

APPENDIX 'A'

GEOTECHNICAL REPORT

APPENDIX 'A' - GEOTECHNICAL REPORT

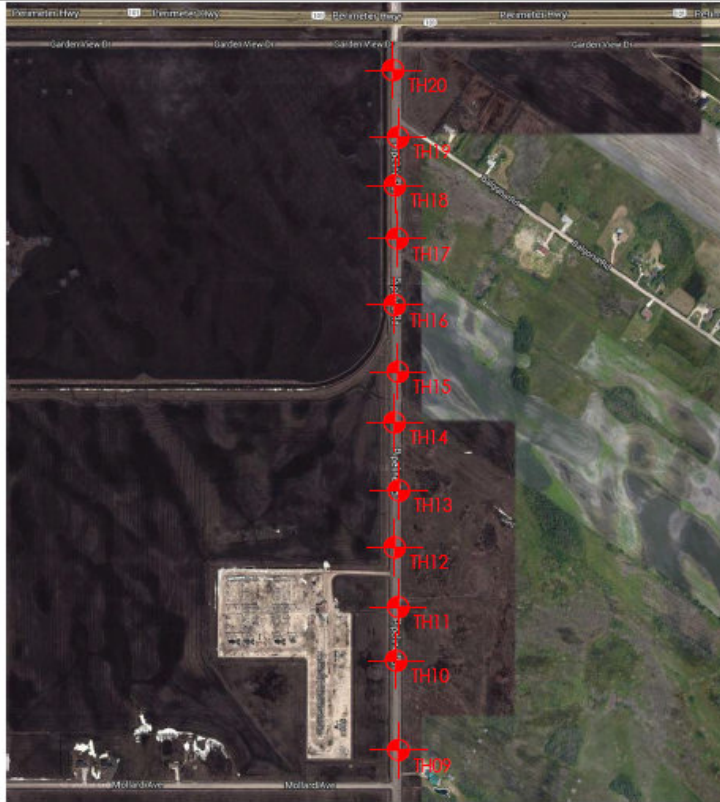
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The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure and/or soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. 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.

Geotechnical Report for PIPELINE ROAD

Test Hole Locations



Project No. 123311237

Drawn by: SB

Figure: 2

Date: June 3, 2014

Reviewed by: GL

Scale: NTS

**Testhole Location Plan
 Pipeline Road
 Winnipeg, MB**

Test Hole Log for TH09

TESTHOLE TH09



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
Project Location: Winnipeg, MB
Client: KGS Group Inc.
Drilling Contractor: Paddock Drilling Ltd.
Drilling Method: 150 mm Solid Stem Auger
UTM Coordinates: 14U 631859.0 m E, 5537590.0 m N

Date Drilled: May 28, 2014
Depth of Testhole: 3.0 m
Logged by: Sothea Bun
Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	Water Content (%)			
				25	50	75	100
0.0 - 0.9		Granular Fill - 20 mm maximum aggregate size	BS 5 BS 9 BS 9				
0.9 - 2.1		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS 10 BS 15 BS 21				
2.1 - 3.0		Clay - brown, stiff, moist, high plasticity	BS 33 BS 32 BS 41 BS 47 BS 50				
<ul style="list-style-type: none"> • Minor groundwater seepage was observed at a depth of 0.9 m. • Soil sloughing observed in the silt at a depth of 0.9 m. • Testhole terminated at a depth of 3.0 m. 							

Test Hole Log for TH10

TESTHOLE TH10



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
Project Location: Winnipeg, MB
Client: KGS Group Inc.
Drilling Contractor: Paddock Drilling Ltd.
Drilling Method: 150 mm Solid Stem Auger
UTM Coordinates: 14U 631850.0 m E, 5537756.0 m N

