

APPENDIX 'A'

GEOTECHNICAL REPORT



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June 14, 2013

Our File No. 0012 004 00

Craig Rowbotham
KGS Group
3rd Floor – 865 Waverly St.
Winnipeg, MB R3T 5P4

**RE: Sub-Surface Investigation Report for
2013 City of Winnipeg Regional and Local Street Renewals – Alley Package (I3-RL-03)**

TREK Geotechnical Inc. is pleased to submit our Report for the sub-surface investigations at the five alleyways within Winnipeg.

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:

A handwritten signature in blue ink, appearing to read "N. Ferreira".

Nelson John Ferreira, M. Sc., P. Eng.
Geotechnical Engineer, Principal
Tel: 204.975.9433 ext. 103

cc: Brent Hay, P.Eng (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	BSH	June 12, 2013	Final Report


Authorization Signatures



Prepared By:

Brent Hay, P.Eng
Geotechnical Engineer

Reviewed By:



Nelson John Ferreira, M. Sc., P.Eng.
Geotechnical Engineer



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1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for the proposed 2013 City of Winnipeg Alley Package (PW File #: 13-RL-03). The project consists of reconstruction of five alleyways in Winnipeg. Information regarding the asphalt, concrete, road base for the existing road, and the soil stratigraphy beneath the pavement structure is provided.

2.0 Sub-Surface Investigation and Laboratory Program

A total of 32 test holes were drilled at five (5) alleyways within the City of Winnipeg as part of the sub-surface investigation. The test holes drilled at each street are listed in Table 1 and the test hole locations are shown on Figures 01 to 05.

Table 1. List of Test Holes Drilled at Each Alley

Street Location	Test Hole
Alleyway between Ashburn St and Valour Rd	ASH13-01 to ASH13-07
Alleyway between Dominion St and Garfield St North	DOM13-01 to DOM13-09
Alleyway between Home St and Ethelbert St	HOM13-01 to HOM13-06
Alleyway between Montrose St and Elm St	MON13-01 to MON13-08
Alleyway between Toronto St and Victor St	TOR13-01 & TOR13-02

The sub-surface investigation was conducted from May 21 and 24, 2013. The test holes were drilled to a depth of 3.1 m below road surface by Paddock Drilling Ltd. using their MP8 truck mounted drill rig equipped with 125 mm diameter solid stem augers. Test hole TOR13-02 was drilled using a 50 mm diameter hand auger by TREK personnel. Test hole HOM13-01 was advanced through the pavement materials only as overhead and underground utilities prohibited further drilling. The pavement structure (asphalt and/or concrete) was cored by Quality Coring using a portable coring drill press equipped with a hollow 150 mm diameter diamond core drill bit. The sub-surface conditions were observed during drilling and visually classified by Brent Hay and Beta Taryana of TREK Geotechnical Inc. (TREK). Other pertinent information such as groundwater and drilling conditions were also recorded during the drilling investigation.

Disturbed (auger cuttings) samples retrieved during the sub-surface investigation were transported to TREK's material testing laboratory for further testing. Pavement core samples were also retrieved and logged at TREK's material testing laboratory. The laboratory testing program consisted of moisture content determination on all samples, and Atterberg limits and grain size analysis (hydrometer method) on select samples.

Information gathered for each alleyway is included in separate appendices (Appendix A to E). The information provided in the Appendices includes test hole logs, laboratory testing summary tables and results, and photos of the asphalt and concrete cores.

Test hole locations shown on Figures 01 to 05 are based on measured distances from the nearest alleyway, street intersection and/or edge of pavement.

Figures

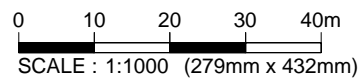
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FILE NAME: 0012 004 00_RA.dwg



KEY PLAN
SCALE: N.T.S.



LEGEND :

● TEST HOLE (TREK, MAY 2013)

NOTES :

1. AERIAL IMAGE FROM BING MAPS

Figure 01

Test Hole Location Plan

Alleyway Between Ashburn Street and Valour Road

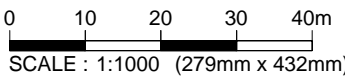
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KEY PLAN
SCALE: N.T.S.



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 TEST HOLE (TREK, MAY 2013)

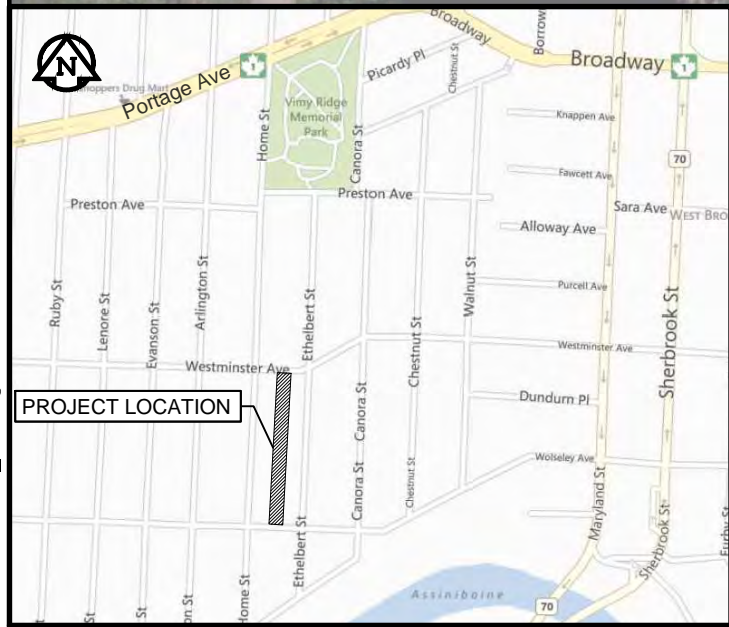
NOTES :
 1. AERIAL IMAGE FROM BING MAPS

Figure 02
 Test Hole Location Plan
 Alleyway Between Dominion Street and Garfield Street North

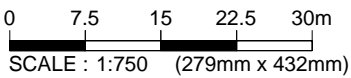
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KEY PLAN
SCALE: N.T.S.



LEGEND :

● TEST HOLE (TREK, MAY 2013)

NOTES :

1. AERIAL IMAGE FROM BING MAPS

Figure 03

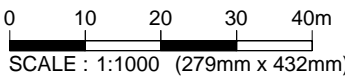
Test Hole Location Plan

Alleyway Between Home Street and Ethelbert Street

Tabloid (279mm x 432mm)

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FILE NAME: 0012 004 00_RA.dwg



LEGEND :

● TEST HOLE (TREK, MAY 2013)

NOTES :

1. AERIAL IMAGE FROM BING MAPS

Figure 04

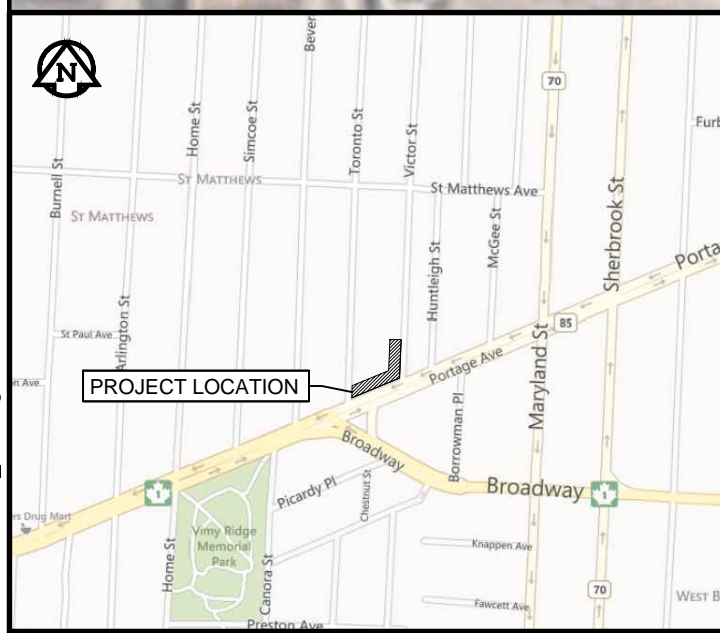
Test Hole Location Plan

Alleyway Between Montrose Street and Elm Street

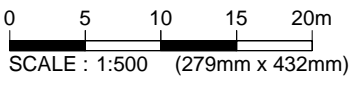
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KEY PLAN
SCALE: N.T.S.



LEGEND :
 TEST HOLE (TREK, MAY 2013)

NOTES :
 1. AERIAL IMAGE FROM GOOGLE EARTH

Figure 05
 Test Hole Location Plan
 Alleyway Between Toronto Street and Victor Street

Appendix A

Alleyway between Ashburn St and Valour Rd



Sub-Surface Log

Test Hole ASH13-01

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Ashburn St and Vaour Rd
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill 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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100									
					0 50 100 150 200 250									
0.00		ASPHALT 20 mm thick		C001										
0.05		CONCRETE 170 mm thick (rubble)		C002										
0.10		CLAY and SILT (F) with sand dark grey to black wet, firm to stiff intermediate plasticity		G003		●							+	
0.20		CLAY silty, trace fine sand brown moist, firm high plasticity		G004		●								△
0.50				G005		●								
1.00				G006		●								
1.50				G007		●								
2.00				G008		●								
2.50				G009		●								
3.00		stiff below 2.9 m		G010		●								
3.00				G011		●							+	

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No suffraging or seepage observed.
- 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 3) Test hole located behind # 891 Ashburn St, 24.0 m north of south edge of Alleyway at St. Matthews Ave and 1.6 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Sub-Surface Log

Test Hole ASH13-02

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Ashburn St and Vancouver Rd
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill Barre (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/m ³)						Undrained Shear Strength (kPa)	
					16	17	18	19	20	21		
0.0		ASPHALT 25 mm thick		C012								
0.0		CONCRETE 215 mm thick (rubber)		C013								
0.2		CLAY and SILT (Fines) with sand dark grey to black, wet, firm intermediate plasticity		G014								
0.4		SILT and CLAY sandy brown moist, firm, intermediate plasticity		G015								
0.6				G016								
0.8		some sand below 0.9 m		G017								
1.2		CLAY silty, trace sand brown frozen, moist and firm when thawed high plasticity		G018								
1.4				G019								
1.8		SILT trace fine sand brown frozen, wet and firm when thawed low plasticity		G020								
2.2				G021								
2.6		CLAY silty brown moist, stiff to very stiff high plasticity		G022								

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No suffraging or seepage observed.
- 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 3) Test hole located behind # 907 Ashburn St, 72.6 m north of south edge of Alleyway at St. Matthews Ave and 1.1 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - ASHBURN GPJ - REK GEO TECHNICAL GD - 14/6/13



