APPENDIX ‘A’

GEOTECHNICAL REPORT

Quality Engineering | Valued Relationships

KGS Group

2017 Industrial Street Rehabilitation
Sub-Surface Investigation

Prepared for:

KGS Group
3rd Floor, 865 Waverley Street
Winnipeg, MB R3T 5P4
Attention: Jarrod Boscow

Project Number:
0012-006-00

Date:
May 25, 2017
Final Report

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TREK GEOTECHNICAL

Quality Engineering | Valued Relationships

May 25, 2017

Our File No. 0012-006-00

Jarrod Boscow, P.Eng.
KGS Group
3rd Floor, 865 Waverley Street
Winnipeg, MB R3T 5P4

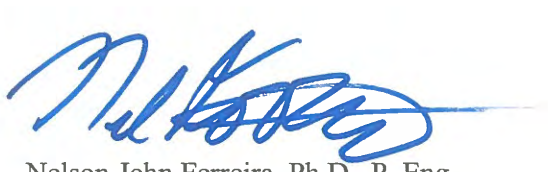
RE: 2017 Industrial Street Rehabilitation
Sub-Surface Investigation Report

TREK Geotechnical Inc. is pleased to submit our report for the sub-surface investigations for the 2017 Industrial Street Rehabilitation project.

Please contact the undersigned if you have any questions. Thank you for the opportunity to serve you on this assignment.

Sincerely,

TREK Geotechnical Inc.
Per:



Nelson John Ferreira, Ph.D., P. Eng.
Geotechnical Engineer, Principal
Tel: 204.975.9433 ext. 103

cc: Shane Broderick, Assistant Lab and Field Services Manager, (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	SGBR	May 25, 2017	Final Report

Authorization Signatures

Prepared By:

Shane Broderick, Assistant Lab and Field Services Manager.

Reviewed By:

Nelson John Ferreira, Ph.D., P.Eng.
Geotechnical Engineer

APEGM Certificate of Authorization
Trek Geotechnical Inc.
No. 4877 Date: May 25, 2017

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1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for the 2017 Industrial Street Rehabilitation Program. The streets investigation includes Bournais Drive, Beghin Avenue, De Baets Street and Paquin Road in the St. Boniface Industrial Park area and St Matthews Avenue. The information collected describes the pavement structure of the existing road as well as the soil stratigraphy beneath the pavement structure.

2.0 Sub-Surface Investigation and Laboratory Program

For each street, test holes were drilled approximately every 50 m of street length with specific locations shown in Figure 1 and Figure 2. The test holes were drilled to determine sub-surface conditions for use in design and construction of the roads.

The sub-surface investigation was conducted between April 24th and April 27, 2017. The test holes were drilled to a depth of 3.1 m below road surface by Paddock Drilling Ltd. using a Canterra CT 250 truck mounted drill rig equipped with 125 mm diameter solid stem augers. The pavement structure (asphalt or concrete) was cored by Paul Bevel of Trek Geotechnical, using a portable coring press equipped with a hollow 150 mm diameter diamond core drill bit. The sub-surface conditions were observed during drilling were visually classified by Shane Broderick of TREK. Other pertinent information such as groundwater and drilling conditions were also recorded during drilling. Disturbed (auger cuttings) samples retrieved during the sub-surface investigation were transported to TREK's material testing laboratory for further testing. Core samples were also retrieved and logged at TREK's material testing laboratory.

The laboratory testing program consisted of moisture content determination, Atterberg limits, and grain size analysis (mechanical sieve and hydrometer methods). Information gathered for the St. Boniface Area (Appendix A) and St. Matthews Avenue (Appendix B) are included in separate appendices. The information provided in the Appendices includes test hole logs, laboratory testing summary tables, and photos of the pavement cores.

Test hole locations are noted on the test hole logs and shown on Figure 01 and Figure 02 based on measured distances from the nearest address, edge of pavement or other permanent features.

3.0 Closure

The geotechnical information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The findings of this report were based on information provided (field investigation and laboratory testing). Soil conditions are natural deposits that can be highly variable across a site. If subsurface conditions are different than the conditions previously encountered on-site or those presented here, we should be notified to adjust our findings if necessary.

All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and you are not already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

This report has been prepared by TREK Geotechnical Inc. (the Consultant) for the exclusive use of KGS Group (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

Figures

TREK GEOTECHNICAL

0012 006 00
KGS Group
2017 Industrial Streets - St. Boniface Industrial Park

ANSI full bleed B (11.00 x 17.00 Inches)

Z:\Projects\0012 KGS Group\0012 006 000 2017 Industrial Streets\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder, 5/25/2017 8:21:31 AM

0 50 100 150 m
SCALE = 1 : 3 000 (279 mm x 432 mm)

LEGEND: TEST HOLE (TREK, 2017)

NOTES:
1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016.

Figure 01
Test Hole Location Plan

TREK GEOTECHNICAL

0012 006 00
KGS Group
2017 Industrial Streets

0 50 100 150 m
SCALE = 1 : 2 500 (279 mm x 432 mm)

LEGEND: TEST HOLE (TREK, 2017)

NOTES:
1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016.

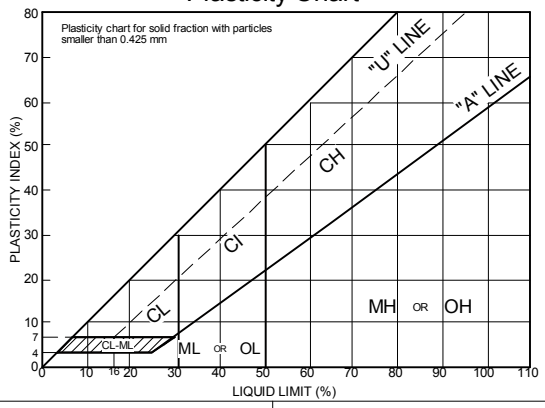
Figure 02
Test Hole Location Plan

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

1. Classifications are based on the United Soil Classification System and include consistency, moisture, and color. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate.
2. Descriptions on these test hole logs apply only at the specific test hole locations and at the time the test holes were drilled. Variability of soil and groundwater conditions may exist between test hole locations.
3. When the following classification terms are used in this report or test hole logs, the primary and secondary soil fractions may be visually estimated.

Major Divisions			USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	Clean gravel (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols* — $C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 — Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits above "A" line or P.I. greater than 7
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 — Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	Atterberg limits above "A" line or P.I. greater than 7
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and Clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt		Peat and other highly organic soils	Von Post Classification Limit — Strong colour or odour, and often fibrous texture



Particle Size			Material
ASTM Sieve sizes	mm		
#10 to #4	2.00 to 4.75		Sand
#40 to #10	0.425 to 2.00		Coarse
#200 to #40	0.075 to 0.425		Medium
< #200	< 0.075		Fine
			Silt or Clay

Particle Size			Material
ASTM Sieve Sizes	mm		
> 12 in.	> 300		Boulders
3 in. to 12 in.	75 to 300		Cobbles
3/4 in. to 3 in.	19 to 75		Gravel
#4 to 3/4 in.	4.75 to 19		Coarse
			Fine

* Borderline classifications used for soils possessing characteristics of two groups are designated by combinations of groups symbols. For example; GW-GC, well-graded gravel-sand mixture with clay binder.

