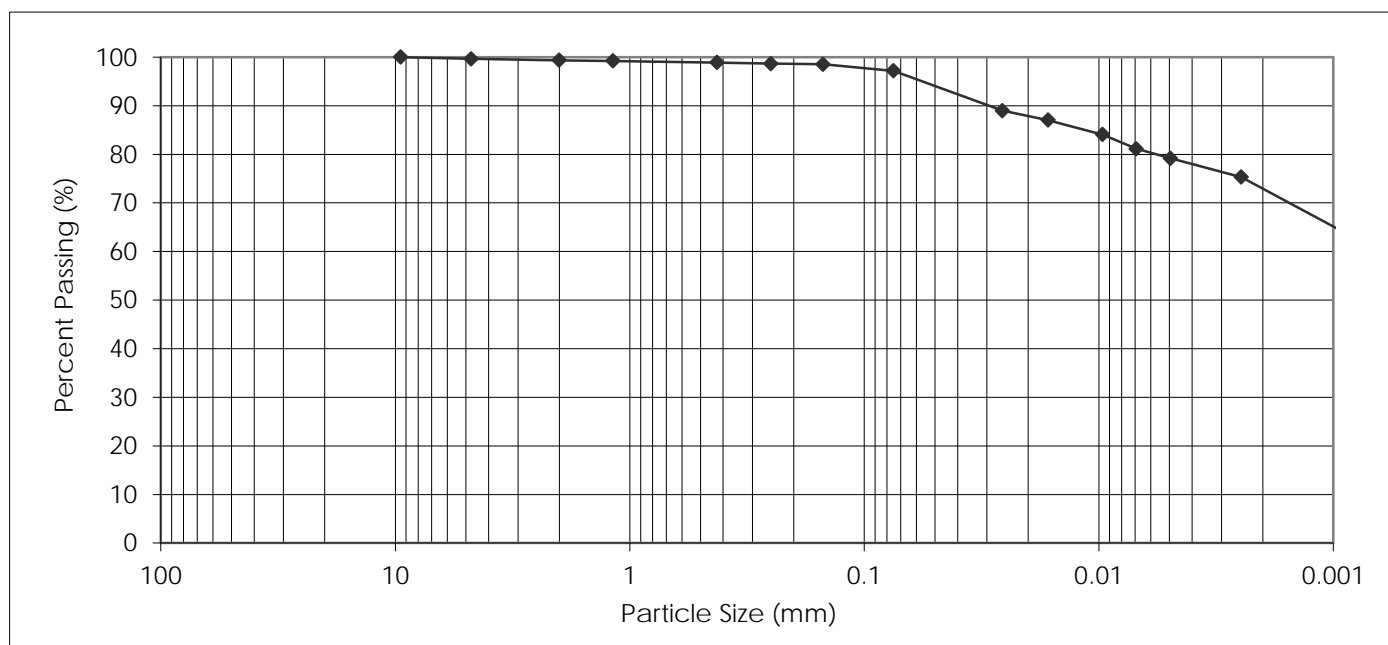
PROJECT: 2015 City of Winnipeg Alley Package  
Contract (15-RL-01)  
Partridge Ave and Royal Ave Alley  
between Powers St and Salter St

Attention: Michael Turko

PROJECT NO.: 123311678

SAMPLED BY: Nestor Abarca  
SAMPLE ID: TH3 @ 0.91 m

DATE RECEIVED: January 13, 2015  
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING	PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0	1.18 mm	99.2
25.00 mm	100.0	0.425 mm	98.9
19.00 mm	100.0	0.250 mm	98.7
16.00 mm	100.0	0.150 mm	98.5
12.50 mm	100.0	0.075 mm	97.2
9.50 mm	100.0	0.005 mm	79.2
4.75 mm	99.6	0.002 mm	72.1
2.00 mm	99.4	0.001 mm	65.1

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.4	0.2	0.5	1.7	25.1	72.1	65.1

January 19, 2015



REVIEWED BY: German E. Leal, B.Sc., P. Eng.

**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



Project No. 123311678

Drawn by: SB

Figure: 1

Date: January 8, 2014

Reviewed by: GL

Scale: NTS

Testhole Location Plan  
2015 City of Winnipeg Alley  
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**

[illegible]



## TESTHOLE RECORD TH01

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Wellington Cres and Ruskin Row Alley between Grosvenor Ave and Palk Rd ELEVATION \_\_\_\_\_  
 DRILLING DATE December 18, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay Fill - black, firm, moist, high plasticity - some fine to coarse sand - some fine gravel - brown below 0.6 m - concrete debris encountered at a depth of 0.9 m (no sample recovery) - some silt - brown, stiff below 1.5 m		AS	26						2
1		CH	Clay - brown, stiff, moist, high plasticity - trace fine to medium sand - trace silt		AS	31						4
		CH			AS	33						6
2					AS	20						8
					AS	27						10
3			TESTHOLE LOCATION: 15.0 m Southeast of Palk Road, approximately 1.0 m West of Centreline.  • 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.									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



## TESTHOLE RECORD TH02

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Wellington Cres and Ruskin Row Alley between Grosvenor Ave and Palk Rd ELEVATION \_\_\_\_\_  
 DRILLING DATE December 18, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)	
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0	AS		Asphalt	CORE								0	
	CO		Concrete										
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material - some fine to coarse sand		AS	28							
					AS	22							2
1			Silt - tan, soft, moist, low plasticity - some clay - trace fine to coarse sand		AS	24							
	ML		Particle Size Analysis at 0.9 m: 0.0% Gravel, 6.8% Sand, 73.0% Silt, 20.2% Clay		AS	19							4
					AS	23							
	CH		Clay - brown, stiff, moist, high plasticity	AS	31							6	
2				AS	38								
3			TESTHOLE LOCATION: 50.0 m Southeast of Palk Road, approximately 1.0 m West of Centreline.  • 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.									8	
												10	
												12	