Sub-Surface Log

Test Hole ASH13-03

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Ashburn St and Vancouver Rd
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100									
					0 50 100 150 200 250									
		ASPHALT 20 mm thick		C023										
		CONCRETE 180 mm thick (165 mm intact, 15 mm rubble)		C024										
		CLAY and SILT (F) with sand dark grey to black, wet, firm to stiff intermediate plasticity		G025										
		SILT and CLAY sandy brown wet, firm, intermediate plasticity		G026										
				G027										
		CLAY silty, trace sand brown moist, stiff high plasticity		G028										
				G029										
				G030										
		SILT trace fine sand brown moist, firm low plasticity		G031										
				G032										
				G033										

END OF HOLE AT 3.1 m IN SILT

Notes:

- 1) Test hole sounded to 2.1 m below surface.
- 2) No seepage observed.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 927 Ashburn St, 135.0 m north of south edge of Alleyway at St. Matthews Ave and 1.1 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Sub-Surface Log

Test Hole ASH13-04

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Ashburn St and Vancouver Rd
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100									
					0 50 100 150 200 250									
0.0 - 0.1		ASPHALT 40 mm thick		C034										
0.1 - 0.2		CONCRETE 230 mm thick (200 mm intact, 30 mm rubble)		C035										
0.2 - 0.4		CLAY and SILT (F) with sand dark grey to black, wet, firm to stiff intermediate plasticity		G036		●								
0.4 - 0.5				G037		●								
0.5 - 1.2		SILT and CLAY sandy brown wet, firm, intermediate plasticity		G038		●								
1.2 - 1.5				G039		●								
1.5 - 1.7		CLAY silty, trace fine sand brown moist, stiff low plasticity		G040		●								
1.7 - 2.0				G041		●								
2.0 - 2.4				G042		●								
2.4 - 2.5														
2.5 - 3.0		SILT some clay, trace fine sand brown moist, firm low plasticity wet below 2.4 m		G043		●								
3.0 - 3.1				G044		●								

END OF HOLE AT 3.1 m IN SILT

Notes:

- 1) Test hole sounded to 0.6 m below surface.
- 2) Seepage observed at 2.4 m below surface.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 949 Ashburn St, 182.7 m north of south edge of Alleyway at St. Matthews Ave and 1.2 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Sub-Surface Log

Test Hole ASH13-05

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Ashburn St and Vaour Rd
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill Barre (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/m ³)						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					0	20	40	60	80	100	0	50	100	150	200	250
0.00 - 0.05		ASPHALT 25 mm thick		C045												
0.05 - 0.10		CONCRETE 240 mm thick (rubber)		C046												
0.10 - 0.40		CLAY and SILT (F) with sand, trace gravel dark grey to black, wet, firm to stiff, intermediate plasticity most below 0.4 m		G047			●									
0.40 - 0.50				G048			●								⊕	△
0.50 - 1.20		CLAY silty, trace fine sand brown most, firm to stiff, high plasticity high plasticity		G049			●								⊕	△
1.20 - 1.80		frozen from 1.2 to 1.8 m		G050			●								⊕	△
1.80 - 2.00				G051			●									
2.00 - 2.50				G052			●									
2.50 - 3.00		soft below 2.0 m		G053			●								△	
3.00 - 3.10				G054			●								⊕	△
3.10 - 3.15				G055			●								⊕	△

END OF HOLE AT 3.1 m IN SILT

Notes:

- 1) Test hole soughed to 1.2 m below surface.
- 2) Seepage observed from 1.8 to 2.1 m below surface.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 957 Ashburn St, 123.0 m south of north edge of Alleyway at Ece Ave and 1.1 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - ASHBURN GPJ - REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole ASH13-06

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Ashburn St and Vancouver Rd
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100									
					0 50 100 150 200 250									
0.00 - 0.05	ASPHALT	90 mm thick		C056										
0.05 - 0.10	CONCRETE	130 mm thick (rubble)		C057										
0.10 - 0.35	CLAY and SILT (F)	with sand, some organics dark grey to black, wet, firm to stiff, intermediate plasticity trace gravel and most below 0.4 m		G058										
0.35 - 0.40				G059										
0.40 - 0.70	SILT and CLAY	sandy brown frozen, wet and firm when thawed low plasticity		G060										
0.70 - 0.80				G061										
0.80 - 0.90				G062										
0.90 - 1.00				G063										
1.00 - 1.10				G064										
1.10 - 2.20	CLAY	stiff, trace fine sand brown most, stiff, high plasticity		G065										
2.20 - 3.00				G066										

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No squeezing observed, test hole squeezed from 1.2 to 2.2 m below surface.
- 2) Seepage observed from 1.8 to 2.1 m below surface.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cord patch to top of pavement.
- 4) Test hole located behind # 971 Ashburn St, 61.8 m south of north edge of Alleyway at Ece Ave and 0.8 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - ASHBURN GPJ - REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole ASH13-07

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Wynnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Ashburn St and Vancouver Rd
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100									
					0 20 40 60 80 100						0 50 100 150 200 250			
0.0 - 0.1		ASPHALT 30 mm thick		C067										
0.1 - 0.2		CONCRETE 230 mm thick		C068										
0.2 - 0.4		CLAY and SILT (F) with sand, some gravel dark grey to black, wet, firm to stiff, intermediate plasticity		G069		●							⊕	
0.4 - 0.6		SILT and CLAY sandy brown wet, firm intermediate plasticity		G070		●								
0.6 - 0.8				G071		●								
0.8 - 1.0				G072		●								
1.0 - 1.2				G073		●								
1.2 - 1.4				G074		●								
1.4 - 1.8		CLAY silty, trace fine sand brown most, stiff high plasticity		G075		●							⊕ Δ	
1.8 - 2.1				G076		●							⊕ Δ	
2.1 - 3.0		firm below 2.9 m		G077		●							⊕	

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) Test hole sounded to 1.2 m below surface.
- 2) Seepage observed from 1.8 to 2.1 m below surface.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 985 Ashburn St, 19.7 m south of north edge of Alleyway at Ece Ave and 1.0 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - ASHBURN GPJ - REK GEO TECH CAL GD 14/6/13



Photo 1: Asphalt and Concrete Core Sample from Test Hole ASH13-01



Photo 2: Asphalt and Concrete Core Sample from Test Hole ASH13-02



Photo 3: Asphalt and Concrete Core sample from Test Hole ASH13-03



Photo 4: Asphalt and Concrete Core sample from Test Hole ASH13-04



Photo 5: Asphalt and Concrete Core sample from Test Hole ASH13-05



Photo 6: Asphalt and Concrete Core sample from Test Hole ASH13-06



Photo 7: Asphalt and Concrete core sample from Test Hole ASH13-07



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 1712 St. James Street
 Winnipeg, MB R3H 0L3
 Tel: 204.975.9433 Fax: 204.975.9435

**Atterberg Limits
 ASTM D4318**

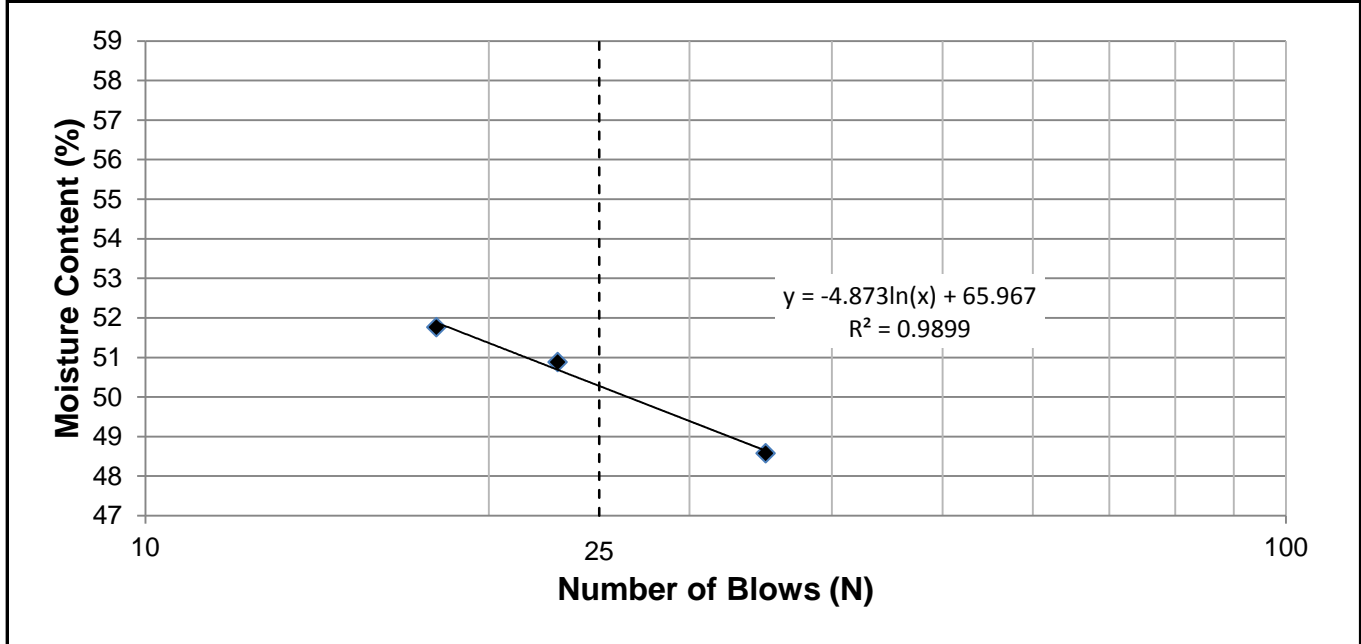
Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole ASH13-02
Sample # G16
Depth (m) 0.6-0.7
Sample Date 21-May-13
Test Date 01-Jun-13
Technician Beta Taryana

Liquid Limit	50
Plastic Limit	19
Plasticity Index	31

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	35	23	18		
Mass Wet Soil + Tare (g)	27.943	22.486	27.096		
Mass Dry Soil + Tare (g)	23.356	19.608	22.615		
Mass Tare (g)	13.912	13.951	13.958		
Mass Water (g)	4.587	2.878	4.481		
Mass Dry Soil (g)	9.444	5.657	8.657		
Moisture Content (%)	48.571	50.875	51.762		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	21.037	21.206			
Mass Dry Soil + Tare (g)	19.888	20.065			
Mass Tare (g)	13.970	14.190			
Mass Water (g)	1.149	1.141			
Mass Dry Soil (g)	5.918	5.875			
Moisture Content (%)	19.415	19.421			