Other Symbol Types

	Asphalt		Bedrock (undifferentiated)		Cobbles
	Concrete		Limestone Bedrock		Boulders and Cobbles
	Fill		Cemented Shale		Silt Till
			Non-Cemented Shale		Clay Till

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)
PL - Plastic Limit (%)
PI - Plasticity Index (%)
MC - Moisture Content (%)
SPT - Standard Penetration Test
RQD - Rock Quality Designation
Qu - Unconfined Compression
Su - Undrained Shear Strength
VW - Vibrating Wire Piezometer
SI - Slope Inclinometer

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

TERM	EXAMPLES	PERCENTAGE
and	and CLAY	35 to 50 percent
"y" or "ey"	clayey, silty	20 to 35 percent
some	some silt	10 to 20 percent
trace	trace gravel	1 to 10 percent

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

The Standard Penetration Test blow count (N) of a non-cohesive soil can be related to compactness condition as follows:

Descriptive Terms	SPT (N) (Blows/300 mm)
Very loose	< 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	> 50

The Standard Penetration Test blow count (N) of a cohesive soil can be related to its consistency as follows:

Descriptive Terms	SPT (N) (Blows/300 mm)
Very soft	< 2
Soft	2 to 4
Firm	4 to 8
Stiff	8 to 15
Very stiff	15 to 30
Hard	> 30

The undrained shear strength (Su) of a cohesive soil can be related to its consistency as follows:

Descriptive Terms	Undrained Shear Strength (kPa)
Very soft	< 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very stiff	100 to 200
Hard	> 200

Appendix A

Test Hole Logs, Lab Testing Summary & Pavement Core Photos - Bournais Drive, Beghin Avenue, De Baets Street and Paquin Road

Sub-Surface Log

Test Hole TH17-01
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640592, E-5528105
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	26 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (190 mm THICK)		C01
0.5		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular to sub-rounded - poorly graded fine sand to fine gravel (<20 mm dia.) - "pit run"		G08
1.0		CLAY (Fill) - silty, trace sand, trace gravel (<20 mm dia.), trace organics - mottled black to grey - moist, stiff to very stiff - high plasticity		G09 G10
1.5		CLAY - silty, trace sand, trace precipitates (sulphates, <20 mm dia.), trace organics between 1.2 m and 1.7 m, silt inclusions (<20 mm dia.) below 1.2 m - mottled dark brown to green - moist, stiff to very stiff - high plasticity		G11 G12 G13
2.0				
2.5				G14
3.0				G15

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on Bournais Drive, 340 m north from Dugald Road, southbound lane, 1.7 m east from west curb. (5528105m N 640592m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-02
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640576, E-5528022
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	26 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (190 mm THICK)		C02
		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular to sub-rounded - poorly graded fine sand to fine gravel (<20 mm dia.), "pit run"		G01a
0.5		CLAY (Fill) - some silt - mottled dark grey to black - moist, stiff to very stiff - high plasticity		G01
				G02
1.0		- silty below 0.9 m		G03
				G04
1.5				G05
		CLAY - some silt, trace sand, trace gravel, trace precipitates (sulphates, <10 mm dia.), trace oxidation - mottled brown - moist, firm to stiff - high plasticity		G06
2.0				
2.5				
3.0				G07

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ | ✤ Pocket Pen. ✤ | ☒ Qu ☒ | ○ Field Vane ○

0 50 100 150 200 250

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on Bournais Drive, 250 m north from Dugald Road, northbound lane, 1.7 m west from east curb. (5528022m N 640576m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-03
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640571, E-5527937
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	26 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		CONCRETE (210 mm THICK)		C03		
		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular to sub-rounded - poorly graded fine sand to fine gravel (<20 mm dia.), "pit run"		G16	●	
0.5		CLAY (FILL) - silty, some sand, trace gravel, trace silt inclusions (<30 mm dia.) - black - moist, stiff to very stiff - high plasticity		G17	●	△ ✤
				G18	●	△ ✤
1.0				G19	●	△ ✤
		CLAY - silty, trace precipitates (sulphates <15 mm dia.), trace oxidation, trace organics - light brown to brown - moist, stiff to very stiff - high plasticity		G20	●	△ ✤
1.5				G21	●	△ ✤
2.0						
				G22	●	△ ✤
2.5						
				G23	●	△ ✤
3.0		END OF TEST HOLE AT 3.1 m IN CLAY				

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on Bournais Drive, 170 m north from Dugald Road, southbound lane, 1.7 m east from west curb. (5527937m N 640571m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-04
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640574, E-5527843
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	26 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		CONCRETE (210 mm THICK)		C04		
		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular to sub-rounded - poorly graded fine sand to fine gravel (<20 mm dia.), "pit run"		G24		
0.5		CLAY (FILL) - silty, trace sand, trace fine gravel (<15 mm dia.) - black - moist, stiff - intermediate plasticity		G25		
				G26		
1.0		SILT - clayey - brown - moist, soft - low plasticity		G27		
		CLAY - silty, trace oxidation - light to dark brown - moist, stiff to very stiff - high plasticity		G28		
1.5				G29		
2.0		- trace silt inclusions (<30 mm dia.) below 2.0 m				
2.5				G30		
				G31		
3.0		END OF TEST HOLE AT 3.1 m IN CLAY				

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on Bournais Drive, 75 m north from Dugald Road, northbound lane, 5.5 m east from west curb. (5527843m N 640574m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-05
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640567, E-5527756
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	26 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (110 mm THICK)		C05
		CONCRETE (190 mm THICK)		C05
0.5		CLAY - silty, some sand, some gravel (<25 mm dia.) - light brown to brown - moist, stiff - high plasticity		G32
				G33
1.0		- trace sand, trace gravel between 0.9 m and 1.2 m		G34
		- trace silt inclusions (<50 mm dia.) below 1.2 m		G35
1.5		SILT - clayey, trace oxidation, some silt inclusions (<50 mm dia.) - light brown, soft - moist, soft to firm - intermediate plasticity		G36
2.0		CLAY - some silt, trace sand, trace oxidation, trace silt inclusions (<25 mm dia.) - mottled light brown to brown - moist, stiff - high plasticity		G37
2.5				
		- silty below 2.7 m		G38
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on Beghin Avenue, 25 m south from Dugald Road, southbound lane, 6.0 m east from west curb. (5527756m N 640567m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-06
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640578, E-5527672
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	26 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (190 mm THICK)		C06
		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular to sub-rounded - poorly graded fine sand to fine gravel (<20 mm dia.), "pit run"		G47
0.5		CLAY (FILL)- silty, trace sand, trace gravel, mottled dark grey, moist, stiff to very stiff - high plasticity		G48
		CLAY - silty, trace sand, trace oxidation, trace silt inclusions (<20 mm dia.) - mottled greenish brown to dark grey - moist, stiff to very stiff - high plasticity		G49
1.0				G50
				G51
1.5				G52
2.0				G53
2.5		SILT - clayey, trace oxidation - light brown to brown, moist to wet, soft, low plasticity		G54
		SILT and CLAY - trace oxidation, trace silt inclusions (<30 mm dia.) - light to dark brown - moist, stiff - high plasticity		
3.0				G55

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.1 m IN SILT and CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on Beghin Avenue, 100 m north from Dugald Road, northbound lane, 5.9 m west from east curb. (5527672m N 640578m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-07
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640567, E-5527605
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	26 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		CONCRETE (175 mm THICK)		C07		
		Silt and CLAY - some sand - light brown, soft to firm, loose - intermediate plasticity		G39		
0.5		CLAY - silty, trace sand, trace gravel (<20 mm dia.) , trace silt inclusions (<25 mm dia.) - mottled dark grey to black - moist, stiff - high plasticity		G40		
1.0				G41		
				G42		
1.5				G43		
		- trace precipitates (sulphates, <10 mm dia.) below 1.8 m				
2.0				G44		
		SILT and CLAY - clayey, some oxidation, trace silt inclusions (<30 mm dia.) - light to dark brown - moist, stiff - intermediate plasticity		G45		
2.5		CLAY - silty, trace silt inclusions (<25 mm dia.) - mottled greenish brown - moist, stiff - high plasticity		G46		
3.0						