Date Drilled: May 28, 2014
Depth of Testhole: 3.0 m
Logged by: Sothea Bun
Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	● Water Content (%)			
				25	50	75	100
0.0 - 0.2		Granular Fill - 20 mm maximum aggregate size	BS	4			
0.2 - 0.8		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel	BS	26			
0.8 - 1.0		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS	26			
1.0 - 1.2		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS	34			
1.2 - 1.8		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS	21			
1.8 - 2.2		Clay - brown, stiff, moist, high plasticity	BS	18			
2.2 - 2.8		Clay - brown, stiff, moist, high plasticity	BS	35			
2.8 - 3.0		Clay - brown, stiff, moist, high plasticity	BS	37			
3.0 - 3.2		Clay - brown, stiff, moist, high plasticity	BS	35			
3.2 - 3.4		Clay - brown, stiff, moist, high plasticity	BS	45			
3.4 - 3.6		Clay - brown, stiff, moist, high plasticity	BS	46			
		<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 					

Test Hole Log for TH11

TESTHOLE TH11



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
 Project Location: Winnipeg, MB
 Client: KGS Group Inc.
 Drilling Contractor: Paddock Drilling Ltd.
 Drilling Method: 150 mm Solid Stem Auger
 UTM Coordinates: 14U 631854.0 m E, 5537886.0 m N

Date Drilled: May 28, 2014
 Depth of Testhole: 3.0 m
 Logged by: Sothea Bun
 Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	Water Content (%)			
				25	50	75	100
0		Granular Fill - 20 mm maximum aggregate size	BS	5			
		Clay Fill - black, firm, moist, medium plasticity	BS	19			
1		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS	28			
			BS	30			
			BS	25			
2		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS	21			
			BS	29			
			BS	35			
3		Clay - brown, stiff, moist, high plasticity	BS	43			
			BS	42			
			BS	50			
		<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 					

Test Hole Log for TH12

TESTHOLE TH12



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
Project Location: Winnipeg, MB
Client: KGS Group Inc.
Drilling Contractor: Paddock Drilling Ltd.
Drilling Method: 150 mm Solid Stem Auger
UTM Coordinates: 14U 631843.0 m E, 5538019.0 m N

Date Drilled: May 28, 2014
Depth of Testhole: 3.0 m
Logged by: Sothea Bun
Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	Water Content (%)			
				25	50	75	100
0.0 - 0.2		Granular Fill - 20 mm maximum aggregate size	BS 3				
0.2 - 0.8		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel	BS 6 BS 26				
0.8 - 1.4		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS 33				
1.4 - 1.8		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS 31 BS 22				
1.8 - 2.4		Clay - brown, stiff, moist, high plasticity	BS 24 BS 25				
2.4 - 3.0		Clay - brown, stiff, moist, high plasticity	BS 41 BS 41				
<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 							

Test Hole Log for TH13

TESTHOLE TH13



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
 Project Location: Winnipeg, MB
 Client: KGS Group Inc.
 Drilling Contractor: Paddock Drilling Ltd.
 Drilling Method: 150 mm Solid Stem Auger
 UTM Coordinates: 14U 631847.0 m E, 5538133.0 m N

Date Drilled: May 28, 2014
 Depth of Testhole: 3.0 m
 Logged by: Sothea Bun
 Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	Particle Size Distribution				Water Content (%)	
				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	PL	LL
0.0 - 0.2		Granular Fill - 20 mm maximum aggregate size	BS					3	
0.2 - 0.4		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel	BS					29	
0.4 - 0.6		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS	0.0	2.8	30.1	67.1	33	
0.6 - 0.8		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS					35	
0.8 - 1.0		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS					28	
1.0 - 1.2		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS					29	
1.2 - 1.4		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS					21	
1.4 - 1.6		Clay - brown, firm, moist, high plasticity	BS					39	
1.6 - 1.8		Clay - brown, firm, moist, high plasticity	BS					42	
1.8 - 2.0		Clay - brown, firm, moist, high plasticity	BS					37	
2.0 - 2.2		Clay - brown, firm, moist, high plasticity	BS					47	
		<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 							

Test Hole Log for TH14

TESTHOLE TH14



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
Project Location: Winnipeg, MB
Client: KGS Group Inc.
Drilling Contractor: Paddock Drilling Ltd.
Drilling Method: 150 mm Solid Stem Auger
UTM Coordinates: 14U 631836.0 m E, 5538287.0 m N