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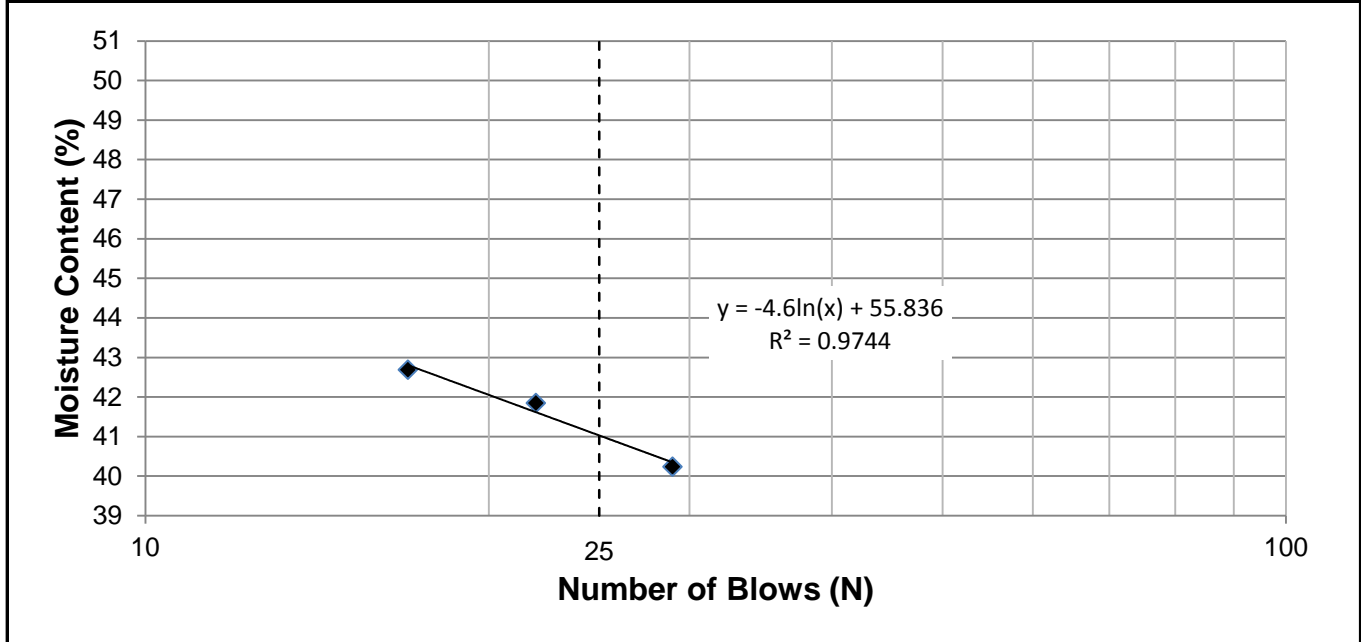
Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole ASH13-06
Sample # G58
Depth (m) 0.2-0.3
Sample Date 22-May-13
Test Date 12-Jun-13
Technician Beta Taryana

Liquid Limit	41
Plastic Limit	19
Plasticity Index	22

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	29	22	17		
Mass Wet Soil + Tare (g)	28.952	30.500	27.869		
Mass Dry Soil + Tare (g)	24.702	25.650	23.721		
Mass Tare (g)	14.139	14.060	14.003		
Mass Water (g)	4.250	4.850	4.148		
Mass Dry Soil (g)	10.563	11.590	9.718		
Moisture Content (%)	40.235	41.846	42.684		



Plastic Limit

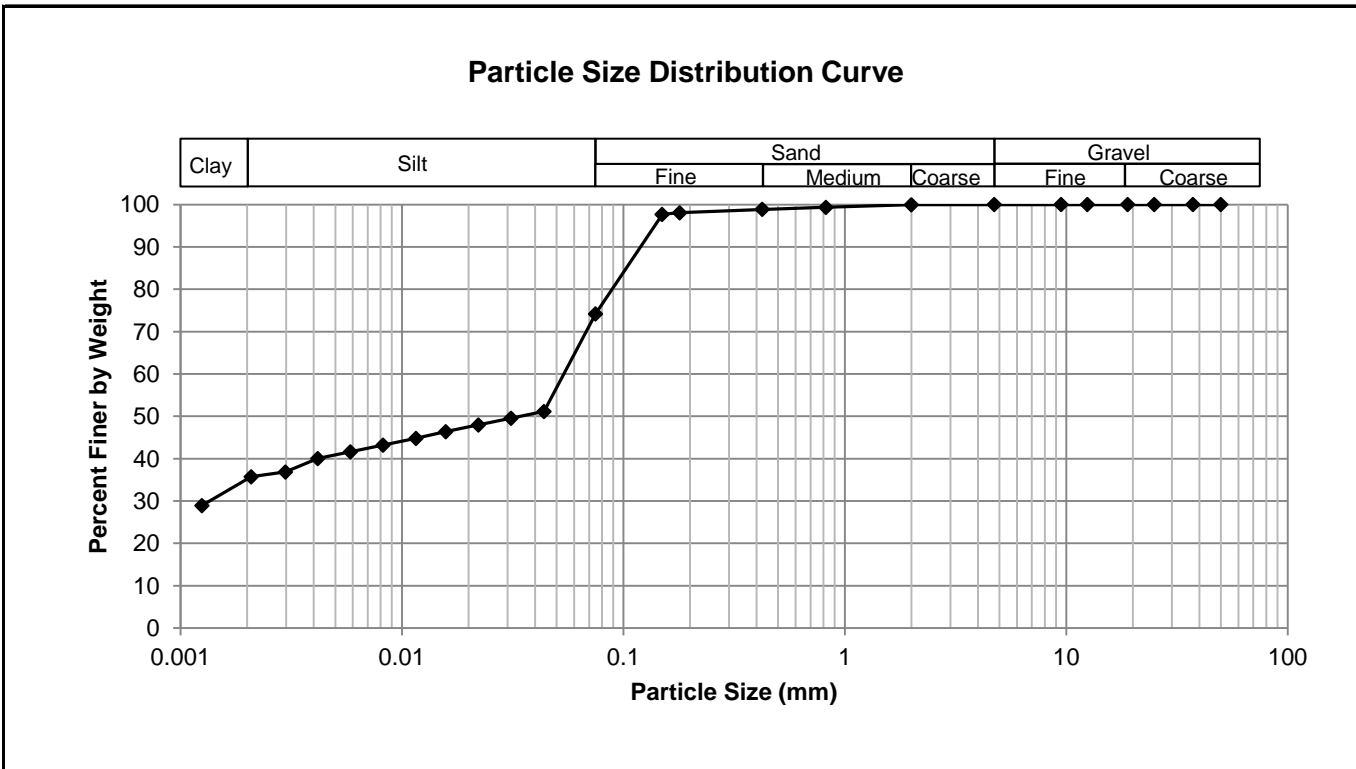
Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.583	20.104			
Mass Dry Soil + Tare (g)	19.547	19.143			
Mass Tare (g)	14.054	13.962			
Mass Water (g)	1.036	0.961			
Mass Dry Soil (g)	5.493	5.181			
Moisture Content (%)	18.860	18.549			



Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole ASH13-02
Sample # G16
Depth (m) 0.6 - 0.7
Sample Date 21-May-13
Test Date 31-May-13
Technician Beta Taryana

Gravel	0.0%
Sand	25.8%
Silt	38.6%
Clay	35.6%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	74.18
37.5	100.00	2.00	99.95	0.0439	51.14
25.0	100.00	0.825	99.35	0.0312	49.55
19.0	100.00	0.425	98.85	0.0222	47.96
12.5	100.00	0.180	98.08	0.0158	46.38
9.50	100.00	0.150	97.70	0.0116	44.79
4.75	100.00	0.075	74.18	0.0082	43.20
				0.0059	41.61
				0.0042	40.03
				0.0030	36.85
				0.0021	35.72
				0.0013	28.92

Appendix B

Alleyway between Dominion St and Garfield St North



Sub-Surface Log

Test Hole DOM13-01

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Dominion St and Garfield St. North
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill 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/m ³)						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL MC LL 0 20 40 60 80 100											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT 25 mm thick		C089												
		CONCRETE 215 mm thick (rubber)		C090												
		CLAY (F) silt, trace gravel dark brown to black frozen, moist and stiff when thawed high plasticity		G091			●									
-0.5				G092			●								▲	
		CLAY silt brown frozen, moist and stiff when thawed high plasticity		G093			●								▲	▲
-1.0		SILT clayey, trace fine sand brown frozen, wet and firm when thawed low plasticity		G094			●									
				G095			●									
				G096			●									
				G097			●									
-2.0		CLAY silt brown frozen, moist and stiff when thawed high plasticity		G098			●									
				G099			●								▲	▲

END OF HOLE AT 3.1 m IN CLAY
 Notes:
 1) No suffraging or seepage observed.
 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
 3) Test hole located behind # 1112 Notre Dame Ave, 19.6 m east of Alleyway at Dominion St. and 2.1 m south of north edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJECT LOGS - DOMINION.GPJ_TREK GEOTECHNICAL GDT 14/6/13



Sub-Surface Log

Test Hole DOM13-02

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Dominion St and Garfield St. North
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100 0 50 100 150 200 250									
											<input checked="" type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Pocket Pen <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>			
		ASPHALT 25 mm thick		C078										
		CONCRETE 215 mm thick (rubber)		C079										
-0.5		CLAY (F) silty, trace gravel back wet, stiff high plasticity		G080										
				G081										
				G082										
-1.0		CLAY silty brown moist, stiff high plasticity		G083										
-1.5		SILT clayey, trace fine sand brown wet, firm low plasticity		G084										
				G085										
				G086										
-2.0		CLAY silty brown frozen, moist and firm to stiff when thawed high plasticity moist and firm to stiff below 2.3 m		G087										
				G088										

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No squeezing observed, test hole squeezed from 1.2 to 1.7 m below surface.
- 2) Seepage from 1.2 to 1.7 m below surface.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 1100 Notre Dame Ave, 11.7 m west of Alleyway at Garfield St. N and 100 mm south of north edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Sub-Surface Log

Test Hole DOM13-03

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Dominion St and Garfield St. North
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100									
					0 20 40 60 80 100						0 50 100 150 200 250			
		ASPHALT 25 mm thick		C067										
		CONCRETE 215 mm thick (rubber)		C068										
-0.5		CLAY (F) silty, trace gravel dark brown to black moist, firm to stiff high plasticity		G069			●						✱	△
				G070			●						✱	△
		CLAY silty brown moist, stiff high plasticity		G071			●						✱	△
-1.0				G072			●							
		SILT some clay, trace fine sand brown wet, firm low plasticity		G073			●							
				G074			●							
				G075			●							
-2.0		CLAY silty brown frozen, moist and firm when thawed high plasticity												
-2.5		moist and firm below 2.4 m		G076			●						✱	△
				G077			●						✱	△