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal

## TESTHOLE RECORD TH03

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Wellington Cres and Ruskin Row Alley between Grosvenor Ave and Palk Rd ELEVATION \_\_\_\_\_  
 DRILLING DATE December 18, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	AS		Asphalt		CORE							0
	CO		Concrete		AS	20						
	CH		Clay Fill - brown, firm, moist, high plasticity - trace organic material - some fine to coarse sand - trace fine gravel - concrete debris encountered at a depth of 0.9 m (no sample recovered)		AS	22						2
1	CH		Clay - brown, stiff, moist, high plasticity		AS	31						4
	CH				AS	34						
2					AS	35						6
					AS	35						
3			TESTHOLE LOCATION: 90.0 m Southeast of Palk Road, approximately 0.5 m West of Centreline.  • 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.									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



**TESTHOLE RECORD TH04**

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Wellington Cres and Ruskin Row Alley between Grosvenor Ave and Palk Rd ELEVATION \_\_\_\_\_  
 DRILLING DATE December 18, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)	
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0	AS	Asphalt										0	
	CO	Concrete											
	CH	Clay - brown, firm, moist, high plasticity - stiff below 0.9 m - trace silt below 1.8 m											
			AS	32									
			AS	34									2
			AS	34									
1			AS	35									4
			AS	35									
	AS	42										6	
2	AS	40											
	TESTHOLE LOCATION: 117.0 m Southeast of Palk Road on Centreline.  • 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.												
3												10	
												12	

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☐ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal





Core sample from Testhole TH1



Core sample from Testhole TH2



Core sample from Testhole TH3



Core sample from Testhole TH4



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

**PARTICLE SIZE ANALYSIS  
ASTM D422**

KGS Group Inc.  
3rd Floor - 865 Waverley St.  
Winnipeg, Manitoba  
R3T 5P4

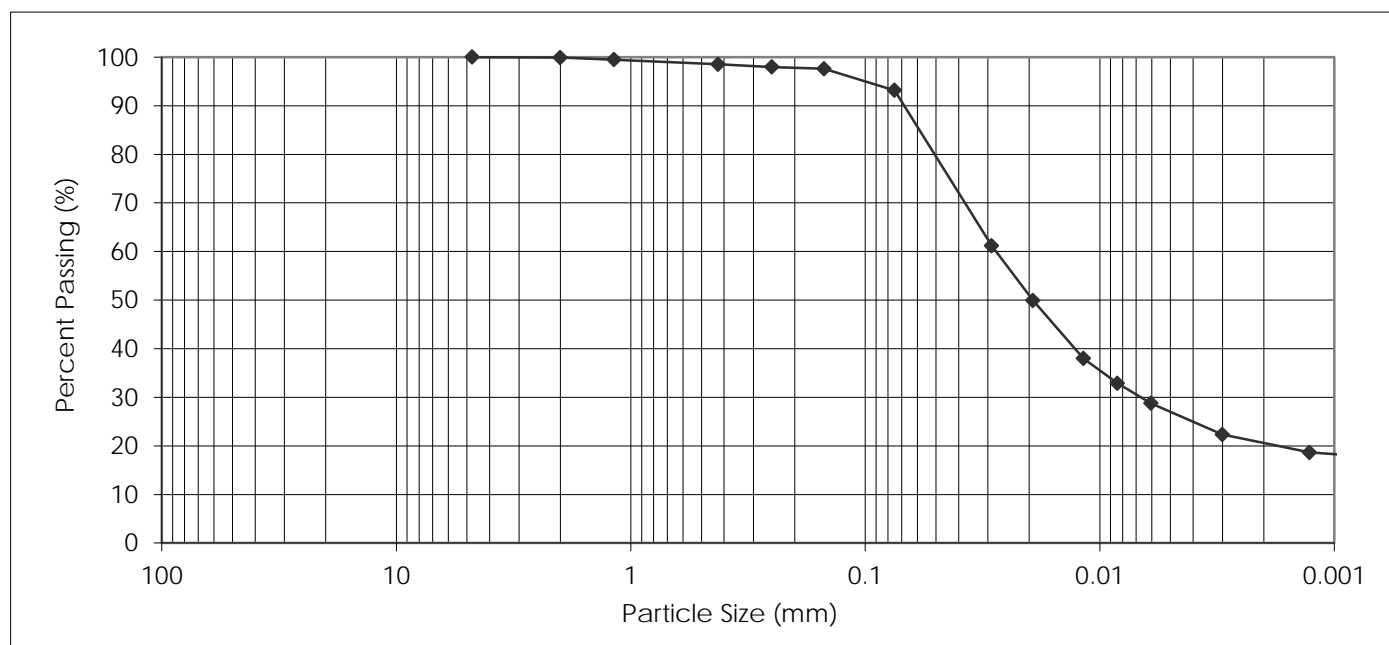
PROJECT: 2015 City of Winnipeg Alley Package  
Contract (15-RL-01)  
Wellington Cres And Ruskin Row Alley between  
Palk Rd and Grosvenor Ave

Attention: 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.