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on Beghin Avenue, 175 m south from Dugald Road, southbound lane, 6.0 m east from west curb. (5527605m N 640567m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-08
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640565, E-5527504
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	26 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (180 mm THICK)		C08
		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular to sub-rounded - poorly graded fine sand to fine gravel (<20 mm dia.) - "pit run"		G56
0.5		CLAY (FILL) - silty, trace sand, trace gravel - light brown to dark grey - moist, stiff - high plasticity		G57
1.0		- trace silt inclusions (<25 mm dia.) below 0.9 m		G58
		SILT - clayey - light to dark brown - moist, soft - low plasticity		G59
1.5		CLAY - silty - light to dark brown - moist, stiff - high plasticity		G60
2.0		- trace precipitates (sulphates, <10 mm dia.), mottled dark grey below 2.0 m		G61
		SILT - clayey, trace oxidation - light brown, moist - soft, low plasticity		G62
2.5		CLAY - silty, trace precipitates (sulphates<10 mm dia.) - light to dark brown - moist, stiff - high plasticity		G63
3.0		END OF TEST HOLE AT 3.1 m IN CLAY		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on De Baets Street, 30 m east from Beghin Ave, eastbound lane, 1.7 m north from south curb. (5527504m N 640565m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-09
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640664, E-5527472
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	27 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (170 mm THICK)		C09
		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular to sub-rounded - poorly graded fine sand to fine gravel (<20 mm dia.) - "pit run"		G104
0.5		CLAY - silty, some sand, trace gravel to 0.6 m, trace oxidation - light brown to dark green - moist, firm to stiff - high plasticity - trace organics between 0.6 m and 0.9 m		G105
				G106
1.0				G107
		- trace oxidation, trace silt inclusions (<35 mm dia.) below 1.2 m		G108
1.5				G109
		SILT - clayey, trace oxidation - light brown - moist, soft - low plasticity		G110
2.0				G111
2.5				
				G112
3.0		END OF TEST HOLE AT 3.1 m IN SILT		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on De Baets Street, 135 m east from Beghin Ave, westbound lane, 1.7 m south from north curb. (5527472m N 640664m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-10
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640795, E-5527416
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	26 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (160 mm THICK)		C10
		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, Sub angular to Sub rounded - poor graded, fine sand to gravel (<20 mm dia.), "pit run"		G64
0.5		CLAY (FILL) - silty, some sand, trace gravel - black - moist, stiff - high plasticity - mottled greenish dark grey, trace (precipitates (sulphates) (<5 mm dia.) below 0.6 m		G65
				G66
1.0				G67
		CLAY - silty, trace precipitates (sulphates, <50 mm dia.), some silt inclusions (<25 mm dia.) - light brown to dark grey - moist, stiff - high plasticity		G68
1.5				G69
2.0				G70
2.5				
				G71
3.0		END OF TEST HOLE AT 3.1 m IN CLAY		

Bulk Unit Wt (kN/m^3): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on De Baets Street, 270 m east from Beghin Ave, eastbound lane, 1.7 m north from south curb. (5527416m N 640795m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-11
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640920, E-5527375
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	27 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		CONCRETE (185 mm THICK)		C11		
		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular to sub-rounded - poorly graded fine sand to fine gravel (<20 mm dia.), "pit run"		G96		
0.5		CLAY - silty, some sand, trace gravel (<20 mm dia.) - mottled brown to dark brown, moist, stiff, high plasticity		G97		
		SILT and CLAY - light to dark brown - moist, soft to firm - high plasticity		G98		
1.0		CLAY - silty, trace oxidation, trace silt inclusions (<30 mm dia.) - light brown to brown - moist, stiff to very stiff - intermediate plasticity		G99		
				G100		
1.5		SILT - clayey, trace oxidation - light brown - moist, soft to firm - low plasticity		G101		
		CLAY - silty, trace precipitate (sulphates, <25 mm dia.) - light to dark brown - moist, stiff - high plasticity				
2.0				G102		
2.5						
				G103		
3.0		END OF TEST HOLE AT 3.1 m IN CLAY				

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on De Baets Street, 400 m east from Beghin Ave, westbound lane, 1.7 m south from north curb. (5527375m N 640920m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-12
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640927, E-5527327
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	26 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		CONCRETE (200 mm THICK)		C12		
		CLAY - silty, trace sand, trace gravel (<25 mm dia.) to 0.9 m - mottled light brown to dark green - moist, stiff - high plasticity		G72		
0.5				G73		
				G74		
1.0				G75		
				G76		
1.5		- trace oxidation below 1.5 m		G77		
		- trace precipitates (sulphates, <15 mm dia.) below 1.8 m				
2.0				G78		
2.5						
				G79		
3.0						

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on Paquin Road, 40 m south from DeBaets Street, southbound lane, 1.7 m east from west curb.(5527327m N 640927m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-13
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640892, E-5527221
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	27 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (210 mm THICK)		C13
		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular to sub-rounded - poorly graded fine sand to fine gravel (<20 mm dia.), "pit run"		G87
0.5		CLAY (FILL) - silty, trace sand, trace gravel (<20 mm dia.) - mottled dark green to black - moist, firm to very stiff - high plasticity		G88
				G89
1.0				G90
		CLAY - silty, trace silt inclusions (<50 mm dia.), trace organics - light brown to brown - moist, firm to stiff - high plasticity		G91
1.5				G92
		- trace oxidation below 1.8 m		
2.0				G93
2.5		SILT - some clay, trace oxidation - light brown - moist, soft - low plasticity		G94
		CLAY - silty, trace precipitates (sulphates, <10 mm dia.) - light brown to brown - moist, stiff - high plasticity		G95
3.0		END OF TEST HOLE AT 3.1 m IN CLAY		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on Paquin Road, 140 m south from DeBaets Street, northbound lane, 1.5 m west from east edge.(5527221m N 640892m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-14
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Boniface	**Location:**	UTM N-640853, E-5527131
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	27 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		ASPHALT (55 mm THICK)		C14		
		CONCRETE (195 mm THICK)		C14		
0.5		CLAY - silty, some sand, some gravel between 0.3 m and 0.6 m - mottled greenish to dark brown - moist, firm to very stiff - high plasticity		G80		
		- grey trace silt inclusions (<30 mm dia.) between 0.6 m and 0.9 m		G81		
1.0		- trace sand between 0.9 m and 1.2 m		G82		
				G83		
1.5		- trace precipitates (sulphates, <5 mm dia.) between 1.5 m and 1.8 m		G84		
2.0				G85		
2.5						
3.0				G86		

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located on Paquin Road, 250 m south from DeBaets Street, southbound lane, 1.7 m east from west curb.(5527131m N 640853m E)

Logged By: Shane Broderick **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Local Street Rehabilitation (St. Boniface Industrial Park Area)
Sub-Surface Investigation
Summary Table 1