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) Test hole soured to 1.2 m below surface.
- 2) Seepage observed from 1.1 to 2.0 m below surface.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 1297 Dominion St, 53.3 m south of south side of 1108 Notre Dame Ave and 1.2 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Sub-Surface Log

Test Hole DOM13-04

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Dominion St and Garfield St. North
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill Barre (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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100 0 50 100 150 200250									
											<input type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Pocket Pen <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>			
0.0		ASPHALT 40 mm thick		C056										
0.0		CONCRETE 170 mm thick (rubber)		C057										
0.2		CLAY (F) silty, trace gravel dark brown to black wet, firm to stiff high plasticity		G058										
0.4				G059										
0.6				G060										
0.8		CLAY silty brown moist, firm high plasticity		G061										
1.0		SILT some clay, trace fine sand brown wet, soft low plasticity		G062										
1.2				G063										
1.4				G064										
1.6				G065										
1.8				G066										
2.0		CLAY silty brown moist, firm to stiff high plasticity												
2.2														
2.4														
2.6														
2.8														
3.0														

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No squeezing observed, test hole squeezed at 1.2 to 2.0 m below surface.
- 2) Seepage observed from 1.1 to 2.0 m below surface.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 1285 Dominion St, 108.6 m south of south side of 1108 Notre Dame Ave and 1.1 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Sub-Surface Log

Test Hole DOM13-05

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Dominion St and Garfield St. North
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

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/m ³)						Undrained Shear Strength (kPa)
					16	17	18	19	20	21	
0.0		ASPHALT 20 mm thick		C045							
0.0		CONCRETE 200 mm thick (150 mm intact, 50 mm rubble)		C046							
0.0		CLAY (F) silty, some sand, trace gravel dark brown to black wet, stiff high plasticity		G047							
0.5				G048							
0.5				G049							
1.0		CLAY silty brown moist, firm high plasticity		G050							
1.0				G051							
1.5		SILT clayey, trace fine sand brown moist, soft low plasticity		G052							
2.0		CLAY silty brown moist, stiff high plasticity		G053							
2.5		firm to stiff below 2.4 m		G054							
3.0		trace discontinuities (<3 mm diam.) below 2.9 m		G055							

END OF HOLE AT 3.1 m IN CLAY
 Notes:
 1) No seepage or seepage observed.
 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cord patch to top of pavement.
 3) Test hole located behind # 1277 Dominion St, 149.9 m south of south side of 1108 Notre Dame Ave and 1.3 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJECT LOGS - DOMINION GP, TREK GEOTECHNICAL GDT 14/6/13



Sub-Surface Log

Test Hole DOM13-06

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Dominion St and Garfield St. North
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill Barre (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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100									
					0 20 40 60 80 100						0 50 100 150 200250			
0.0		ASPHALT 25 mm thick		C034										
0.0		CONCRETE 140 mm thick (rubble)		C035										
0.0		CLAY (F) silty, some sand, trace gravel dark brown to black wet, stiff high plasticity		G036										
0.5		CLAY silty brown moist, stiff high plasticity		G037										
0.5		CLAY silty brown moist, stiff high plasticity		G038										
1.0		SILT some clay, trace fine sand brown moist, firm low plasticity wet at 1.2 m		G039										
1.5				G040										
2.0				G041										
2.5		CLAY silty grey moist, stiff high plasticity		G042										
2.5				G043										
3.0		firm to stiff below 2.9 m		G044										

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) Test hole sounded to 1.2 m below surface.
- 2) Seepage observed at 1.5 to 2.3 m below surface.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 1263 Dominion St, 215.0 m south of south side of 1108 Notre Dame Ave and 0.8 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Sub-Surface Log

Test Hole DOM13-07

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Dominion St and Garfield St. North
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill Barre (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/m ³)						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL MC LL 0 20 40 60 80 100											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT 25 mm thick		C023												
		CONCRETE 210 mm thick (125 mm intact, 85 mm rubble)		C024												
		SAND and GRAVEL (F) 20 mm down crushed limestone, clayey, dark brown, wet, compact		G025												
		CLAY (F) silty, trace sand, some organics dark brown to black moist, stiff high plasticity		G026												
				G027												
		CLAY silty grey moist, stiff high plasticity		G028												
				G029												
		SILT trace clay, trace sand brown moist, firm low plasticity		G30												
		CLAY silty grey moist, stiff high plasticity		G31												
				G32												
				G33												

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No seepage observed, test hole squeezed at 1.5 m below surface.
- 2) Seepage observed from 1.5 to 1.8 m below surface.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located south of # 1138 Garfield St N, 16.6 m west of east edge of Alleyway at Garfield St. N and 1.1 m south of north edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJECT LOGS - DOMINION GP | TREK GEOTECHNICAL GDT 14/6/13



Sub-Surface Log

Test Hole DOM13-08

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Dominion St and Garfield St. North
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill Barre (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/m ³)						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					0	20	40	60	80	100	0	50	100	150	200	250
0.0 - 0.1		ASPHALT 20 mm thick		C012												
0.1 - 0.2		CONCRETE 210 mm thick (rubber)		C013												
0.2 - 0.4		SAND and GRAVEL (F) 20 mm down crushed limestone, clayey, dark brown, wet, compact		G014												
0.4 - 0.6		CLAY (F) silty, trace sand brown moist, firm high plasticity soft below 0.6 m		G015												
0.6 - 0.8				G016												
0.8 - 1.0		SILT trace clay, trace sand brown moist, firm low plasticity		G017												
1.0 - 1.2				G018												
1.2 - 1.4				G019												
1.4 - 1.6				G020												
1.6 - 2.5		CLAY silty grey moist, stiff high plasticity		G021												
2.5 - 3.0		firm below 2.9 m		G022												

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No squeezing observed, test hole squeezed at 0.9 to 2.3 m below surface.
- 2) No seepage observed.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cord patch to top of pavement.
- 4) Test hole located behind # 1247 Dominion St, 113.9 m north of south edge of Alleyway at Yarwood St and 1.0 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Sub-Surface Log

Test Hole DOM13-09

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Dominion St and Garfield St. North
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 21 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill 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/m ³)						Undrained Shear Strength (kPa)						
					16	17	18	19	20	21	Test Type						
					Particle Size (%)												
					0	20	40	60	80	100							
					PL MC LL 0 20 40 60 80 100												
					0 50 100 150 200 250												
0.0 - 0.1		ASPHALT 20 mm thick	Grab (G)	C001													
0.1 - 0.2		CONCRETE 210 mm thick (50 mm intact, 160 mm rubble)	Grab (G)	C002													
0.2 - 0.4		SAND and GRAVEL (F) 20 mm down crushed limestone, clayey, dark brown, wet, compact	Shelby Tube (T)	G003													
0.4 - 0.5		CLAY (F) silty, trace sand	Shelby Tube (T)	G004													
0.5 - 0.6		grey moist, firm high plasticity	Shelby Tube (T)	G005													
0.6 - 0.7			Shelby Tube (T)	G006													
0.7 - 1.2		SILT trace clay, trace sand brown moist, firm low plasticity	Shelby Tube (T)	G007													
1.2 - 1.3			Shelby Tube (T)	G008													
1.3 - 1.4			Shelby Tube (T)	G009													
1.4 - 2.5		CLAY silty grey moist, firm high plasticity	Shelby Tube (T)	G010													
2.5 - 3.0			Shelby Tube (T)	G011													

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No suffraging or seepage observed.
- 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 3) Test hole located behind # 1235 Dominion St, 47.6 m north of south edge of Alleyway at Yarwood St and 1.1 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Photo 1: Asphalt and Concrete Core Sample from Test Hole DOM13-01



Photo 2: Asphalt and Concrete Core Sample from Test Hole DOM13-02



Photo 3: Asphalt and Concrete Core Sample from Test Hole DOM13-03



Photo 4: Asphalt and Concrete Core Sample from Test Hole DOM13-04



Photo 5: Asphalt and Concrete Core Sample from Test Hole DOM13-05



Photo 6: Asphalt and Concrete Core Sample from Test Hole DOM13-06



Photo 7: Asphalt and Concrete Core Sample from Test Hole DOM13-07



Photo 8: Asphalt and Concrete Core Sample from Test Hole DOM13-08



Photo 9: Asphalt and Concrete Core Sample from Test Hole DOM13-09



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**Atterberg Limits
 ASTM D4318**

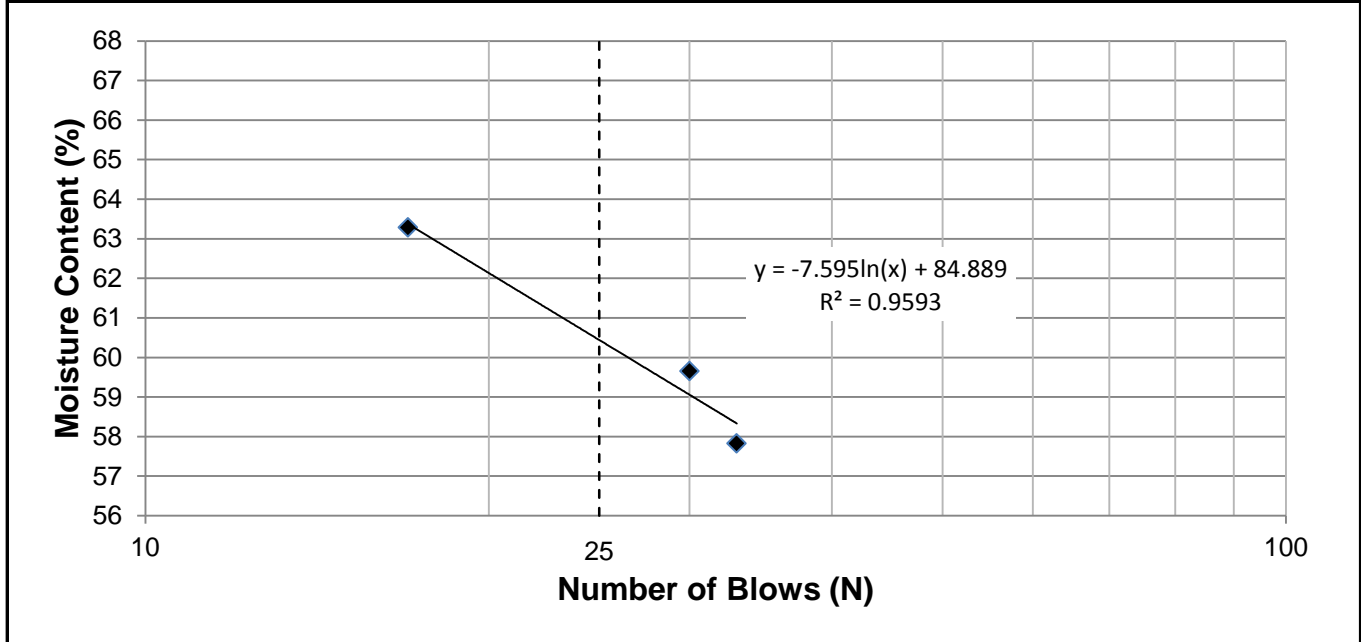
Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole DOM13-05
Sample # G48
Depth (m) 0.4-0.5
Sample Date 21-May-13
Test Date 01-Jun-13
Technician Beta Taryana