Date Drilled: May 28, 2014
Depth of Testhole: 3.0 m
Logged by: Sothea Bun
Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	Water Content (%)			
				25	50	75	100
0.0 - 0.5		Granular Fill - 20 mm maximum aggregate size	BS-4				
0.5 - 1.0		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel	BS-3				
1.0 - 1.2		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS-18				
1.2 - 1.4		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS-30				
1.4 - 1.6			BS-22				
1.6 - 1.8			BS-21				
1.8 - 2.0		Clay - brown, firm, moist, high plasticity	BS-31				
2.0 - 2.2			BS-35				
2.2 - 2.4			BS-44				
2.4 - 2.6			BS-52				
2.6 - 2.8			BS-50				
2.8 - 3.0		<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 					

Test Hole Log for TH015

TESTHOLE TH15



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
Project Location: Winnipeg, MB
Client: KGS Group Inc.
Drilling Contractor: Paddock Drilling Ltd.
Drilling Method: 150 mm Solid Stem Auger
UTM Coordinates: 14U 631836.0 m E, 5538415.0 m N

Date Drilled: May 28, 2014
Depth of Testhole: 3.0 m
Logged by: Sothea Bun
Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	Water Content (%)			
				25	50	75	100
0.0 - 0.2		Granular Fill - 20 mm maximum aggregate	BS	6			
0.2 - 0.8		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel	BS	17			
0.8 - 1.0		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS	33			
1.0 - 1.2		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS	31			
1.2 - 2.5		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS	33			
2.5 - 2.8		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS	25			
2.8 - 3.0		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS	21			
3.0 - 3.2		Clay - brown, firm, moist, high plasticity	BS	21			
3.2 - 3.4		Clay - brown, firm, moist, high plasticity	BS	34			
3.4 - 3.6		Clay - brown, firm, moist, high plasticity	BS	36			
3.6 - 3.8		Clay - brown, firm, moist, high plasticity	BS	45			
<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 							

Test Hole Log for TH16

TESTHOLE TH16		Stantec									
Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy Project Location: Winnipeg, MB Client: KGS Group Inc. Drilling Contractor: Paddock Drilling Ltd. Drilling Method: 150 mm Solid Stem Auger UTM Coordinates: 14U 631829.0 m E, 5538537.0 m N					Date Drilled: May 28, 2014 Depth of Testhole: 3.0 m Logged by: Sothea Bun Reviewed by: German Leal						
Depth (m)	Symbol	Description	Sample Type	Particle Size Distribution				Water Content (%)			
				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	PL		LL	
1		Granular Fill - 20 mm maximum aggregate size	BS					3			
			BS					8			
		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel	BS	1.0	6.4	32.8	59.8	26			
			BS					26			
			BS					27			
2		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS					24			
			BS					7			
		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS					32			
			BS					33			
3		Clay - brown, stiff, moist, high plasticity	BS					40			
			BS					49			
			BS								
<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 											

Test Hole Log for TH17

TESTHOLE TH17



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
 Project Location: Winnipeg, MB
 Client: KGS Group Inc.
 Drilling Contractor: Paddock Drilling Ltd.
 Drilling Method: 150 mm Solid Stem Auger
 UTM Coordinates: 14U 631832.0 m E, 5538663.0 m N

Date Drilled: May 28, 2014
 Depth of Testhole: 3.0 m
 Logged by: Sothea Bun
 Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	Water Content (%)			
				25	50	75	100
0.0 - 0.2		Granular Fill - 20 mm maximum aggregate size	BS	5			
0.2 - 0.8		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel	BS	21			
0.8 - 1.0		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS	25			
1.0 - 1.5		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS	33			
1.5 - 2.0		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS	23			
2.0 - 2.5		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS	22			
2.5 - 3.0		Clay - brown, stiff, moist, high plasticity	BS	23			
3.0 - 3.3		Clay - brown, stiff, moist, high plasticity	BS	32			
3.3 - 3.5		Clay - brown, stiff, moist, high plasticity	BS	37			
3.5 - 3.8		Clay - brown, stiff, moist, high plasticity	BS	40			
3.8 - 4.0		Clay - brown, stiff, moist, high plasticity	BS	38			
		<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 					

Test Hole Log for TH18

TESTHOLE TH18



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
Project Location: Winnipeg, MB
Client: KGS Group Inc.
Drilling Contractor: Paddock Drilling Ltd.
Drilling Method: 150 mm Solid Stem Auger
UTM Coordinates: 14U 631822.0 m E, 5538791.0 m N