PARTICLE SIZE	PERCENT PASSING	PARTICLE SIZE	PERCENT 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

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.1	1.4	5.3	73.0	20.2	18.3

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**

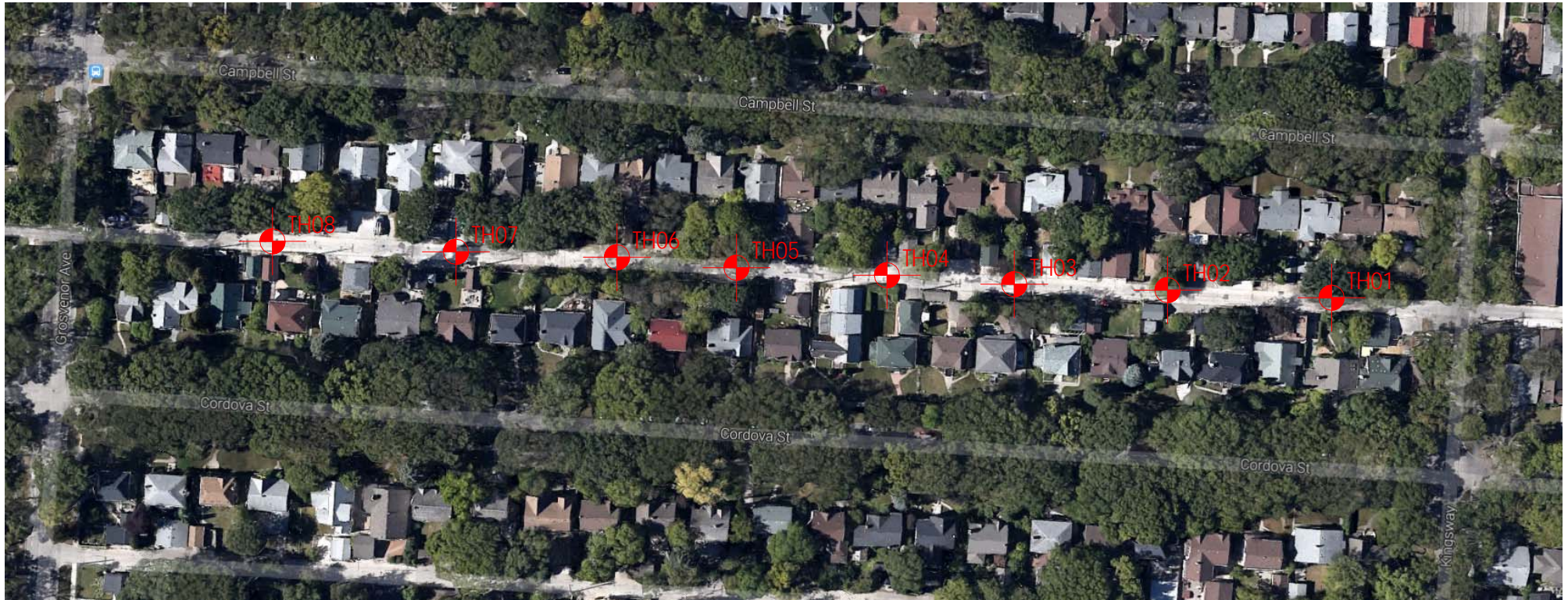


Prepared for:  
KGS Group Inc.  
3rd Floor - 865 Waverley Street  
Winnipeg, Manitoba  
R3T 5P4

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

January 22, 2015  
Project No. 123311678





Project No. 123311678

Drawn by: SB

Figure: 1

Date: January 9, 2015

Reviewed by: GL

Scale: NTS

Testhole Location Plan  
2015 City of Winnipeg Alley Package  
Contract (15-RL-01)  
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**

[illegible]

**TESTHOLE RECORD TH01**

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cordova St and Campbell St Alley between Kingsway and Grosvenor Ave ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete	CORE								0
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material - trace fine to coarse sand	AS	28							2
	CH			AS	32							2
1	CH			AS	24							1
	ML		Silt - tan, soft, moist, low plasticity - trace clay - some fine to medium sand	AS	18							4
	ML			AS	21							4
2	CH		Clay - brown, stiff, moist, high plasticity	AS	41							6
	CH			AS	42							6
3			<p>TESTHOLE LOCATION: 41.0 m South of Kingsway, approximately 1.0 m West of Centreline.</p> <ul style="list-style-type: none"> <li>The soil was frozen to a depth of 1.1 m.</li> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole terminated at a depth of 2.1 m.</li> </ul>									8
												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal

## TESTHOLE RECORD TH02

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cordova St and Campbell St Alley between Kingsway and Grosvenor Ave ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete	CORE								0
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material - trace fine to coarse sand	AS	28							2
	CH			AS	27							2
1	ML		Silt - tan, soft, moist, low plasticity - trace clay - some fine to medium sand	AS	21							4
	ML			AS	20							4
	ML			AS	20							4
2	CH		Clay - brown, stiff, moist, high plasticity	AS	39							6
	CH			AS	41							6
3			TESTHOLE LOCATION: 62.0 m South of Kingsway, approximately 1.0 m West of Centreline.  • 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.									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal

## TESTHOLE RECORD TH03

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cordova St and Campbell St Alley between Kingsway and Grosvenor Ave ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0			Concrete		CORE							0
		CH	Clay Fill - black, firm, moist, high plasticity - trace organic material - trace fine to coarse sand		AS	26						
			Clay - brown, stiff, moist, high plasticity - silty to a depth of 0.9 m		AS	23						2
1					AS	28						
	CH				AS	28						4
					AS	35						
2					AS	40						6
					AS	41						
3			TESTHOLE LOCATION: 130.0 m South of Kingsway on Centreline.  • 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.									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



## TESTHOLE RECORD TH04

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cordova St and Campbell St Alley between Kingsway and Grosvenor Ave ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			Moisture Content & Atterberg Limits				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	□ Insitu Shear Vane (kPa)	△ Pocket Penetrometer (kPa)	■ Torvane on Grab Samples (kPa)	✕	
0	CO		Concrete	CORE								0
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material - some silt	AS	40							2
	ML		Silt - tan, soft, moist, low plasticity - trace clay - some fine to medium sand	AS	20							1
	CH		Clay - brown, stiff, moist, high plasticity - trace silt below 1.2 m	AS	26							4
	CH			AS	29							6
	CH			AS	38							8
	CH			AS	40							10
3			TESTHOLE LOCATION: 170.0 m South of Kingsway on Centreline.  • 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.									12

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite ☒ Drill Cuttings ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



**TESTHOLE RECORD TH05**

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cordova St and Campbell St Alley between Kingsway and Grosvenor Ave ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay Fill - black, firm, moist, high plasticity - trace organic material - silty below 0.6 m		AS	34						
					AS	43						2
					AS	27						
1		CH	Clay - brown, stiff, moist, high plasticity		AS	37						
					AS	31						4
					AS	35						
2					AS	39						6
					AS	41						
3			TESTHOLE LOCATION: 195.0 m South of Kingsway on Centreline.  • 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.									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☐ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal





## TESTHOLE RECORD TH06

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cordova St and Campbell St Alley between Kingsway and Grosvenor Ave ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete		CORE							0
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material - trace fine to coarse sand		AS	28						
					AS	41						2
1	ML		Silt - tan, soft, moist, low plasticity - trace clay - some fine to medium sand		AS	27						
					AS	23						4
	CH		Clay - brown, stiff, moist, high plasticity		AS	38						
					AS	23						6
2	ML		Silt - tan, soft, moist, low plasticity - some clay		AS	22						
			TESTHOLE LOCATION: 240.0 m South of Kingsway on Centreline.  • 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.									8
3												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal

**TESTHOLE RECORD TH07**

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cordova St and Campbell St Alley between Kingsway and Grosvenor Ave ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete	CORE								0
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material	AS	20							
	ML		Silt - tan, soft, moist, low plasticity - trace clay - some fine to medium sand	AS	23							2
1	ML		Particle Size Analysis at 0.9 m: 0.0% Gravel, 15.0% Sand, 75.4% Silt, 9.6% Clay	AS	18							
	AS			AS	16							4
	CH		Clay - brown, stiff, moist, high plasticity	AS	35							
2	CH			AS	39							6
	AS			AS	40							
3			TESTHOLE LOCATION: 112.0 m North of Grosvenor Avenue on Centreline.  • 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.									8
												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal

## TESTHOLE RECORD TH08

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Cordova St and Campbell St Alley between Kingsway and Grosvenor Ave ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete		CORE							0
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	28						
	ML		Silt - tan, soft, moist, low plasticity - trace clay - some fine to medium sand		AS	27						2
1					AS	21						
	CH		Clay - brown, stiff, moist, high plasticity		AS	31						4
					AS	31						
2					AS	37						6
					AS	40						
3			TESTHOLE LOCATION: 62.0 m North of Grosvenor Avenue on Centreline.  • 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.									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



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



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

**PARTICLE SIZE ANALYSIS  
ASTM D422**

KGS Group Inc.  
3rd Floor - 865 Waverley St.  
Winnipeg, Manitoba  
R3T 5P4

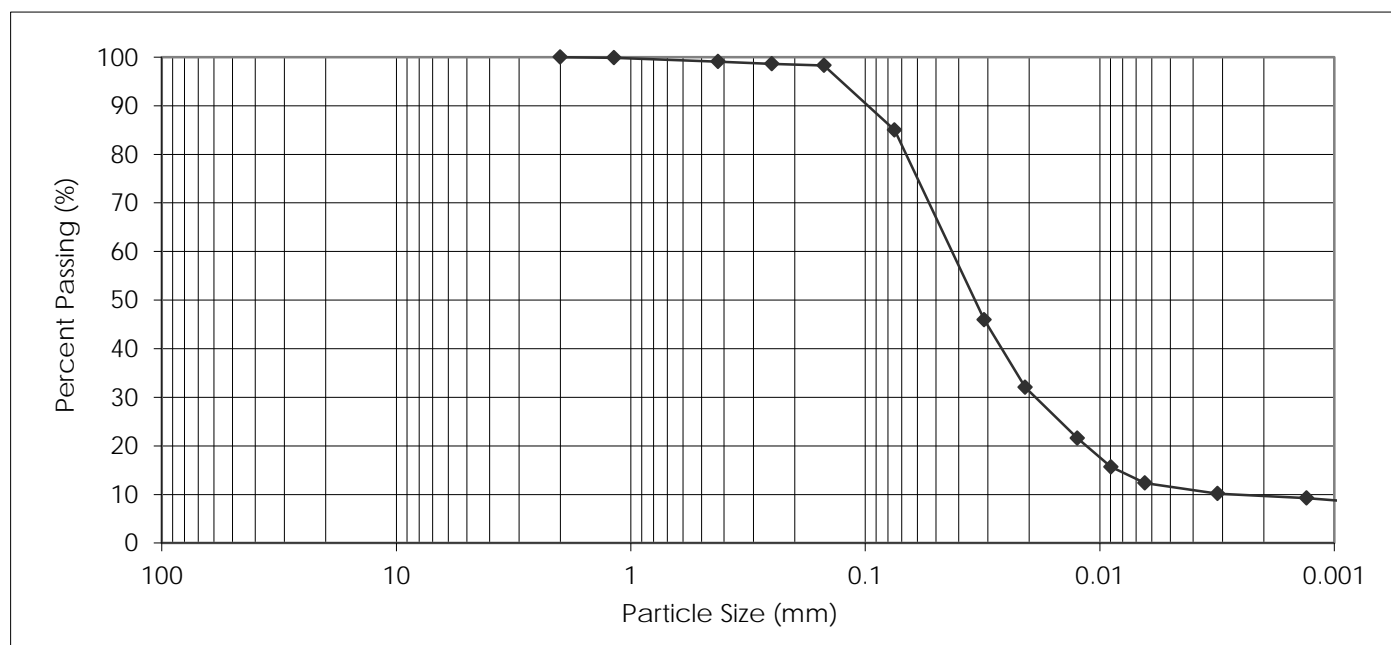
PROJECT: 2015 City of Winnipeg Alley Package  
Contract (15-RL-01)  
Cordova St and Campbell St Alley between  
Kingsway St and Grosvenor Ave

Attention: Michael Turko

PROJECT NO.: 123311678

SAMPLED BY: Nestor Abarca  
SAMPLE ID: TH7 @ 0.91 m

DATE RECEIVED: January 13, 2015  
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING	PARTICLE SIZE	PERCENT 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