Liquid Limit	60
Plastic Limit	18
Plasticity Index	43

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	33	30	17		
Mass Wet Soil + Tare (g)	26.487	25.996	25.031		
Mass Dry Soil + Tare (g)	21.903	21.486	20.727		
Mass Tare (g)	13.975	13.926	13.926		
Mass Water (g)	4.584	4.510	4.304		
Mass Dry Soil (g)	7.928	7.560	6.801		
Moisture Content (%)	57.820	59.656	63.285		



Plastic Limit

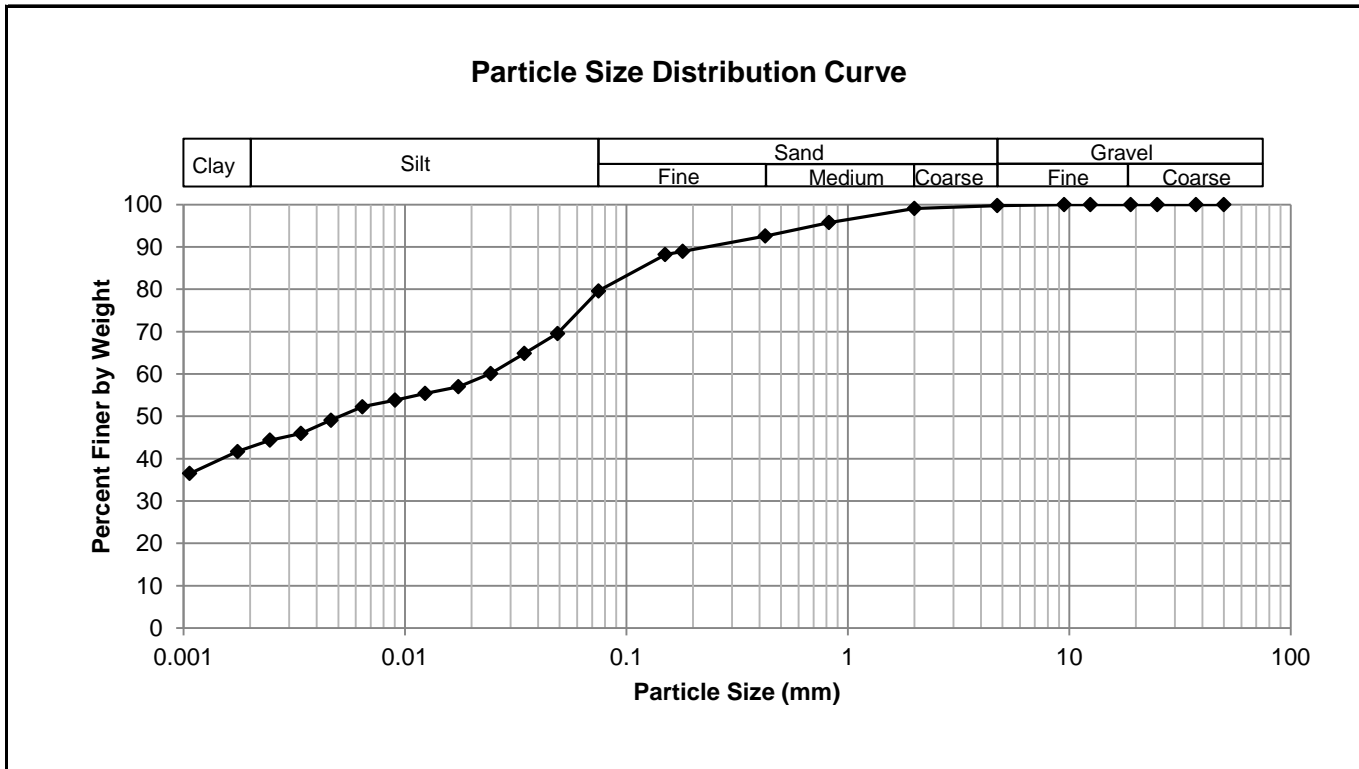
Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.140	20.090			
Mass Dry Soil + Tare (g)	19.224	19.154			
Mass Tare (g)	14.060	13.933			
Mass Water (g)	0.916	0.936			
Mass Dry Soil (g)	5.164	5.221			
Moisture Content (%)	17.738	17.928			



Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole DOM13-05
Sample # G48
Depth (m) 0.4 - 0.5
Sample Date 21-May-13
Test Date 31-May-13
Technician Beta Taryana

Gravel	0.2%
Sand	20.2%
Silt	36.0%
Clay	43.6%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	99.77	0.0750	79.62
37.5	100.00	2.00	99.09	0.0490	69.58
25.0	100.00	0.825	95.75	0.0346	64.86
19.0	100.00	0.425	92.61	0.0245	60.14
12.5	100.00	0.180	88.95	0.0175	56.99
9.50	100.00	0.150	88.19	0.0124	55.42
4.75	99.77	0.075	79.62	0.0090	53.84
				0.0064	52.27
				0.0046	49.12
				0.0034	45.97
				0.0025	44.40
				0.0018	41.71
				0.0011	36.53

Appendix C

Alleyway between Home St and Ethelbert St



Sub-Surface Log

Test Hole HOM13-01

1 of 1

Client: KGS Group **Project Number:** 0012 004 00
Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 **Location:** Alleyway between Home St and Ethelbert St
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Existing Ground
Method: 150 mm Concrete Coring Drill **Date Drilled:** 22 May 2013

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/m ³)						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL ——— MC ——— LL —————●—————											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT 40 mm thick		C001												
		CONCRETE 165 mm thick (115 mm intact, 50 mm rubble)		C002												

END OF HOLE AT 0.7 m AT TOP OF CLAY FILL
 Notes:
 1) Test hole could not be advanced into sub grade materials due to overhead power lines.
 2) Test hole backfilled with sand to 0.1 below top of pavement and asphalt cold patch to top of pavement.
 3) Test hole located east of # 860 Westminster Ave, 10.3 m south of north edge of Alleyway at Westminster Ave and 0.7 m east of west edge of pavement.

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJEC LOGS - HOME GPJ REK GEO TECHNICAL GD 14/6/13

Logged By: Brent Hay **Reviewed By:** Nelson Ferreira **Project Engineer:** Brent Hay



Sub-Surface Log

Test Hole HOM13-02

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Home St and Ethelbert St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100									
					0 50 100 150 200 250									
0.0		ASPHALT 25 mm th ck		C003										
0.0		CONCRETE 140 mm th ck (130 mm intact, 10 mm rubble)		C004										
0.0		SAND and GRAVEL (F) 20 mm down crushed limestone, some clay, dark brown, wet, compact		G005	●									
0.5		CLAY and SILT (F) w th sand, trace gravel brown moist, firm intermediate plasticity		G006	●						+	△		
0.7				G007	●						+	△		
1.0				G008	●						+	△		
1.5		CLAY silty, trace sand grey moist, firm high plasticity		G009	●									
1.5		back below 1.5 m		G010	●									
2.0				G011	●									
2.5				G012	●						+	△		
3.0				G013	●						+	△		

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) Test hole sounded to 0.9 m below surface.
- 2) No seepage observed.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cord patch to top of pavement.
- 4) Test hole located behind # 137 Home St, 52.7 m south of north edge of Alleyway at Westminster Ave and 1.2 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Sub-Surface Log

Test Hole HOM13-03

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Home St and Ethelbert St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

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/m ³)						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL MC LL											
					0	20	40	60	80	100	0	50	100	150	200	250
0.0		CONCRETE 130 mm thick (120 mm intact, 10 mm rubble)		C014												
0.0		SAND and GRAVEL (Granular F) 20 mm down, brown, wet, well graded, coarse graded gravel		G015	●											
0.0		CLAY and SILT (F) with sand, trace gravel brown moist, firm intermediate plasticity		G016		●										
0.5		SILT and CLAY trace fine sand back moist, firm intermediate plasticity		G017			●									
1.0				G018				●					⊕			
1.5		brown, frozen, wet and firm when thawed below 1.3 m		G019				●								
1.5				G020				●								
2.0		CLAY silty, trace sand grey frozen, moist and stiff when thawed high plasticity		G021				●								
2.5				G022				●						⊕	△	
3.0				G023				●						⊕	△	

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) Test hole sounded to 1.2 m below surface.
- 2) No seepage observed.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 131 Home St, 83.6 m south of north edge of Alleyway at Westmaster Ave and 1.5 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - HOME GPJ REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole HOM13-04

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Home St and Ethelbert St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

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/m ³)					Undrained Shear Strength (kPa)						
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					0	20	40	60	80	100	0	50	100	150	200	250
0.00		ASPHALT 75 mm thick		C024												
0.05		CONCRETE 150 mm thick (contact)		C025												
0.10		SAND and GRAVEL (Granular F) brown, wet, well graded, coarse graded gravel		G026			●									
0.20		CLAY and SILT (F) with sand, trace gravel brown moist, firm intermediate plasticity		G027			●									
0.30				G028			●									
0.40				G029			●							△		
0.50		CLAY silty, trace sand, trace organics grey to black frozen, moist and stiff when thawed high plasticity		G030			●							△		
0.60				G031			●							△		
0.70				G032			●									
0.80				G033			●							△		
0.90				G034			●							△		
2.70		moist and firm to stiff below 2.7 m														

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No seepage or seepage observed.
- 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 3) Test hole located behind # 123 Home St, 124.2 m south of north edge of Alleyway at Westminster Ave and 1.4 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - HOME GP. REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole HOM13-05