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH17-01	U14 (5528105m N 640592m E) Bournais Drive, 340 m north from Dugald Road, southbound lane, 1.7 m east from west curb	Concrete	190													
						Sand and Gravel Fill	3.0	0.6	4.4							
						Clay Fill	0.6	0.9	25.6							
						Clay Fill	0.9	1.2	33.2							
						Clay	1.2	1.5	30.8							
						Clay	1.5	1.7	34.0							
						Clay	1.7	1.8	21.4							
						Clay	2.3	2.6	23.2							
						Clay	2.7	3.0	39.2							
TH17-02	U14 (5528022m N 640576m E) Bournais Drive, 250 m north from Dugald Road, northbound lane, 1.7 m west from east curb	Concrete	190													
						Sand and Gravel Fill	0.3	0.5	5.8							
						Clay Fill	0.5	0.6	21.1							
						Clay Fill	0.6	0.9	32.2							
						Clay Fill	0.9	1.2	34.8							
						Clay Fill	1.2	1.5	34.2							
						Clay Fill	1.5	1.8	31.6							
						Clay	2.0	2.3	43.8							
						Clay	2.7	3.0	47.2							
TH17-03	U14 (5527937m N 640571m E) Bournais Drive, 170 m north from Dugald Road, southbound lane, 1.7 m east from west curb	Concrete	210													
						Sand and Gravel Fill	0.3	0.5	6.2							
						Clay Fill	0.5	0.6	15.6	1	16	43	40	48	15	33
						Clay Fill	0.6	0.9	26.5							
						Clay Fill	0.9	1.2	25.8							
						Clay	1.2	1.5	35.5							
						Clay	1.5	1.8	36.2							
						Clay	2.3	2.6	35.3							
						Clay	2.7	3.0	44.5							
TH17-04	U14 (5527843m N 640574m E) Bournais Drive, 75 m north from Dugald Road, northbound lane, 5.5 m west from east curb	Concrete	210													
						Sand and Gravel Fill	0.3	0.5	7.4							
						Clay Fill	0.5	0.6	21.8	1	13	42	44	49	19	30
						Clay Fill	0.6	0.9	44.6							
						Silt	0.9	1.2	26.0	0	4	62	34	38	15	23
						Clay	1.2	1.5	35.2							
						Clay	1.5	1.8	39.3							
						Clay	2.3	2.6	24.8							
						Clay	2.7	3.0	26.5							

Local Street Rehabilitation (St. Boniface Industrial Park Area)
Sub-Surface Investigation
Summary Table 1

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH17-05	U14 (5527756m N 640567m E) Beghin Avenue, 25 m south from Dugald Road, southbound lane, 6.0 m east from west curb	Asphalt	110	Concrete	190											
						Clay	0.3	0.6	25.6							
						Clay	0.6	0.9	30.0							
						Clay	0.9	1.2	30.3							
						Clay	1.2	1.5	32.9							
						Silt	1.5	1.8	27.8							
						Clay	2.0	2.3	50.5							
						Clay	2.7	3.0	47.2							
TH17-06	U14 (5527672m N 640578m E) Beghin Avenue, 100 m north from Dugald Road, northbound lane, 5.9 m west from east curb	Concrete	180													
						Sand and Gravel Fill	0.3	0.5	28.0							
						Clay Fill	0.5	0.6	32.0							
						Clay	0.6	0.9	32.0							
						Clay	0.9	1.2	31.0							
						Clay	1.2	1.5	30.9							
						Clay	1.5	1.8	28.1							
						Clay	2.0	2.3	31.5							
						Silt	2.4	2.6	27.0							
						Silt and Clay	2.7	3.0	38.4							
TH17-07	U14 (5527605m N 640567m E) Beghin Avenue, 175 m south from Dugald Road, southbound lane, 6.0 m east from west curb	Concrete	175													
						Silt and Clay	0.3	0.6	18.7	1	19	44	37	44	15	29
						Clay	0.6	0.9	32.6							
						Clay	0.9	1.2	28.9							
						Clay	1.2	1.5	28.2							
						Clay	1.5	1.8	30.1							
						Clay	2.0	2.3	40.0							
						Silt and Clay	2.3	2.4	52.8							
						Clay	2.7	3.0	51.1							
TH17-08	U14 (5527504m N 640565m E) De Baets Street, 30 m east from Beghin Ave, eastbound lane, 1.7 m north from south curb	Concrete	190													
						Sand and Gravel Fill	0.3	0.6	14.6							
						Clay Fill	0.6	0.9	30.0							
						Clay Fill	0.9	1.2	26.8							
						Silt	1.2	1.5	22.1							
						Clay	1.5	1.8	29.3							
						Clay	2.0	2.3	44.9							
						Silt	2.4	2.6	36.1							
						Clay	2.7	3.0	54.6							

Local Street Rehabilitation (St. Boniface Industrial Park Area)
Sub-Surface Investigation
Summary Table 1

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH17-09	U14 (5527472m N 640664m E) De Baets Street, 135 m east from Beghin Ave, westbound lane, 1.7 m south from north curb	Concrete	170													
						Sand and Gravel Fill	0.3	0.5	8.3							
						Clay	0.5	0.6	25.7							
						Clay	0.6	0.9	30.9							
						Clay	0.9	1.2	24.8							
						Clay	1.2	1.5	26.9							
						Clay	1.5	1.8	29.2							
						Silt	1.8	2.1	29.0							
						Silt	2.1	2.4	27.0							
						Silt	2.7	3.0	25.0							
TH17-10	U14 (5527416m N 640795m E) De Baets Street, 270 m east from Beghin Ave, eastbound lane, 1.7 m north from south curb	Concrete	160													
						Sand and Gravel Fill	0.3	0.5	11.1							
						Clay Fill	0.5	0.6	20.7							
						Clay Fill	0.6	0.9	32.4							
						Clay Fill	0.9	1.2	33.7							
						Clay	1.2	1.5	33.3							
						Clay	1.5	1.8	40.8							
						Clay	2.0	2.3	52.9							
						Clay	2.7	3.0	49.4							
TH17-11	U14 (5527375m N 640920m E) De Baets Street, 400 m east from Beghin Ave, westbound lane, 1.7 m south from north curb	Concrete	185													
						Sand and Gravel Fill	0.3	0.5	9.6	35	54	11.2*				
						Clay	0.5	0.6	33.2							
						Silt and Clay	0.6	0.9	35.1							
						Clay	0.9	1.2	36.9							
						Clay	1.2	1.5	36.3							
						Silt	1.5	1.8	20.9							
						Clay	2.0	2.3	47.1							
						Clay	2.7	3.0	19.5							
TH17-12	U14 (5527327m N 640927m E) Paquin Road, 40 m south from De Baets Street, southbound lane, 1.7 m east from west curb	Concrete	200													
						Clay	0.3	0.4	33.7							
						Clay	0.4	0.6	35.1							
						Clay	0.6	0.9	34.1							
						Clay	0.9	1.5	33.5							
						Clay	1.2	1.5	41.1							
						Clay	1.5	1.8	41.2							
						Clay	2.0	2.3	52.3							
						Clay	2.7	3.0	48.6							

*Last Sieve Test Completed and fines noted

Local Street Rehabilitation (St. Boniface Industrial Park Area)
Sub-Surface Investigation
Summary Table 1

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH17-13	U14 (5527221m N 640892m E) Paquin Road, 140 m south from De Baets Street, northbound lane, 1.5 m west from east edge	Concrete	210													
						Sand and Gravel Fill	0.3	0.5	10.0							
						Clay Fill	0.5	0.6	27.1							
						Clay Fill	0.6	0.9	34.0							
						Clay Fill	0.9	1.2	29.9							
						Clay	1.2	1.5	33.8							
						Clay	1.5	1.8	31.4							
						Clay	2.0	2.3	28.3							
						Silt	2.4	2.7	22.2							
						Clay	2.7	3.0	45.4							
TH17-14	U14 (5527131m N 640853m E) Paquin Road, 250 m south from De Baets Street, southbound lane, 1.7 m east from west curb	Asphalt	55	Concrete	195											
						Clay	0.3	0.6	30.9	2	23	24	51	65	25	40
						Clay	0.6	0.9	25.5							
						Clay	0.9	1.2	32.8							
						Clay	1.2	1.5	33.3							
						Clay	1.5	1.8	41.2							
						Clay	2.0	2.3	53.6							
						Clay	2.7	3.0	54.0							