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.0	0.9	14.1	75.4	9.6	8.8

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**

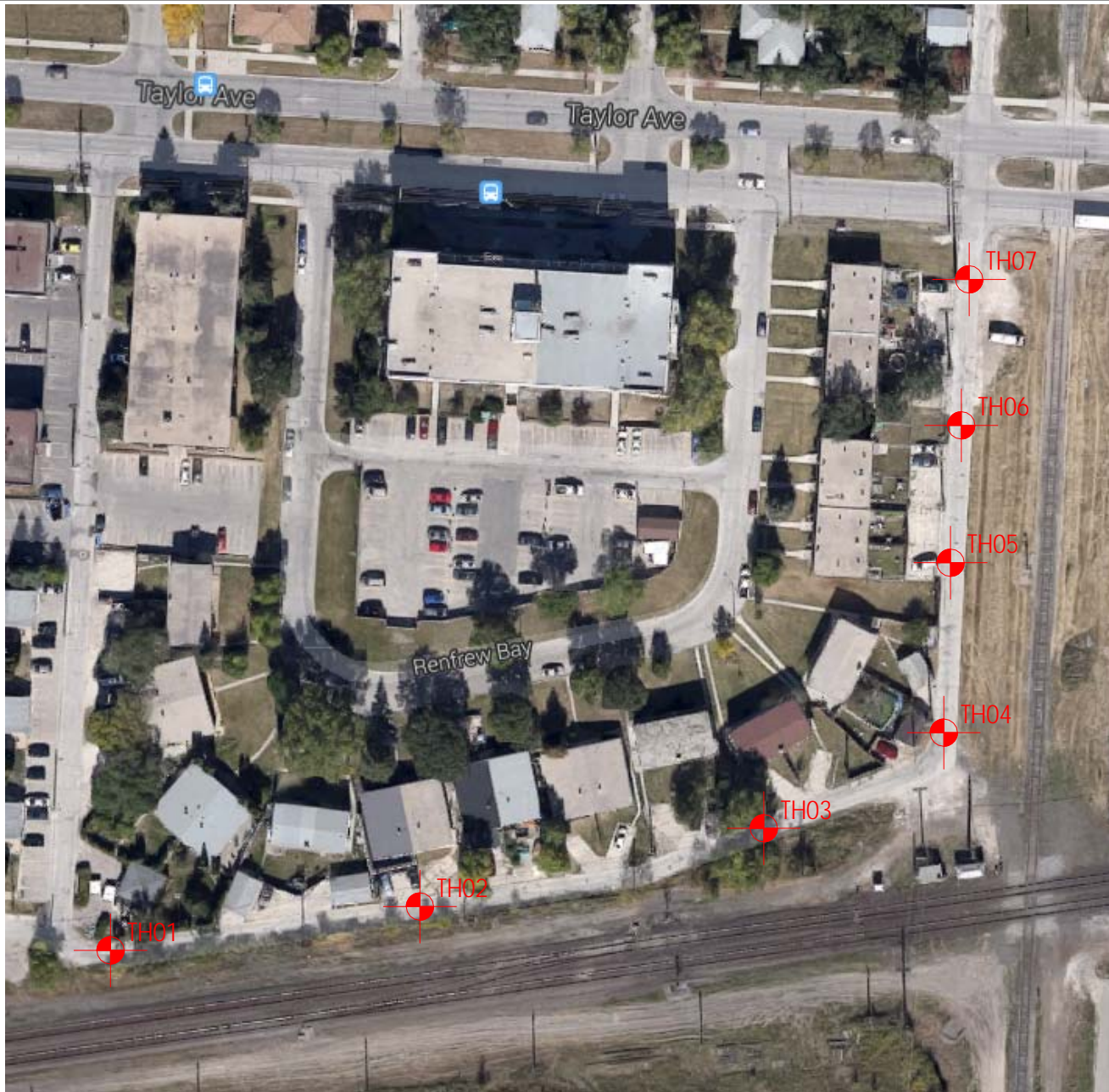


Prepared for:  
KGS Group Inc.  
3rd Floor - 865 Waverley Street  
Winnipeg, Manitoba  
R3T 5P4

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

January 23, 2015  
Project No. 123311678





Project No. 123311678

Drawn by: SB

Figure: 1

Date: January 9, 2015

Reviewed by: GL

Scale: NTS

Testhole Location Plan  
2015 City of Winnipeg Alley Package  
Contract (15-RL-01)  
Renfrew Bay Alley between  
Taylor Ave and CNR Tracks

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

[illegible]

## TESTHOLE RECORD TH01

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Renfrew Bay Alley between Taylor Ave and CNR Tracks ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	AS		Asphalt		CORE							0
	CO		Concrete									
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material - some silt below 0.6 m		AS	28						
					AS	34						2
1					AS	34						
					AS	36						4
	CL ML		Clayey Silt - tan, soft, moist, medium plasticity - trace fine to medium sand		AS	29						
2	CH		Clay - brown, stiff, moist, high plasticity		AS	38						6
					AS	46						
			TESTHOLE LOCATION: 153.0 m South of Taylor Avenue, approximately 18.0 m West from property line 966 / 968 and 970 / 972 Renfrew Bay on Centreline.									8
			<ul style="list-style-type: none"> <li>The soil was frozen to a depth 1.2 m.</li> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole terminated at a depth of 2.1 m.</li> </ul>									10
3												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



## TESTHOLE RECORD TH02

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Renfrew Bay Alley between Taylor Ave and CNR Tracks ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	43						
					AS	36						2
1		CL ML	Clayey Silt - tan, soft, moist, medium plasticity - trace fine to medium sand  Particle Size Analysis at 0.9 m: 0.0% Gravel 6.9% Sand, 67.9% Silt, 25.2% Clay		AS	28						
					AS	29						4
					AS	28						
2		CH	Clay - brown, stiff, moist, high plasticity		AS	39						6
					AS	40						
3			TESTHOLE LOCATION: 153.0 m South of Taylor Avenue, approximately 9.0 m East from property line 964 and 966 / 968 Renfrew Bay on 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. • Testhole terminated at a depth of 2.1 m.									8
												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