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Home St and Ethelbert St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill Barre (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/m ³)						Undrained Shear Strength (kPa)
					16	17	18	19	20	21	
0.0		ASPHALT 65 mm thick		C035							
0.0		CONCRETE 150 mm thick (130 mm intact, 20 mm rubble)		C036							
0.0		SAND and GRAVEL (Granular F) 20 mm down, brown, wet, well graded, coarse graded gravel		G037							
0.5		CLAY and SILT (F) with sand, trace gravel brown moist, firm intermediate plasticity		G038							
0.5		SILT and CLAY some to trace fine sand back moist, firm intermediate plasticity		G039							
1.0		brown, frozen, wet and firm when thawed below 1.1 m		G040							
1.5		CLAY some silt, trace organics grey moist, stiff high plasticity		G042							
2.0		frozen from 1.5 to 2.0 m, moist and stiff when thawed		G043							
2.5				G044							
3.0		firm below 2.9 m		G045							

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No suffraging or seepage observed.
- 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 3) Test hole located behind # 101 Home St, 163.2 m south of north edge of Alleyway at Westminster Ave and 1.4 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - HOME GPJ REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole HOM13-06

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Home St and Ethelbert St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill 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/m ³)						Undrained Shear Strength (kPa)
					16	17	18	19	20	21	
0.0		CONCRETE 200 mm thick (160 mm intact, 40 mm rubble)		C046							
0.0		SAND and GRAVEL (Granular Fines) 20 mm down, brown, moist, well graded, coarse graded gravel		G047							
0.0		CLAY and SILT (Fines) with sand, trace gravel brown moist, firm intermediate plasticity		G048							
0.0		CLAY silty, trace sand, trace organics dark grey to black moist, firm to stiff high plasticity		G049							
0.0				G050							
0.0				G051							
0.0				G052							
0.0				G053							
0.0		brown below 2.1 m									
0.0		frozen from 1.1 to 2.3 m, moist and stiff when thawed									
0.0				G054							
0.0				G055							

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No suffraging or seepage observed.
- 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 3) Test hole located behind # 83 Home St, 208.1 m south of north edge of Alleyway at Westminster Ave and 1.5 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - HOME GPJ REK GEO ECHN CAL GD 14/6/13



Photo 1: Asphalt and Concrete Core Sample from Test Hole HOM13-01



Photo 2: Asphalt and Concrete Core Sample from Test Hole HOM13-02



Photo 3: Concrete Core Sample from Test Hole HOM13-03



Photo 4: Asphalt and Concrete Core Sample from Test Hole HOM13-04



Photo 5: Asphalt and Concrete Core Sample from Test Hole HOM13-05



Photo 6: Concrete Core Sample from Test Hole HOM13-06



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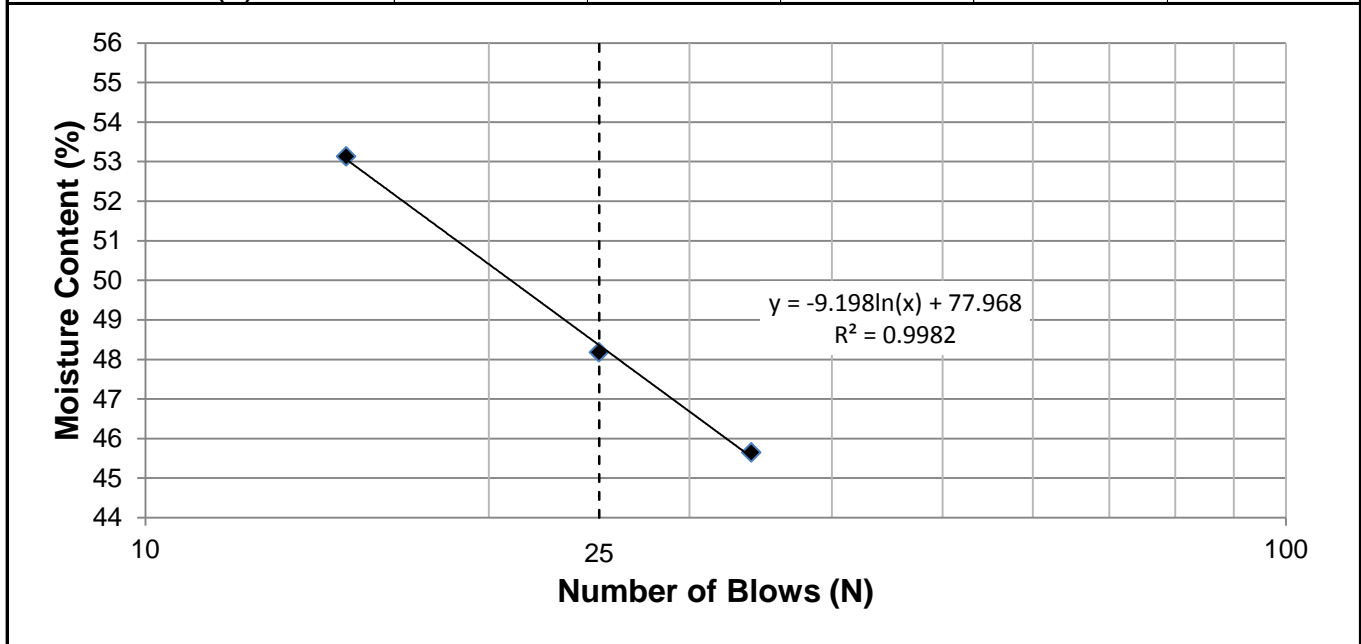
Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole HOM13-05
Sample # G38
Depth (m) 0.4-0.5
Sample Date 22-May-13
Test Date 05-Jun-13
Technician Beta Taryana

Liquid Limit	48
Plastic Limit	15
Plasticity Index	33

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	34	25	15		
Mass Wet Soil + Tare (g)	21.936	22.835	22.683		
Mass Dry Soil + Tare (g)	19.462	19.983	19.642		
Mass Tare (g)	14.042	14.063	13.918		
Mass Water (g)	2.474	2.852	3.041		
Mass Dry Soil (g)	5.420	5.920	5.724		
Moisture Content (%)	45.646	48.176	53.127		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.080	20.076			
Mass Dry Soil + Tare (g)	19.297	19.294			
Mass Tare (g)	14.064	14.009			
Mass Water (g)	0.783	0.782			
Mass Dry Soil (g)	5.233	5.285			
Moisture Content (%)	14.963	14.797			



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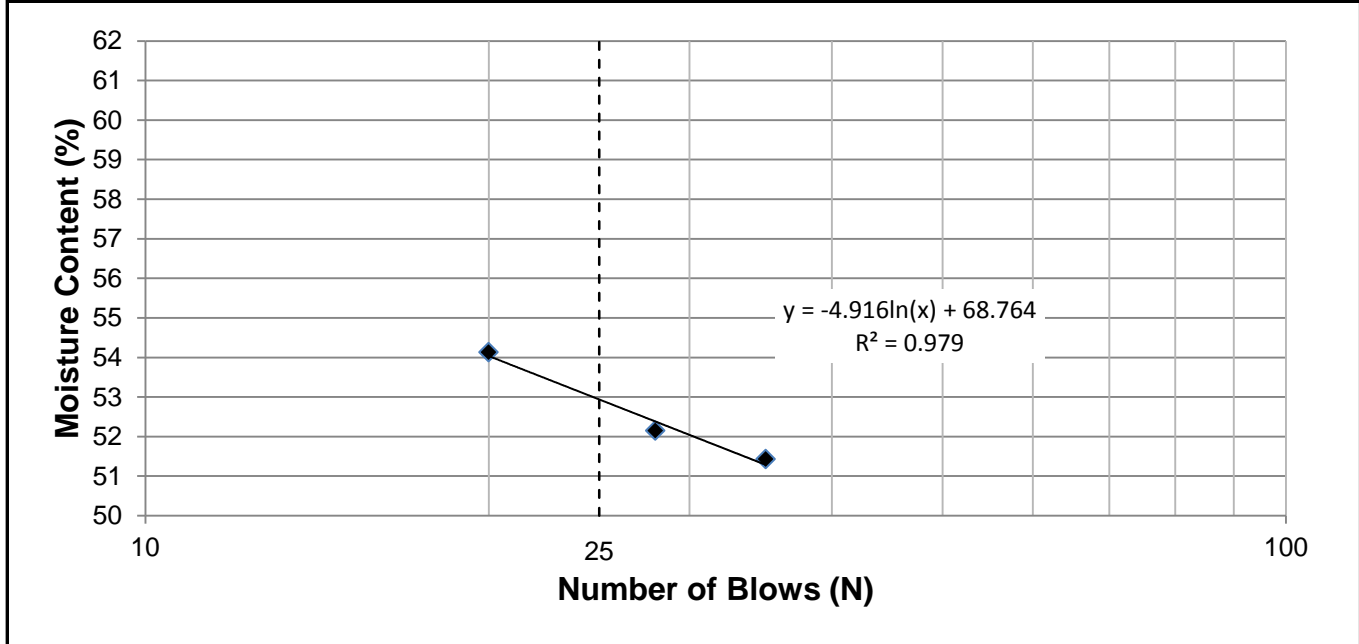
Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole HOM13-05
Sample # G39
Depth (m) 0.6-0.7
Sample Date 22-May-13
Test Date 08-Jun-13
Technician Beta Taryana

Liquid Limit	53
Plastic Limit	21
Plasticity Index	32

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	35	28	20		
Mass Wet Soil + Tare (g)	29.008	28.978	27.583		
Mass Dry Soil + Tare (g)	23.826	23.869	22.830		
Mass Tare (g)	13.749	14.072	14.049		
Mass Water (g)	5.182	5.109	4.753		
Mass Dry Soil (g)	10.077	9.797	8.781		
Moisture Content (%)	51.424	52.149	54.128		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.428	20.642			
Mass Dry Soil + Tare (g)	19.244	19.513			
Mass Tare (g)	13.643	14.110			
Mass Water (g)	1.184	1.129			
Mass Dry Soil (g)	5.601	5.403			
Moisture Content (%)	21.139	20.896			