Photo 1: Pavement Core Sample at Test Hole TH17-01

Photo 2: Pavement Core Sample at Test Hole TH17-02

Photo 3: Pavement Core Sample at Test Hole TH17-03

Photo 4: Pavement Core Sample at Test Hole TH17-04

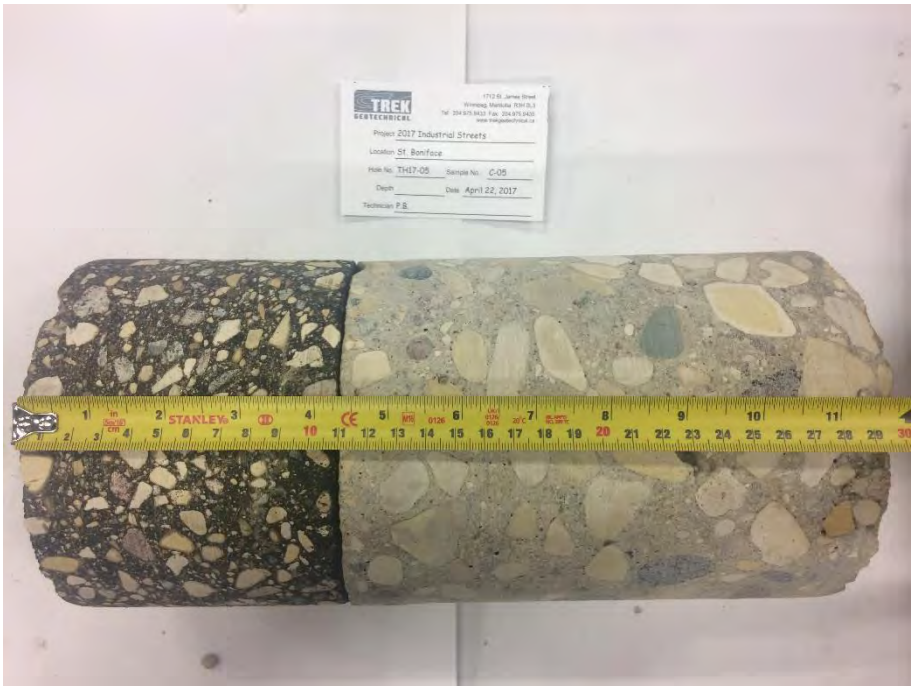


Photo 5: Pavement Core Sample at Test Hole TH17-05

Photo 6: Pavement Core Sample at Test Hole TH17-06

Photo 7: Pavement Core Sample at Test Hole TH17-07

Photo 8: Pavement Core Sample at Test Hole TH17-08

Photo 9: Pavement Core Sample at Test Hole TH17-09

Photo 10: Pavement Core Sample at Test Hole TH17-10

Photo 11: Pavement Core Sample at Test Hole TH17-11

Photo 12: Pavement Core Sample at Test Hole TH17-12

Photo 13: Pavement Core Sample at Test Hole TH17-13

Photo 14: Pavement Core Sample at Test Hole TH17-14

Appendix B

Test Hole Logs, Lab Testing Summary & Pavement Core Photos – St Matthews Avenue

Sub-Surface Log

Test Hole TH17-01
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628850, E-5528010
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	27 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (45 mm THICK)		C01M
		CONCRETE (225 mm THICK)		C01M
0.5		CLAY (Fill) - silty, trace sand, trace gravel (<20 mm dia), trace oxidation - mottled light grey to black - moist, firm - high plasticity		G85
				G86
1.0		SILT - clayey - mottled light brown to brown - moist, firm - low plasticity		G87
		SILT and CLAY - trace oxidation - light brown - moist, soft to firm - low plasticity		G88
1.5		CLAY - silty, trace sand, trace precipitate (sulphate, <20 mm dia), trace silt inclustion (25 mm dia.) - light brown to green - moist, firm - high plasticity		G89
2.0		- trace oxidation, trace silt inclusions (<15 mm dia.) below 2.0 m		G90
2.5				
3.0				G91

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 300 m east of Berry Street, eastbound lane, 5.5 m north of south curb. (5528010m N 628850m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-02
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628786, E-5528018
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	24 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (40 mm THICK)		C02M
		CONCRETE (185 mm THICK)		C02M
		CLAY (Fill) - silty, some sand, some gravel (<20 mm dia.) - light to dark grey - moist, firm - high plasticity		G01
0.5		CLAY - silty, trace precipitates (sulphates, <30 mm dia.) - mottled grey to black - moist, firm - high plasticity		G02
1.0				G03
				G04
1.5		SILT - clayey - mottled light brown to brown - moist, soft - low plasticity		G05
		CLAY - silty, trace precipitates (sulphates, <30 mm dia.) - brown - moist, firm - high plasticity		G06
2.0				
2.5				
				G07
3.0		END OF TEST HOLE AT 3.1 m IN CLAY		

Bulk Unit Wt (kN/m^3): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 780 m east of Berry Street, westbound lane, 5.6 m south of north curb. (5528018m N 628786m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-03
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628738, E-5528010
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	25 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT (45 mm THICK)		C03M		
		CONCRETE (210 mm THICK)		C03M		
		CLAY (Fill) - some silt, some gravel (<20 mm dia.), trace sand - mottled light brown to black - moist, soft - high plasticity		G92	●	△
0.5				G93	●	△ ✤
1.0		SILT and CLAY - trace sand, trace gravel, trace oxidation below 1.6 m - mottled light brown to black - moist, soft to firm - low plasticity		G94	●	△ ✤
				G95	●	
1.5				G96	●	✤
		CLAY - silty, trace silt inclusions (<25 mm dia.) - grey - moist, soft to firm - low plasticity		G97	●	△ ✤
2.0		SILT - clayey - light brown - moist to wet, soft - low plasticity				
2.5				G98	●	
3.0						

END OF TEST HOLE AT 3.1 m IN SILT

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 190 m east of Berry Street, eastbound lane, 1.7 m north of south curb. (5528010m N 628738m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-04
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628688, E-5528026
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	24 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (35 mm THICK)		C04M
		CONCRETE (190 mm THICK)		C04M
0.5		CLAY (Fill) - silty, some sand, some gravel - light to dark brown - moist, soft to frim - high plasticity		G08
				G09
1.0		SILT - clayey - light brown to brown - moist, stiff - low plasticity		G10
				G11
1.5		CLAY - silty, trace precipitates (sulphate, 15 mm dia.) - light to dark brown - moist, firm - high plasticity		G12
2.0				
				G13
2.5				
				G14
3.0				

Bulk Unit Wt (kN/m^3): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 140 m east of Berry Street, westbound lane, 1.7 m south of north curb. (5528026m N 628688m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-05
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628651, E-5528012
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	27 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT (50 mm THICK)		C05M		
		CONCRETE (210 mm THICK)		C05M		
		CLAY (FILL) - some silt, some sand, some gravel (20 mm dia.) - light brown to brown - moist, stiff - high plasticity		G122		
0.5				G123		
		- trace sand, trace gravel below 0.9 m		G124		
1.0						
		SILT - trace oxidation, some silt inclusions (<50 mm dia.) below 1.2 m - light brown, soft - moist, soft to firm - intermediate plasticity		G125		
1.5				G126		
		CLAY - silty, trace sand, trace oxidation, trace silt inclusions (<25 mm dia.) - mottled light brown to brown - moist, soft to firm - high plasticity		G127		
2.0						
2.5				G128		
3.0						