## TESTHOLE RECORD TH03

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Renfrew Bay Alley between Taylor Ave and CNR Tracks ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	39						
					AS	27						2
1		CH	Clay - brown, firm, moist, high plasticity - some silt		AS	30						
					AS	30						4
					AS	35						
					AS	43						6
2					AS	39						
			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.  • 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.									8
3												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☐ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



## TESTHOLE RECORD TH04

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Renfrew Bay Alley between Taylor Ave and CNR Tracks ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0			Concrete		CORE							0
			Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	40						
					AS	35						2
1			Clay - brown, firm, moist, high plasticity - some silt below		AS	34						
					AS	34						4
					AS	35						
2					AS	40						6
					AS	40						
3			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. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☐ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



**TESTHOLE RECORD TH05**

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Renfrew Bay Alley between Taylor Ave and CNR Tracks ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	34						2
		CH	Clay - brown, stiff, moist, high plasticity		AS	35						2
1		CH			AS	35						4
		CH			AS	38						4
		CH			AS	37						6
2		CH			AS	42						6
		CH			AS	40						12
3			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. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.									10

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



## TESTHOLE RECORD TH06

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Renfrew Bay Alley between Taylor Ave and CNR Tracks ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	26						2
		CH	Clay - brown, stiff, moist, high plasticity		AS	30						2
1		CH			AS	37						4
		CH			AS	39						4
		CH			AS	40						6
2		CH			AS	43						6
		CH			AS	48						12
3			<p>TESTHOLE LOCATION: 40.0 m South of Taylor Avenue on East side of Renfrew Bay Alley on Centreline.</p> <ul style="list-style-type: none"> <li>The soil was frozen to a depth 1.1 m.</li> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole terminated at a depth of 2.1 m.</li> </ul>									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



**TESTHOLE RECORD TH07**

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Renfrew Bay Alley between Taylor Ave and CNR Tracks ELEVATION \_\_\_\_\_  
 DRILLING DATE December 17, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0		CO	Concrete		CORE							0
		CH	Clay Fill - black, firm, moist, high plasticity - trace organic material		AS	37						
		CH			AS	40						2
1		CH			AS	31						
		CL ML	Clayey Silt - tan, soft, moist, medium plasticity - trace fine to medium sand		AS	24						4
		CL ML			AS	26						
2		CL ML			AS	22						6
		CL ML			AS	22						
3			TESTHOLE LOCATION: 15.0 m South of Taylor Avenue on East side of Renfrew Bay Alley on Centreline.  • The soil was frozen to a depth 1.1 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.									8
												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal





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



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

**PARTICLE SIZE ANALYSIS  
ASTM D422**

KGS Group Inc.  
3rd Floor - 865 Waverley St.  
Winnipeg, Manitoba  
R3T 5P4

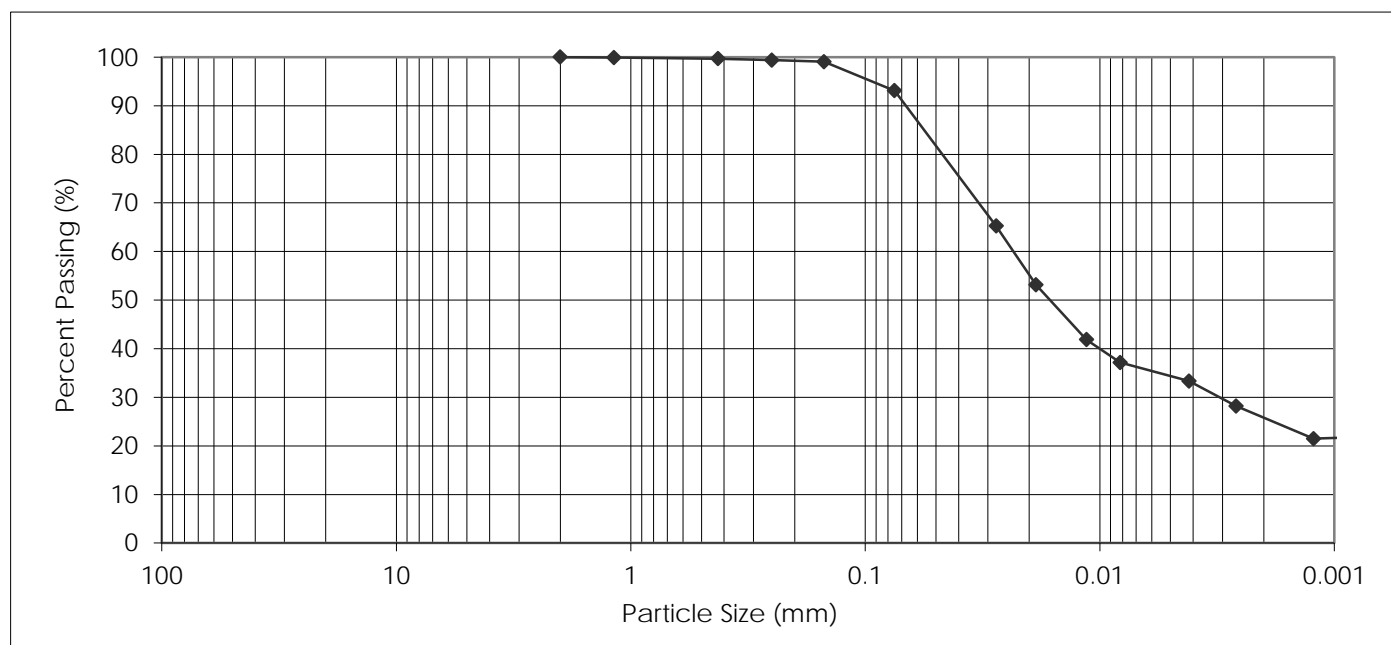
PROJECT: 2015 City of Winnipeg Alley Package  
Contract (15-RL-01)  
Renfrew Bay Alley between  
Taylor Avenue and CNR Tracks

Attention: 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.