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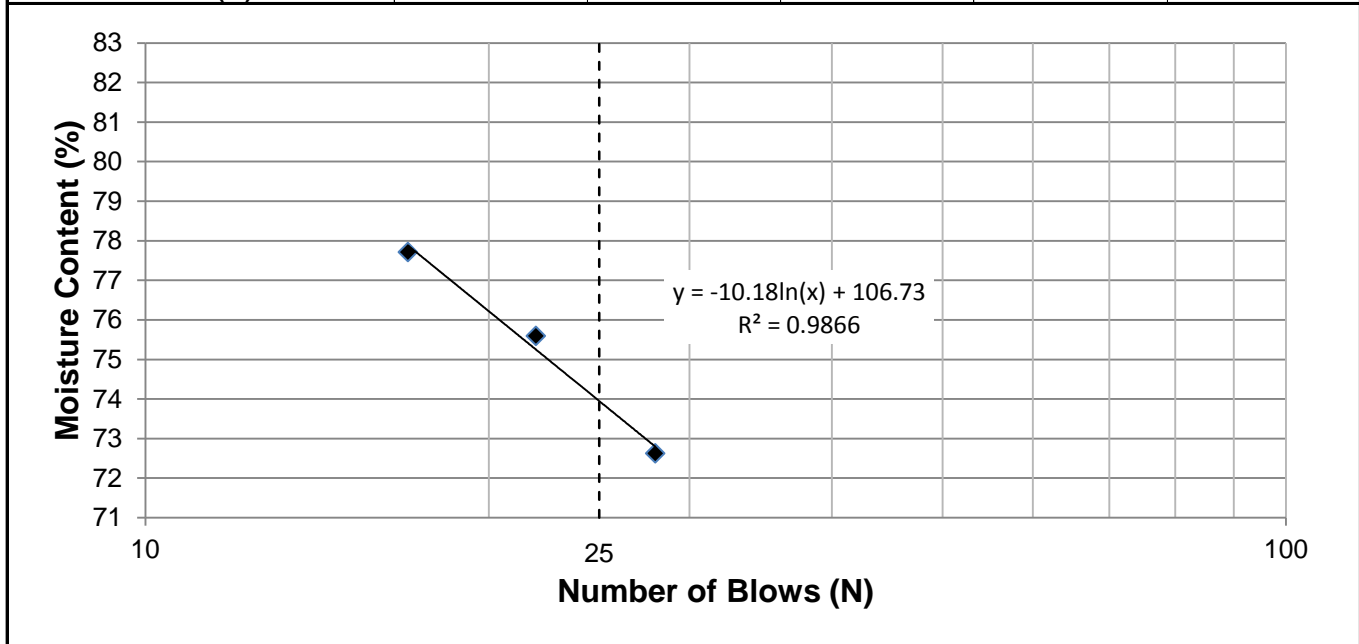
Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole HOM13-06
Sample # G50
Depth (m) 0.9-1.0
Sample Date 22-May-13
Test Date 12-Jun-13
Technician Beta Taryana

Liquid Limit	74
Plastic Limit	26
Plasticity Index	48

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	28	22	17		
Mass Wet Soil + Tare (g)	28.967	26.380	27.470		
Mass Dry Soil + Tare (g)	22.769	21.056	21.581		
Mass Tare (g)	14.234	14.013	14.003		
Mass Water (g)	6.198	5.324	5.889		
Mass Dry Soil (g)	8.535	7.043	7.578		
Moisture Content (%)	72.619	75.593	77.712		



Plastic Limit

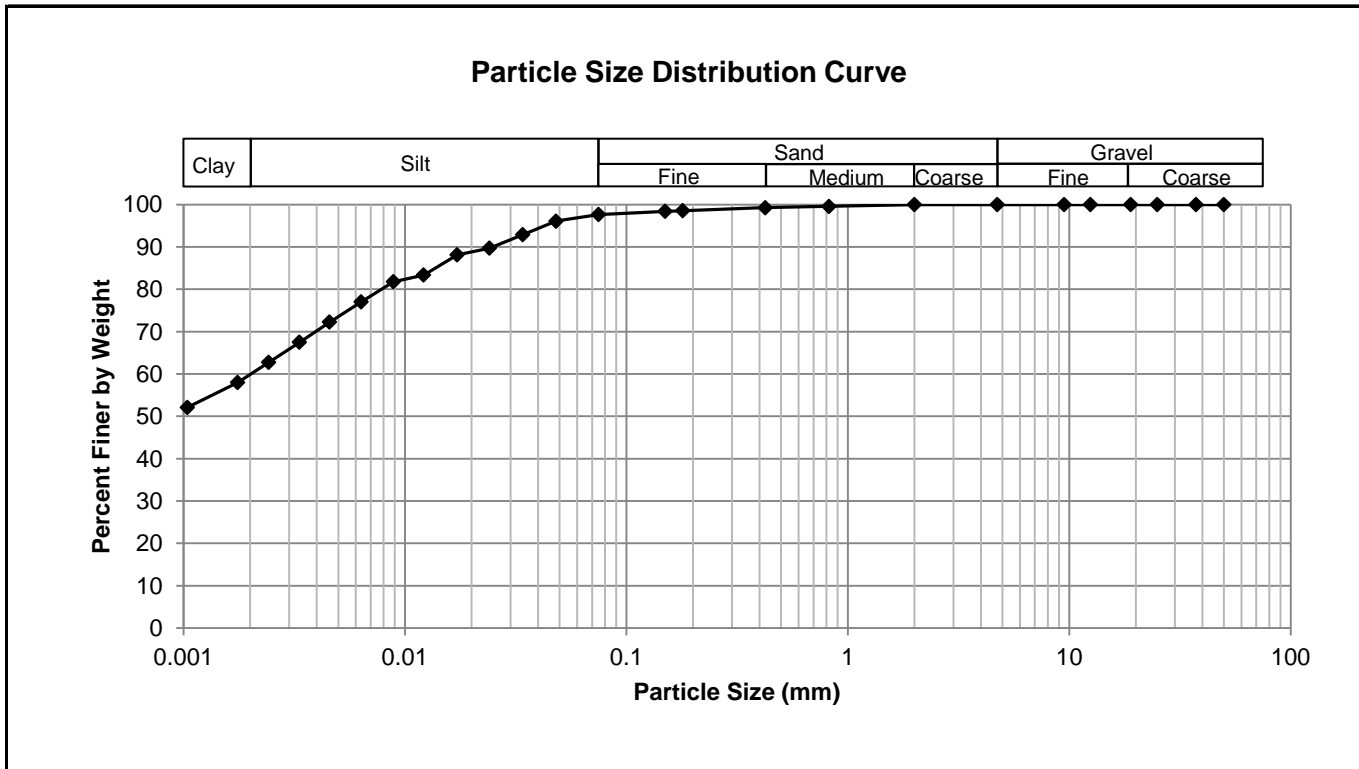
Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.254	20.230			
Mass Dry Soil + Tare (g)	18.972	18.945			
Mass Tare (g)	13.963	13.962			
Mass Water (g)	1.282	1.285			
Mass Dry Soil (g)	5.009	4.983			
Moisture Content (%)	25.594	25.788			



Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole HOM13-06
Sample # G50
Depth (m) 0.9 - 1.0
Sample Date 22-May-13
Test Date 11-Jun-13
Technician Beta Taryana

Gravel	0.0%
Sand	2.3%
Silt	37.1%
Clay	60.5%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	97.66
37.5	100.00	2.00	100.00	0.0482	96.09
25.0	100.00	0.825	99.59	0.0341	92.91
19.0	100.00	0.425	99.29	0.0241	89.74
12.5	100.00	0.180	98.55	0.0172	88.15
9.50	100.00	0.150	98.40	0.0122	83.38
4.75	100.00	0.075	97.66	0.0089	81.79
				0.0063	77.03
				0.0046	72.27
				0.0033	67.50
				0.0024	62.74
				0.0018	57.97
				0.0010	52.13

Appendix D

Alleyway between Montrose St and Elm St



Sub-Surface Log

Test Hole MON13-01

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Montrose St and Elm St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

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/m ³)		Undrained Shear Strength (kPa)	
					16	17	18	19
0.0		ASPHALT 25 mm thick		C01				
0.0		CONCRETE 175 mm thick (intact)		C02				
0.0		SAND and GRAVEL (F) 20 mm down crushed limestone, clayey dark brown, wet, compact, well graded		G03				
0.0		CLAY and SILT (F) some sand, trace gravel brown to grey moist, firm to stiff, high plasticity		G04				
0.0		SILT clayey, trace fine sand brown frozen, wet and firm when thawed low plasticity		G05				
0.0				G06				
0.0				G07				
0.0		CLAY silty, trace silt inclusions (1-10 m dia.) brown frozen, moist and firm to stiff when thawed high plasticity		G08				
0.0				G09				
0.0		moist and firm to stiff below 2.1 m						
0.0				G10				
0.0		50 mm silt seam at 2.7 m						
0.0				G11				

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No suffraging or seepage observed.
- 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cord patch to top of pavement.
- 3) Test hole located behind # 171 Montrose St, 14.3 m south of north edge of Alleyway at Academy Road and 0.7 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - MON ROSE GPJ - REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole MON13-02

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Montrose St and Elm St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

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/m ³)						Undrained Shear Strength (kPa)
					16	17	18	19	20	21	
0.0 - 0.1		ASPHALT 25 mm thick		C12							
0.1 - 0.2		CONCRETE 175 mm thick (rubble)		C13							
0.2 - 0.4		SAND and GRAVEL (F) 20 mm down crushed limestone, clayey dark brown, wet, compact, well graded	<input checked="" type="checkbox"/>	G14							
0.4 - 0.6		CLAY and SILT (F) some sand, trace gravel brown to grey moist, firm to stiff high plasticity	<input checked="" type="checkbox"/>	G15							
0.6 - 0.8		CLAY and SILT (F) some sand, trace gravel brown to grey moist, firm to stiff high plasticity	<input checked="" type="checkbox"/>	G16							□ △
0.8 - 1.0		SILT clayey, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G17							
1.0 - 1.2		SILT clayey, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G18							
1.2 - 1.4		SILT clayey, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G19							
1.4 - 1.6		SILT clayey, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G20							
1.6 - 1.8		SILT clayey, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G21							□ △
1.8 - 2.0		SILT clayey, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G22							□ △

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No seepage or seepage observed.
- 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cord patch to top of pavement.
- 3) Test hole located behind # 179 Montrose St, 61.7 m south of north edge of Alleyway at Academy Road and 1.4 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - MON - ROSE GPJ - REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole MON13-03

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Montrose St and Elm St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

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/m ³)						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL MC LL 0 20 40 60 80 100											
					0	20	40	60	80	100	0	50	100	150	200	250
0.0 - 0.1		CONCRETE 215 mm thick (in contact)		C24												
0.1 - 0.4		CLAY and SILT (Fines) some sand brown moist, stiff, high plasticity		G25		●										
0.4 - 0.6		CLAY silty brown moist, firm to stiff high plasticity		G26		●						⊕				
0.6 - 0.8				G27		●						⊕	△			
0.8 - 1.0				G28		●										
1.0 - 1.2				G29		●										
1.2 - 1.4				G30		●										
1.4 - 2.0		SILT some clay, trace fine sand brown frozen, wet and firm when thawed low plasticity wet and firm below 2.1 m		G31		●										
2.0 - 2.4				G32		●										
2.4 - 3.0		CLAY silty, trace silt inclusions (1-10 m dia.) brown moist, firm to stiff high plasticity		G33		●						⊕	△			