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 100 m east of Berry Street, eastbound lane, 1.7 m north of south curb. (5528012m N 628651m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-06
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628604, E-5528025
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	24 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (45 mm THICK)		C06M
		CONCRETE (210 mm THICK)		C06M
0.5		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular - poorly graded fine sand to coarse gravel (<50 mm dia.), pit run - "pit run"		G15
		CLAY (FILL) - silty, trace sand, trace gravel - mottled dark grey - moist, stiff - high plasticity		G16
1.0		SILT - clayey, - light brown - moist, soft to firm - low plasticity		G17
				G18
1.5				G19
		CLAY - silty, trace precipitates (sulphate, <20 mm dia.) - mottled brown - moist, firm - high plasticity		G20
2.0				
2.5				
				G21
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 50 m east of Berry Street, westbound lane, 5.6 m south of north curb. (5528025m N 628604m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-07
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628567, E-5528015
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	27 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (40 mm THICK)		C07M
		CONCRETE (240 mm THICK)		C07M
0.5		CLAY (FILL) - silty, trace sand, trace gravel to 1.8 m - dark green to black - moist, firm - high plasticity		G115
				G116
1.0				G117
				G118
1.5				G119
		CLAY - silty, trace precipitates (sulphate, <20 mm dia.) - mottled brown to dark brown - moist, firm - high plasticity		
2.0				G120
2.5				G121
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 20 m east of Berry Street, eastbound lane, 1.7 m north of south curb. (5528015m N 628567m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-08
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628515, E-5528032
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	24 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (45 mm THICK)		C08M
		CONCRETE (205 mm THICK)		C09M
0.5		CLAY (FILL) - some silt, trace sand, trace gravel (<20 mm dia.) - dark grey to black - moist, firm - high plasticity		G22
				G23
1.0				G24
				G25
1.5				G26
		CLAY - silty, trace precipitate (sulphate,<10 mm dia.) - brown - moist, firm - high plasticity		
2.0				G27
2.5				
				G28
3.0		END OF TEST HOLE AT 3.1 m IN CLAY		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 40 m west of Berry Street, westbound lane, 1.7 m south of north curb. (5528032m N 628515m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-09
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628465, E-5528024
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	24 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		CONCRETE (210 mm THICK)		C09M		
		CLAY (FILL) - silty, trace precipitates (sulphates, <20 mm dia.) - mottled brown - moist, firm - high plasticity		G43		
0.5				G44		
		CLAY - silty, trace sand - mottle light brown to black - moist, firm to stiff - high plasticity		G45		
1.0				G46		
1.5		- trace gravel (<20 mm dia.) between 1.5 m and 1.8 m		G47		
2.0		- trace oxidation, trace precipitates (sulphates, <20 mm dia.) below 2.1 m		G48		
2.5				G49		
3.0		END OF TEST HOLE AT 3.1 m IN CLAY				

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 90 m west of Berry Road, eastbound lane, 5.7 m north of south curb. (5528024m N 628465m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-10

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628417, E-5528031
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	24 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (55 mm THICK)		C10M
		CONCRETE (200 mm THICK)		C10M
0.5		CLAY (FILL) - some silt, trace sand, trace gravel (<20 mm dia.), trace silt inclusions (<15 mm dia.) - dark grey to black - moist, firm - high plasticity		G29
				G30
1.0				G31
				G32
1.5				G33
		CLAY - silty, trace precipitates (sulphates, <10 mm dia.) - mottled greenish to black - moist, firm - high plasticity		
2.0				G34
2.5				
				G35
3.0		END OF TEST HOLE AT 3.1 m IN CLAY		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ ✿ Pocket Pen. ✿ ☒ Qu ☒ ○ Field Vane ○

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 135 m west of Berry Street, westbound lane, 5.6 m south of north curb. (5528031m N 628417m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

Sub-Surface Log

Test Hole TH17-11
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628377, E-5528023
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	27 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (205 mm THICK)		C11M
		CLAY (FILL) - silty, trace sand, trace gravel (<20 mm dia.), trace organics - mottled green to dark green - moist, firm - high plasticity		G107
0.5				G108
		CLAY - silty, trace sand - mottle brown - moist, stiff - high plasticity		G109
1.0				G110
				G111
1.5		- trace precipitates (sulphates, <15 mm dia.) below 1.5 m		G112
2.0				G113
2.5				
				G114
3.0		END OF TEST HOLE AT 3.1 m IN CLAY		

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 175 m west of Berry Street, eastbound lane, 1.7 m north of south curb. (5528023m N 628377m E)

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-12
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628308, E-5528039
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	25 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (45 mm THICK)		C12M
		CONCRETE (190 mm THICK)		C12M
0.5		CLAY (FILL) - trace sand, trace gravel (<20 mm dia.) - dark grey to black - moist, firm - high plasticity		G36
1.0		CLAY - silty, trace precipitates (sulphates, <10 mm dia.) - mottled greenish to black - moist, firm - high plasticity		G37
				G38
1.5				G39
				G40
2.0				
				G41
2.5				
				G42
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 230 m west of Berry Street, westbound lane, 1.7 m south of north curb. (5528039m N 628308m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-13
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628248, E-5528030
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	27 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (205 mm THICK)		C13M
0.5		CLAY (FILL) - some silt, trace sand, trace gravel - dark grey to black - moist, firm to stiff - high plasticity		G78
				G79
1.0				G80
				G81
1.5				G82
		CLAY - silty, trace sand, trace gravel, trace silt inclusions (<30 mm dia.), trace precipitates (sulphate, <10 mm dia.), trace orangics - mottled light brown to brown - moist, firm to stiff - high plasticity		
2.0				G83
2.5				
3.0				G84

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✿ Pocket Pen. ✿ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 240 m east of Ferry Road, eastbound lane, 5.6 m north of south curb. (5528030m N 628248m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-14

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628217, E-5528039
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	25 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT (30 mm THICK)		C14M		
		CONCRETE (200 mm THICK)		C14M		
		CLAY (FILL) - some silt, trace sand, trace gravel (<20 mm dia.), - mottle light grey to black - moist, soft to firm - high plasticity		G50	●	△ ✤
0.5		- silty below 0.6 m		G51	●	△ ✤
1.0		CLAY - silty, trace precipitates (sulphates, <20 mm dia.) - mottled greenish brown to light grey - moist, firm - high plasticity		G52	●	△ ✤
				G53	●	△ ✤
1.5				G54	●	△ ✤
2.0		- trace oxidation, light brown to brown below 2.0 m		G55	●	✤
2.5						
				G56	●	✤
3.0		END OF TEST HOLE AT 3.1 m IN CLAY				

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 210 m east of Ferry Road, westbound lane, 5.6 m south of north curb. (5528039m N 628217m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

Sub-Surface Log

Test Hole TH17-15
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628152, E-5528031
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	27 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (215 mm THICK)		C15M
		SAND and GRAVEL (FILL) - trace clay, trace silt, brown, moist, compact, sub-angular - poorly graded fine sand to coarse gravel (<50 mm dia.), "pit run"		G99
0.5		CLAY (Fill) - silty, trace sand, trace gravel, trace precipitate (sulphate) (<15 mm dia.), trace organics - mottled dark green to black - moist, - high plasticity		G100
				G101
1.0				G102
				G103
1.5		CLAY - silty, trace silt inclusions (<25 mm dia.), trace oxidation - light brown - moist, firm - high plasticity		G104
2.0				G105
2.5				G106
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 140 m east of Ferry Road, eastbound lane, 1.7 m north of south curb. (5528031m N 628152m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-16

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628116, E-5528046
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	25 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (55 mm THICK)		C16M
		CONCRETE (175 mm THICK)		C16M
0.5		CLAY (FILL) - silty, trace sand, trace gravel (<20 mm dia.), trace organics - mottle light grey to black - moist, soft to firm - high plasticity		G57
				G58
1.0		CLAY - silty, trace precipitates (sulphates, <15 mm dia.) - mottled greenish to grey - moist, firm - high plasticity		G59
				G60
1.5				G61
2.0		- trace oxidation, light brown to brown below 2.0 m		G62
2.5				
				G63
3.0		END OF TEST HOLE AT 3.1 m IN CLAY		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 110 m east of Ferry Road, westbound lane, 1.7 m south of north curb. (5528046m N 628116m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