PARTICLE SIZE	PERCENT PASSING	PARTICLE SIZE	PERCENT 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

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.0	0.3	6.6	67.9	25.2	21.6

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**

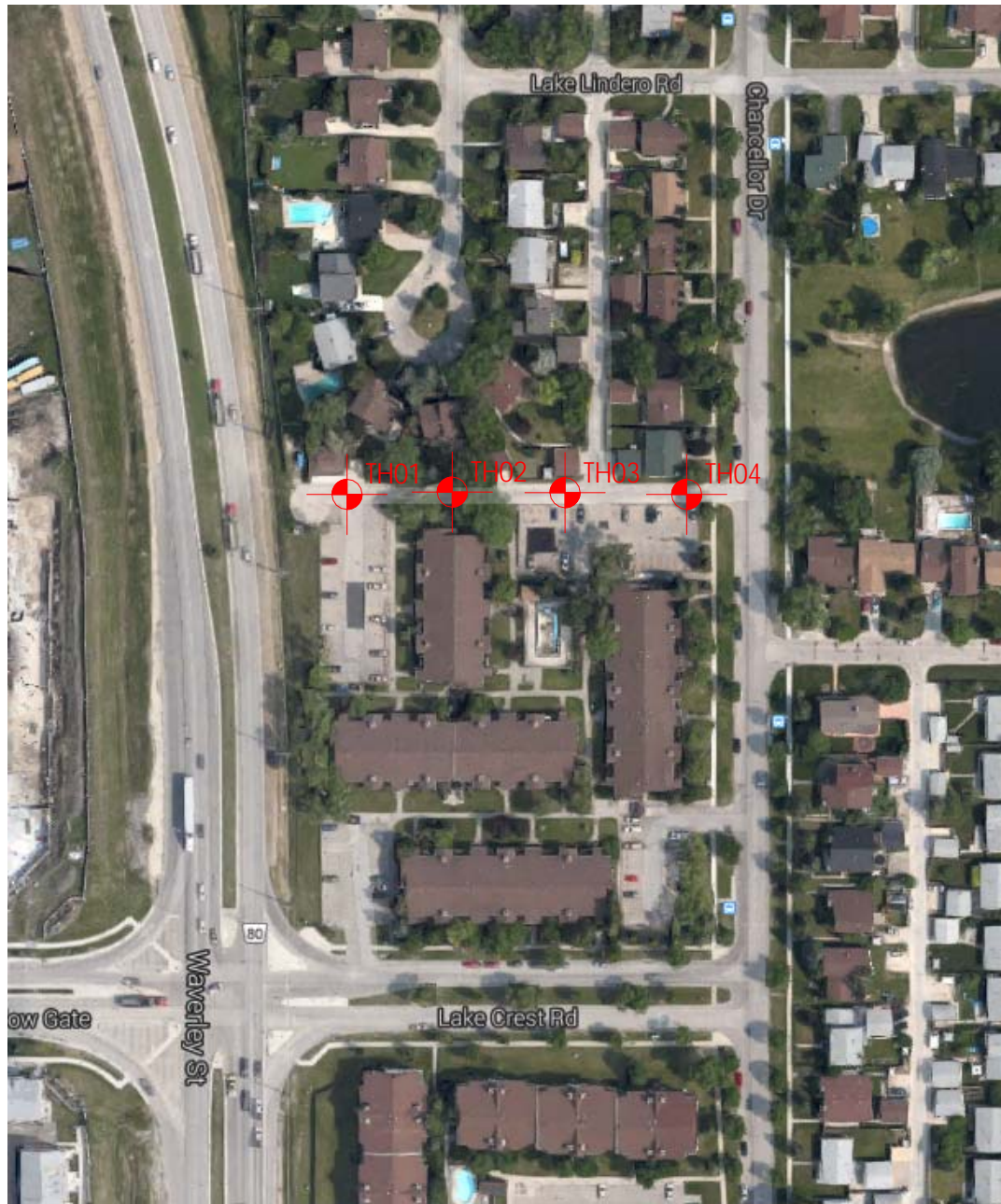


Prepared for:  
KGS Group Inc.  
3rd Floor - 865 Waverley Street  
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Prepared by:  
Stantec Consulting Ltd.  
199 Henlow Bay  
Winnipeg, Manitoba  
R3Y 1G4

January 23, 2015  
Project No. 123311678





Project No. 123311678

Drawn by: SB

Figure: 1

Date: January 9, 2015

Reviewed by: GL

Scale: NTS

**Testhole Location Plan**  
**2015 City of Winnipeg Alley Package**  
**Contract (15-RL-01)**  
**Chancellor Dr and Waverley St Alley**  
**between Lake Lindero Rd and Lake Crest Rd**



**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**

[illegible]

**TESTHOLE RECORD TH01**

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Chancellor Dr and Waverley St Alley between Lake Lindero Rd and Lake Crest Rd ELEVATION \_\_\_\_\_  
 DRILLING DATE December 19, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete		CORE							0
	CH		Clay Fill - brown, firm, moist, high plasticity - trace fine to coarse sand		AS	29						
			Clay - brown, stiff, moist, high plasticity		AS	31						2
1					AS	31						
	CH				AS	28						4
					AS	29						
2					AS	34						6
					AS	39						
3			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 observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.									12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal

## TESTHOLE RECORD TH02

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Chancellor Dr and Waverley St Alley between Lake Lindero Rd and Lake Crest Rd ELEVATION \_\_\_\_\_  
 DRILLING DATE December 19, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	CO		Concrete	CORE								0
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material	AS	30							
	CL		Clayey Silt - tan, soft, moist, medium plasticity - trace fine to medium sand	AS	19							2
1	ML		Particle Size Analysis at 0.9 m: 0.0% Gravel, 10.0% Sand, 63.9% Silt, 26.1% Clay	AS	19							
				AS	17							4
	CH		Clay - brown, stiff, moist, high plasticity - some silt below 2.0 m	AS	29							
2				AS	33							6
				AS	32							
3			TESTHOLE LOCATION: 90.0 m West of Chancellor Drive on Centreline.  • 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.									8
												10
												12