Date Drilled: May 28, 2014
Depth of Testhole: 3.0 m
Logged by: Sothea Bun
Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	● Water Content (%)			
				25	50	75	100
1		Granular Fill - 20 mm maximum aggregate size	BS	3			
			BS	8			
2		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel	BS	27			
			BS	27			
			BS	35			
			BS	23			
3		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS	23			
			BS	23			
			BS	23			
3		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand	BS	24			
			BS	36			
3		Clay - brown, stiff, moist, high plasticity	BS	34			
			BS	34			
		<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 					

Test Hole Log for TH19

TESTHOLE TH19



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
Project Location: Winnipeg, MB
Client: KGS Group Inc.
Drilling Contractor: Paddock Drilling Ltd.
Drilling Method: 150 mm Solid Stem Auger
UTM Coordinates: 14U 631828.0 m E, 5538879.0 m N

Date Drilled: May 28, 2014
Depth of Testhole: 3.0 m
Logged by: Sothea Bun
Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	Water Content (%)			
				25	50	75	100
1		Granular Fill - 20 mm maximum aggregate size Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel	BS-4				
			BS-24				
	BS-22						
	BS-21						
2		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS-29				
			BS-34				
	BS-35						
3		Silt - tan, soft, moist, low plasticity - trace fine to coarse sand Clay - brown, stiff, moist, high plasticity	BS-21				
			BS-24				
	BS-27						
		<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 	BS-37				

Test Hole Log for TH20

TESTHOLE TH20



Project Name: Pipeline Road between Templeton Ave and the Perimeter Hwy
 Project Location: Winnipeg, MB
 Client: KGS Group Inc.
 Drilling Contractor: Paddock Drilling Ltd.
 Drilling Method: 150 mm Solid Stem Auger
 UTM Coordinates: 14U 631817.0 m E, 5539026.0 m N

Date Drilled: May 28, 2014
 Depth of Testhole: 3.0 m
 Logged by: Sothea Bun
 Reviewed by: German Leal

Depth (m)	Symbol	Description	Sample Type	Water Content (%)			
				25	50	75	100
1		Granular Fill - 20 mm maximum aggregate size	BS	3			
			BS	17			
			BS	17			
2		Silty Clay - black, firm, moist, medium plasticity - trace fine to coarse sand	BS	28			
			BS	25			
			BS	32			
			BS	38			
			BS	23			
3		Clay - brown, firm, moist, high plasticity	BS	22			
			BS	27			
			BS	43			
		<ul style="list-style-type: none"> No groundwater seepage or soil sloughing was observed during or upon completion of drilling. Testhole terminated at a depth of 3.0 m. 					

Particle Size Analysis for PIPELINE ROAD TH13



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

PARTICLE SIZE ANALYSIS
 ASTM D422

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

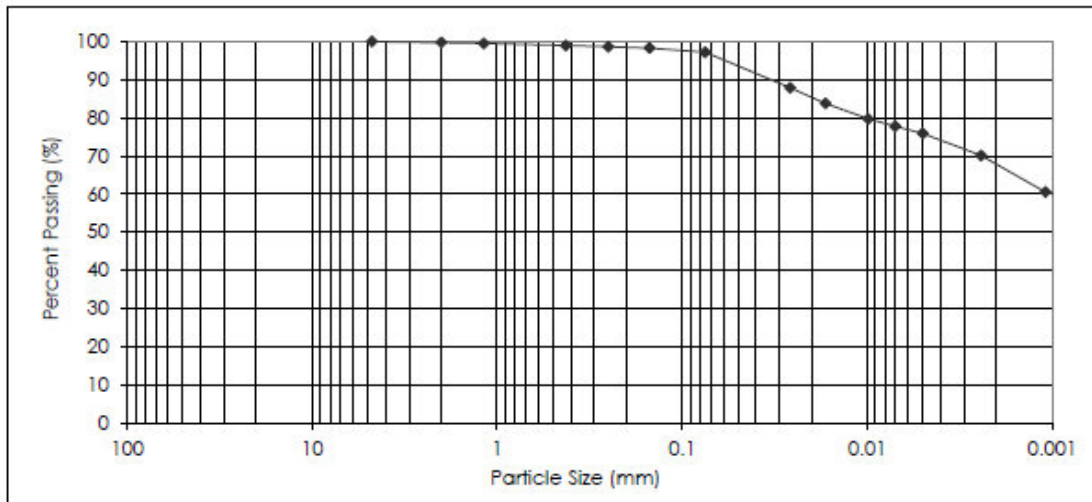
PROJECT: Pipeline Road between
 Templeton Avenue and the
 Perimeter Highway