Sub-Surface Log

Test Hole TH17-17
1 of 1

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628064, E-5528038
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	25 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE (200 mm THICK)		C17M
0.5		CLAY (FILL) - silty, trace sand, trace gravel (<20 mm dia.), trace oxidation - mottle greenish to black - moist, firm - high plasticity		G71
		CLAY - silty, trace sand, trace orangics - mottled light green to black - moist, stiff to very stiff - high plasticity		G72
1.0				G73
1.5		CLAY (TILL) - silty, some gravel, trace sand - mottled greenish to light brown - moist, firm - intermediate to high plasticity		G74
				G75
2.0				G76
2.5				
3.0				G77

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.1 m IN CLAY Till

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 60 m east of Ferry Road, eastbound lane, 5.6 m north of south curb. (5528038m N 628064m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 20170426 ST. BONIFACE 0_A_SGBR 0012-006-00.GPJ TREK GEOTECHNICAL.GDT 25/5/17

Sub-Surface Log

Test Hole TH17-18

Client:	KGS Group	**Project Number:**	0012-006-00
Project Name:	2017 Industrial Streets - St. Matthews Street	**Location:**	UTM N-628023, E-5528048
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Existing Ground
Method:	125 mm Solid Stem Auger, Canterra CT-250 Truck Mount	**Date Drilled:**	25 April 2017

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT (210 mm THICK)		C18M
		CONCRETE (210 mm THICK)		C18M
0.5		SAND and GRAVEL (FILL) - trace clay, trace silt - light brown, moist, compact, sub-angular - poorly graded fine sand to coarse gravel (<50 mm dia.), pit run - "pit run"		G64
1.0		CLAY - silty, trace sand, trace gravel, trace precipitates (sulphates, <15 mm dia.), trace oxidation - mottled light brown to brown - moist, firm - high plasticity		G65
				G66
1.5				G67
				G68
2.0				G69
2.5				
3.0				G70

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:
1) No sloughing or seepage observed.
2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
3) Test hole located 10 m east of Ferry Road, westbound lane, 1.7 m south of north curb. (5528048m N 628023m E)

Logged By: Shane Broderick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

Local Street Renewal (St. Matthews Avenue)
Sub-Surface Investigation
Summary Table 2

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH17-01	U14 (5528010m N 628850m E) 300 m east of Berry Street, eastbound median lane, 5.5 m north of south curb	Asphalt	45	Concrete	225											
						Clay Fill	0.3	0.6	21.0							
						Clay Fill	0.6	0.9	24.2							
						Silt	0.9	1.2	25.3							
						Silt and CLAY	1.2	1.5	24.3							
						Clay	1.5	1.8	31.5							
						Clay	2.0	2.3	40.9							
						Clay	2.7	3.0	49.9							
TH17-02	U14 (5528018m N 628786m E) 240 m east of Berry Street, westbound median lane, 5.6 m south of north curb	Asphalt	40	Concrete	185											
						Clay Fill	0.3	0.6	16.2							
						Clay	0.6	0.9	28.0							
						Clay	0.9	1.2	26.9							
						Clay	1.2	1.5	28.0							
						Silt	1.5	1.8	21.5							
						Clay	1.8	2.1	48.4							
						Clay	2.7	3.0	49.4							
TH17-03	U14 (5528010m N 628738m E) 190 m east of Berry Street, eastbound curb lane, 1.7 m north of south curb	Asphalt	45	Concrete	210											
						Clay Fill	0.3	0.6	21.2							
						Clay Fill	0.6	0.9	23.5							
						Silt and Clay	0.9	1.2	22.7	0	11	55	34	45	19	26
						Silt and Clay	1.2	1.5	30.1							
						Silt and Clay	1.5	1.8	30.8							
						Clay	1.8	2.1	28.4							
						Silt	2.4	2.7	22.3							
TH17-04	U14 (5528026m N 628688m E) 140 m east of Berry Street, westbound curb lane, 1.7 m south of north curb	Asphalt	35	Concrete	190											
						Clay Fill	0.3	0.6	25.7							
						Clay Fill	0.6	0.9	25.0							
						Silt	0.9	1.2	29.9							
						Silt	1.2	1.5	34.0							
						Clay	1.5	1.8	37.6							
						Clay	2.1	2.4	51.9							
						Clay	2.7	3.0	51.1							

Local Street Renewal (St. Matthews Avenue)
Sub-Surface Investigation
Summary Table 2

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH17-05	U14 (5528012m N 628851m E) 100 m east of Berry Street, eastbound curb lane, 1.7 m north of south curb	Asphalt	50	Concrete	210											
						Clay Fill	0.3	0.6	31.2							
						Clay Fill	0.6	0.9	26.6	8	22	42	28	54	24	30
						Clay Fill	0.9	1.2	22.6							
						Silt	1.2	1.5	25.0							
						Silt	1.5	1.8	19.2							
						Clay	2.0	2.3	53.9							
						Clay	2.7	3.0	56.3							
TH17-06	U14 (5528025m N 628604m E) 50 m east of Berry Street, westbound median lane, 5.6 m south of north curb	Asphalt	45	Concrete	210											
						Sand and Gravel Fill	0.3	0.6	17.7							
						Clay Fill	0.6	0.9	38.7							
						Silt	0.9	1.2	27.7							
						Silt	1.2	1.5	27.4							
						Silt	1.5	1.8	24.8							
						Clay	1.8	2.1	43.0							
						Clay	2.7	3.0	57.4							
TH17-07	U14 (5528015m N 628567m E) 20 m east of Berry Street, eastbound curb lane, 1.7 m north of south curb	Asphalt	40	Concrete	240											
						Clay Fill	0.3	0.6	25.0							
						Clay Fill	0.6	0.9	24.5							
						Clay Fill	0.9	1.2	33.5							
						Clay Fill	1.2	1.5	36.0							
						Clay Fill	1.5	1.8	33.8							
						Clay	2.0	2.3	48.3							
						Clay	2.4	2.7	57.0							
TH17-08	U14 (5528032m N 628515m E) 40 m west of Berry Street, westbound curb lane, 1.7 m south of north curb	Asphalt	45	Concrete	205											
						Clay Fill	0.3	0.6	34.0							
						Clay Fill	0.6	0.9	35.2							
						Clay Fill	0.9	1.2	35.4							
						Clay Fill	1.2	1.5	28.0							
						Clay Fill	1.5	1.8	32.8							
						Clay	2.1	2.4	50.4							
						Clay	2.7	3.0	56.9							

Local Street Renewal (St. Matthews Avenue)
Sub-Surface Investigation
Summary Table 2