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



## TESTHOLE RECORD TH03

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Chancellor Dr and Waverley St Alley between Lake Lindero Rd and Lake Crest Rd ELEVATION \_\_\_\_\_  
 DRILLING DATE December 19, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA


DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)	
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0	AS	Asphalt										0	
	CO	Concrete		CORE									
	CH	Clay - brown, firm, moist, high plasticity - stiff below 0.9 m - some silt below 2.0 m		AS	31								
			AS	34									2
			AS	36									
1			AS	38									4
			AS	40									
			AS	42									6
2			AS	38									
		TESTHOLE LOCATION: 55.0 m West of Chancellor Drive on Centreline.  • 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.										8	
3												10	
												12	

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☐ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



## TESTHOLE RECORD TH04

CLIENT KGS Group Inc. PROJECT No. 123311678  
 PROJECT 2015 City of Winnipeg Alley Package Contract 1 (15-RL-01) DATUM \_\_\_\_\_  
 LOCATION Chancellor Dr and Waverley St Alley between Lake Lindero Rd and Lake Crest Rd ELEVATION \_\_\_\_\_  
 DRILLING DATE December 19, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa) <input checked="" type="checkbox"/>				DEPTH (ft)			
					TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa				
0	AS		Asphalt	CORE								0			
	CO		Concrete												
	CH		Clay - brown, firm, moist, high plasticity - stiff below 0.9 m - trace silt below 1.4 m		AS	38									
					AS	40									2
					AS	39									
1					AS	41									4
					AS	44									
2	AS	49									6				
	AS	51													
3			TESTHOLE LOCATION: 15.0 m West of Chancellor Drive on Centreline.  • 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.									12			

Sample Type: GS - Grab Sample    SPT - Standard Penetration Test  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: ☒ Bentonite    ☒ Drill Cuttings    ☒ Sand

Logged by: Nestor Abarca

Reviewed by: German Leal



Core sample from Testhole TH1



Core sample from Testhole TH2





Core sample from Testhole TH3



Core sample from Testhole TH4



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

**PARTICLE SIZE ANALYSIS  
ASTM D422**

KGS Group Inc.  
3rd Floor - 865 Waverley St.  
Winnipeg, Manitoba  
R3T 5P4

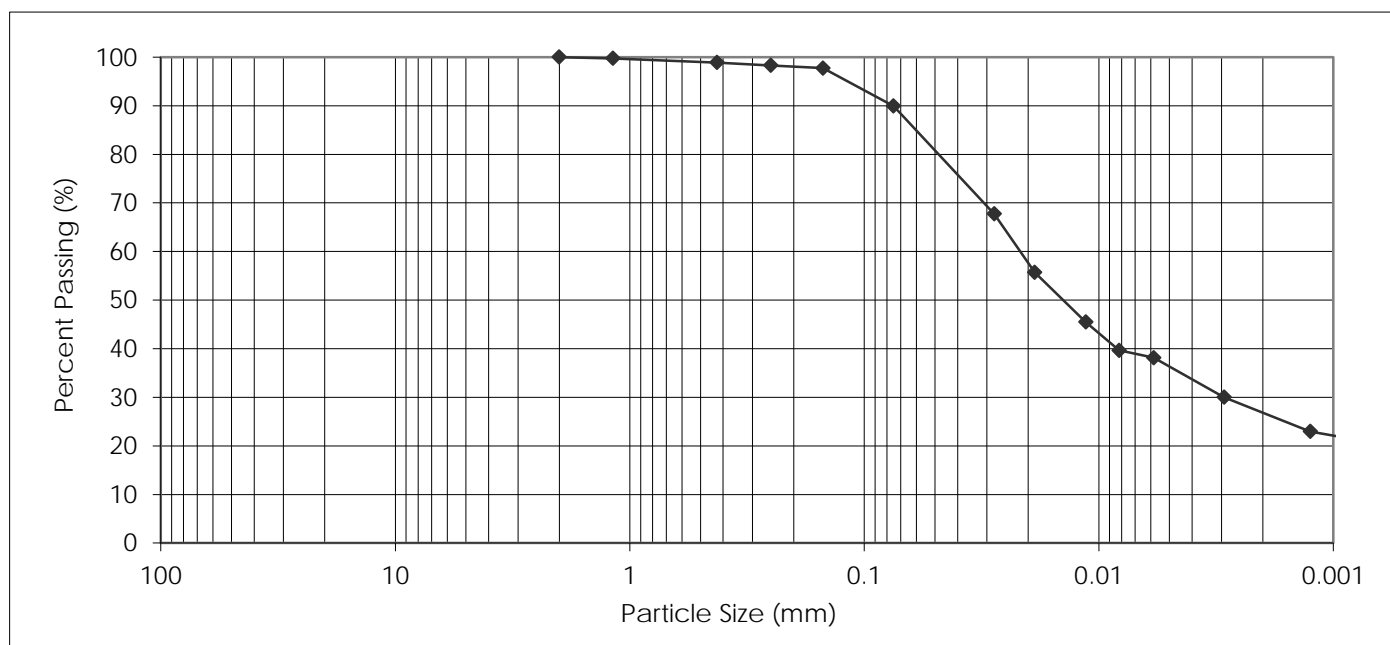
PROJECT: 2015 City of Winnipeg Alley Package  
Contract (15-RL-01)  
Chancellor Dr and Waverley St Alley between  
Lake Lindero Rd and Lake Crest Rd

Attention: 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.



PARTICLE SIZE	PERCENT PASSING	PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0	1.18 mm	99.7
25.00 mm	100.0	0.425 mm	98.9
19.00 mm	100.0	0.250 mm	98.3
16.00 mm	100.0	0.150 mm	97.8
12.50 mm	100.0	0.075 mm	90.0
9.50 mm	100.0	0.005 mm	35.8
4.75 mm	100.0	0.002 mm	26.1
2.00 mm	100.0	0.001 mm	22.0

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.0	1.1	8.9	63.9	26.1	22.0

January 19, 2015



REVIEWED BY: German E. Leal, B.Sc., P. Eng.