Attention: Michael Turko

PROJECT NO.: 123311237

SAMPLED BY: Sothea Bun
 SAMPLE ID: TH13 @ 0.6 m

DATE RECEIVED: May 28, 2014
 TESTED BY: Sothea Bun



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		99.0	
19.00 mm		100.0		0.250 mm		98.7	
16.00 mm		100.0		0.150 mm		98.3	
12.50 mm		100.0		0.075 mm		97.2	
9.50 mm		100.0		0.005 mm		75.9	
4.75 mm		100.0		0.002 mm		67.1	
2.00 mm		99.7		0.001 mm		60.1	
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	0.3	0.7	1.8	30.1	67.1	60.1	

June 16, 2014

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.

Particle Size Analysis for PIPELINE ROAD TH16



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

PARTICLE SIZE ANALYSIS
ASTM D422

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

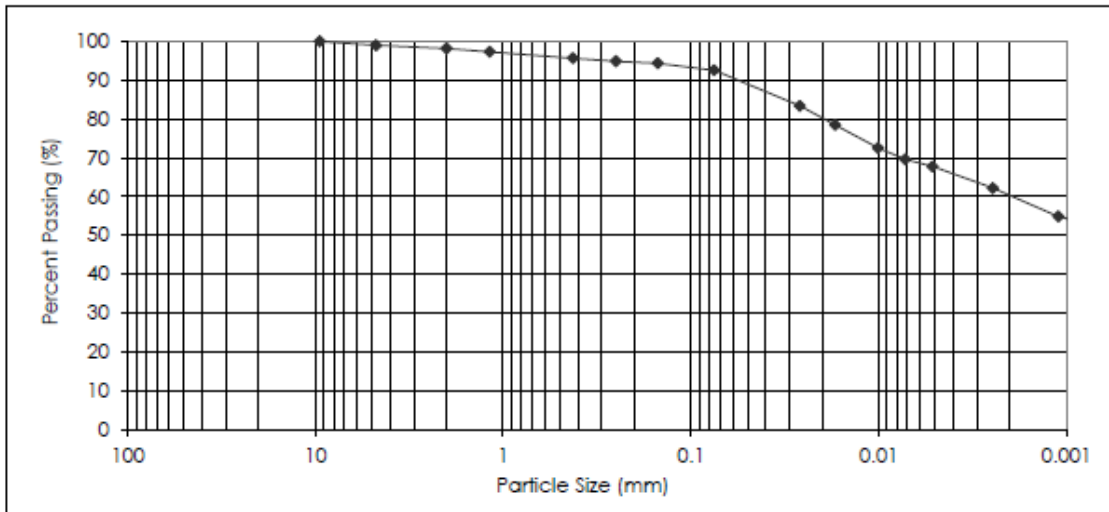
PROJECT: Pipeline Road between
 Templeton Avenue and the
 Perimeter Highway

Attention: Michael Turko

PROJECT NO.: 123311237

SAMPLED BY: Sothea Bun
 SAMPLE ID: TH16 @ 0.6 m

DATE RECEIVED: May 28, 2014
 TESTED BY: Sothea Bun



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	99.0
2.00 mm	98.2

PARTICLE SIZE	PERCENT PASSING
1.18 mm	97.3
0.425 mm	95.7
0.250 mm	94.9
0.150 mm	94.3
0.075 mm	92.6
0.005 mm	67.5
0.002 mm	59.8
0.001 mm	54.4

Gravel, % 75 to 475 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			
1.0	0.8	2.5	3.1	32.8	59.8	54.4

June 16, 2014

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