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH17-09	U14 (5528024m N 628465m E) 90 m west of Berry Street, eastbound median lane, 5.7 north of south curb	Concrete	210													
						Clay Fill	0.3	0.6	28.3	0	0	31	69	56	22	34
						Clay Fill	0.6	0.9	31.4							
						Clay	0.9	1.2	37.5							
						Clay	1.2	1.5	39.8							
						Clay	1.5	1.8	37.9							
						Clay	2.1	2.4	56.2							
						Clay	2.7	3.0	54.3							
TH17-10	U14 (5528031m N 628417m E) 135 m west of Berry Street, westbound median lane, 5.6 m south of north curb	Asphalt	55	Concrete	200											
						Clay Fill	0.3	0.6	34.4							
						Clay Fill	0.6	0.9	35.3							
						Clay Fill	0.9	1.2	36.6							
						Clay Fill	1.2	1.5	40.1							
						Clay Fill	1.5	1.8	43.1							
						Clay	2.1	2.4	52.0							
						Clay	2.7	3.0	53.3							
TH17-11	U14 (5528023m N 628377m E) 175 m west of Berry Street, eastbound curb lane, 1.7 m north of south curb	Concrete	205													
						Clay Fill	0.2	0.3	17.9							
						Clay Fill	0.3	0.6	34.5							
						Clay	0.6	0.9	35.8							
						Clay	0.9	1.2	39.2							
						Clay	1.2	1.5	38.5							
						Clay	1.5	1.8	40.9							
						Clay	2.0	2.3	51.2							
						Clay	2.7	3.0	50.5							
TH17-12	U14 (5528039m N 628308m E) 230 m west of Berry Street, westbound curb lane, 1.7 m south of north curb	Asphalt	45	Concrete	190											
						Clay Fill	0.3	0.6	37.5							
						Clay	0.6	0.9	39.4							
						Clay	0.9	1.2	42.7							
						Clay	1.2	1.5	41.5							
						Clay	1.5	1.8	42.0							
						Clay	2.1	2.4	51.3							
						Clay	2.7	3.0	59.7							

Local Street Renewal (St. Matthews Avenue)
Sub-Surface Investigation
Summary Table 2

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH17-13	U14 (5528030m N 628248m E) 240 m east of Ferry Road, eastbound median lane, 5.7 m north of south curb	Concrete	205													
						Clay Fill	0.3	0.6	29.0							
						Clay Fill	0.6	0.9	36.4							
						Clay Fill	0.9	1.2	31.6							
						Clay Fill	1.2	1.5	37.5							
						Clay Fill	1.5	1.8	37.4							
						Clay	2.0	2.3	41.7							
						Clay	2.7	3.0	52.8							
TH17-14	U14 (5528039m N 628217m E) 210 m east of Ferry Road, westbound median lane, 5.6 m south of north curb	Asphalt	30	Concrete	200											
						Clay Fill	0.3	0.6	23.4							
						Clay Fill	0.6	0.9	45.0							
						Clay	0.9	1.2	37.3							
						Clay	1.2	1.5	41.8							
						Clay	1.5	1.8	40.1							
						Clay	2.0	2.3	56.5							
						Clay	2.7	3.0	44.1							
TH17-15	U14 (5528031m N 628152m E) 140 m east of Ferry Road, eastbound curb lane, 1.7 m north of south curb	Concrete	215													
						Sand and Gravel Fill	0.2	0.3	15.6							
						Clay Fill	0.3	0.6	19.0							
						Clay Fill	0.6	0.9	27.3							
						Clay Fill	0.9	1.2	52.1							
						Clay Fill	1.2	1.5	39.3							
						Clay	1.5	1.8	36.9							
						Clay	2.0	2.3	55.4							
						Clay	2.4	2.7	56.4							
TH17-16	U14 (5528046m N 628116m E) 110 m east of Ferry Road, westbound curb lane, 1.7 m south of north curb	Asphalt	55	Concrete	175											
						Clay Fill	0.3	0.6	28.7							
						Clay Fill	0.6	0.9	43.2							
						Clay	0.9	1.2	38.1							
						Clay	1.2	1.5	34.4							
						Clay	1.5	1.8	40.9							
						Clay	2.0	2.3	49.7							
						Clay	2.7	3.0	57.4							

Local Street Renewal (St. Matthews Avenue)
Sub-Surface Investigation
Summary Table 2

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH17-17	U14 (5528038m N 628064m E) 60 m east of Ferry Road, eastbound median lane, 5.6 m north of south curb	Concrete	200													
						Clay Fill	0.3	0.6	30.3							
						Clay	0.6	0.9	36.2							
						Clay	0.9	1.2	33.2							
						Clay Till	1.2	1.5	31.5							
						Clay Till	1.5	1.8	19.9							
						Clay Till	2.0	2.3	15.1							
						Clay Till	2.7	3.0	12.2							
TH17-18	U14 (5528038m N 628023m E) 10 m east of Ferry Road, westbound curb lane, 1.7 m south of north curb	Asphalt	70	Concrete	210											
						Sand and Gravel Fill	0.3	0.6	12.3							
						Clay	0.6	0.9	22.2							
						Clay	0.9	1.2	40.6	0	12	28	60	78	32	46
						Clay	1.2	1.5	38.6							
						Clay	1.5	1.8	38.9							
						Clay	2.0	2.3	24.2							
						Clay	2.7	3.0	36.5							

Photo 1: Pavement Core Sample at Test Hole TH17-01

Photo 2: Pavement Core Sample at Test Hole TH17-02

Photo 3: Pavement Core Sample at Test Hole TH17-03

Photo 4: Pavement Core Sample at Test Hole TH17-04

Photo 5: Pavement Core Sample at Test Hole TH17-05

Photo 6: Pavement Core Sample at Test Hole TH17-06

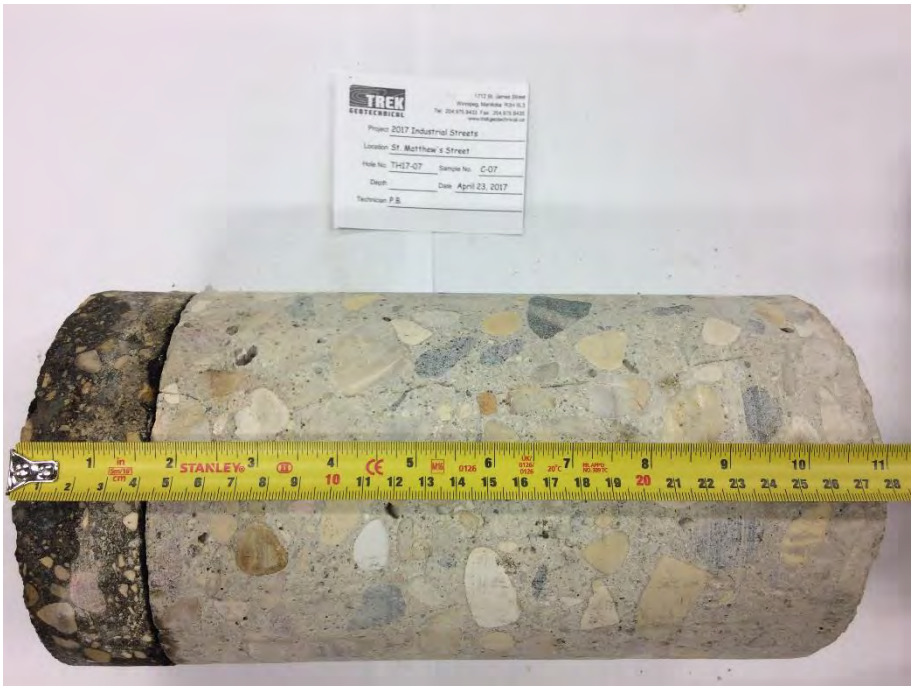


Photo 7: Pavement Core Sample at Test Hole TH17-07

Photo 8: Pavement Core Sample at Test Hole TH17-08

Photo 9: Pavement Core Sample at Test Hole TH17-09

Photo 10: Pavement Core Sample at Test Hole TH17-10

Photo 11: Pavement Core Sample at Test Hole TH17-11

Photo 12: Pavement Core Sample at Test Hole TH17-12

Photo 13: Pavement Core Sample at Test Hole TH17-13

Photo 14: Pavement Core Sample at Test Hole TH17-14

Photo 15: Pavement Core Sample at Test Hole TH17-15

Photo 16: Pavement Core Sample at Test Hole TH17-16

Photo 17: Pavement Core Sample at Test Hole TH17-17

Photo 18: Pavement Core Sample at Test Hole TH17-18