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) Test hole sounded to 9.5 m below surface upon completion
- 2) No seepage observed.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 205 Montrose St, 208.4 m north of south edge of Alleyway at Kingsway and 1.1 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - MON - ROSE GPJ - REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole MON13-04

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Montrose St and Elm St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 22 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill Barre (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/m ³)		Undrained Shear Strength (kPa)	
					16	17	18	19
0.0		ASPHALT 20 mm thick		C34				
0.0		CONCRETE 175 mm thick (intact)		C35				
0.0		SAND and GRAVEL (F) 20 mm down crushed limestone, clayey dark brown, wet, compact, well graded		G36				
0.0		CLAY and SILT (F) some sand, trace gravel brown to grey moist, firm to stiff, high plasticity		G37				
0.0		CLAY silty brown moist, firm to stiff high plasticity frozen to 1.5 m		G38				
0.0				G39				
0.0				G40				
0.0		SILT some clay, trace fine sand brown frozen, wet and firm when thawed low plasticity		G41				
0.0				G42				
0.0		wet and firm below 2.0 m						
0.0		CLAY silty brown moist, firm to stiff high plasticity		G43				
0.0				G44				

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) Test hole sounded to 1.5 m below surface upon completion.
- 2) No seepage observed.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 217 Montrose St, 169.4 m north of south edge of Alleyway at Kingsway and 1.52 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - MON ROSE GPJ - REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole MON13-05

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Montrose St and Elm St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 23 May 2013

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/m ³)						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL MC LL 0 20 40 60 80 100											
					0	20	40	60	80	100	0	50	100	150	200	250
0.0 - 0.2		CONCRETE 200 mm thick (in place)		C45												
0.2 - 0.4		SAND and GRAVEL (F) 20 mm down crushed limestone, clayey dark brown, wet, compact, well graded	<input checked="" type="checkbox"/>	G46		●										
0.4 - 0.6		CLAY and SILT (F) some sand, trace gravel brown to grey moist, firm to stiff, high plasticity	<input checked="" type="checkbox"/>	G47		●							▲	▲		
0.6 - 1.0		CLAY silty brown moist, firm to stiff high plasticity	<input checked="" type="checkbox"/>	G48		●										
1.0 - 1.2		CLAY silty brown moist, firm to stiff high plasticity	<input checked="" type="checkbox"/>	G49		●							▲	▲		
1.2 - 1.8		SILT some clay, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G50		●										
1.8 - 2.0		SILT some clay, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G51		●										
2.0 - 2.2		CLAY silty, trace silt inclusions (1-10 mm dia.) brown moist, firm to stiff, high plasticity	<input checked="" type="checkbox"/>	G52		●							▲	▲		
2.2 - 2.4		SILT trace clay, trace fine sand brown wet, firm, low plasticity	<input checked="" type="checkbox"/>	G53		●										
2.4 - 2.6		CLAY silty, trace silt inclusions (1-10 mm dia.) brown moist, firm to stiff high plasticity	<input checked="" type="checkbox"/>	G54		●							▲	▲		
2.6 - 3.0		CLAY silty, trace silt inclusions (1-10 mm dia.) brown moist, firm to stiff high plasticity	<input checked="" type="checkbox"/>	G55		●							▲	▲		

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) Test hole sounded to 1.4 m below surface upon completion
- 2) No seepage observed.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 221 Montrose St, 127.4 m north of south edge of Alleyway at Kingsway and 1.3 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ.EC. LOGS - MON ROSE GPJ REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole MON13-06

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Montrose St and Elm St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 23 May 2013

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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100									
					0 50 100 150 200 250									
0.0 - 0.1		CONCRETE 215 mm thick (in contact)		C56										
0.1 - 0.4		CLAY and SILT (Fines) some sand, trace gravel brown to grey moist, firm to stiff, high plasticity	<input checked="" type="checkbox"/>	G57		●								
0.4 - 0.6		CLAY silty brown moist, stiff high plasticity	<input checked="" type="checkbox"/>	G58		●						✚	△	
0.6 - 1.0		CLAY silty brown moist, stiff high plasticity	<input checked="" type="checkbox"/>	G59		●						✚	△	
1.0 - 1.3		CLAY silty brown moist, stiff high plasticity	<input checked="" type="checkbox"/>	G60		●						✚		
1.3 - 2.2		SILT some clay, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G61		●								
2.2 - 2.6		SILT some clay, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G62		●								
2.6 - 2.9		SILT some clay, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G63		●								
2.9 - 3.1		CLAY silty, trace silt inclusions (1-10 mm dia.) brown moist, firm high plasticity non frozen below 2.6 m	<input checked="" type="checkbox"/>	G64		●								
3.1 - 3.0		CLAY silty, trace silt inclusions (1-10 mm dia.) brown moist, firm high plasticity non frozen below 2.6 m	<input checked="" type="checkbox"/>	G65		●						✚		

END OF HOLE AT 3.1 m IN CLAY
 Notes:
 1) No suffraging or seepage observed.
 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
 3) Test hole located behind # 257 Montrose St, 74.4 m north of south edge of Alleyway at Kingsway and 1.3 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJECT LOGS - MON ROSE GPJ REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole MON13-07

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Montrose St and Elm St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 23 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill Barre (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/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL MC LL 0 20 40 60 80 100									
					0 20 40 60 80 100						0 50 100 150 200 250			
0.0		CONCRETE 215 mm thick (intact)		G66										
0.0		SAND and GRAVEL (F) 20 mm down crushed limestone, clayey dark brown, wet, compact, well graded		G67										
0.0		CLAY and SILT (F) some sand, trace gravel brown to grey moist, firm to stiff, high plasticity		G68										
0.0		CLAY silty brown moist, firm to stiff high plasticity		G69										
0.0				G70										
0.0		SILT some clay, trace fine sand brown frozen, wet and firm when thawed low plasticity		G71										
0.0				G72										
0.0		wet and firm below 1.8 m		G73										
0.0				G74										
0.0		CLAY silty, trace silt inclusions (1.5 mm dia.) brown moist, firm to stiff high plasticity		G75										

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) Test hole soured to 1.2 m below surface upon completion.
- 2) Seepage observed at 1.2 m in SILT.
- 3) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 4) Test hole located behind # 261 Montrose St, 48.7 m north of south edge of Alleyway at Kingsway and 1.4 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJECT LOGS - MON ROSE GPJ REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole MON13-08

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Montrose St and Elm St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 23 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill 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/m ³)						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL	MC	LL									
					0	20	40	60	80	100	0	50	100	150	200	250
0.0		CONCRETE 215 mm thick (intact)		C76												
0.0		SAND and GRAVEL (F) 20 mm down crushed limestone, clayey dark brown, wet, compact, well graded		G77												
0.0		CLAY and SILT (F) some fine sand, trace gravel, trace organics black moist, stiff, high plasticity		G78												
0.5		CLAY silty, trace silt inclusions (1-5 mm dia.) dark brown moist, firm to stiff high plasticity		G79												
1.0				G80												
1.5				G81												
2.0				G82												
2.0		frozen, moist and firm to stiff when thawed from 1.8 to 2.4 m		G83												
2.5				G84												
3.0				G85												

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No suffraging or seepage observed.
- 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 3) Test hole located behind # 271 Montrose St, 13.6 m north of south edge of Alleyway at Kingsway and 1.1 m east of west edge of pavement.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - MON - ROSE GPJ - REK GEO ECHN CAL GD 14/6/13



Photo 1: Asphalt and Concrete Core Sample from Test Hole MON13-01



Photo 2: Asphalt and Concrete Core Sample from Test Hole MON13-02



Photo 3: Concrete Core Sample from Test Hole MON13-03



Photo 4: Asphalt and Concrete Core Sample from Test Hole MON13-04



Photo 5: Concrete Core Sample from Test Hole MON13-05



Photo 6: Concrete Core Sample from Test Hole MON13-06



Photo 7: Concrete Core Sample from Test Hole MON13-07



Photo 8: Concrete Core Sample from Test Hole MON13-08



2013 City of Winnipeg Alley Package
 PW File #: 13-RL-03
 Sub-Surface Investigation

Test Hole No.	Test Hole Location (Street Name)	House No.	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Hydrometer Analysis				Atterberg Limits				
			Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index		
MON13-05	Alley between Montrose St and Elm St Behind #221 Montrose St		Concrete	200															
							Limestone (Crushed)	0.2	0.3	28									
									Clay and Silt (Fill)	0.4	0.5	33							
									Clay	0.6	0.7	31							
									Clay	0.9	1.0	34							
									Silt	1.2	1.3	28							
									Silt	1.5	1.6	24							
									Clay	1.7	1.8	36							
									Silt	1.9	2.0	25							
									Clay	2.4	2.6	34							
						Clay	2.9	3.0	40										
MON13-06	Alley between Montrose St and Elm St Behind #257 Montrose St		Concrete	215															
							Clay and Silt (Fill)	0.2	0.3	31									
									Clay and Silt (Fill)	0.4	0.5	26							
									Clay	0.6	0.7	29							
									Clay	0.9	1.0	30							
									Silt	1.2	1.3	30							
									Silt	1.5	1.6	27							
									Silt	1.8	2.0	23							
									Clay	2.4	2.6	28							
									Clay	2.9	3.0	30							
MON13-07	Alley between Montrose St and Elm St Behind #261 Montrose St		Concrete	215															
							Limestone (Crushed)	0.2	0.3	27									
									Clay and Silt (Fill)	0.4	0.5	31							
									Clay	0.6	0.7	28							
									Clay	0.9	1.0	30							
									Silt	1.2	1.3	28							
									Silt	1.5	1.6	25							
									Silt	1.8	2.0	24							
									Clay	2.4	2.6	32							
									Clay	2.9	3.0	39							
MON13-08	Alley between Montrose St and Elm St Behind #271 Montrose St		Concrete	215															
							Limestone (Crushed)	0.2	0.3	24									
									Clay and Silt (Fill)	0.4	0.5	26							
									Clay	0.6	0.7	30							
									Clay	0.9	1.0	34							
									Clay	1.2	1.3	32							
									Clay	1.5	1.6	33							
									Clay	1.8	2.0	46							
									Clay	2.4	2.6	36							
									Clay	2.9	3.0	52							



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**Atterberg Limits
 ASTM D4318**

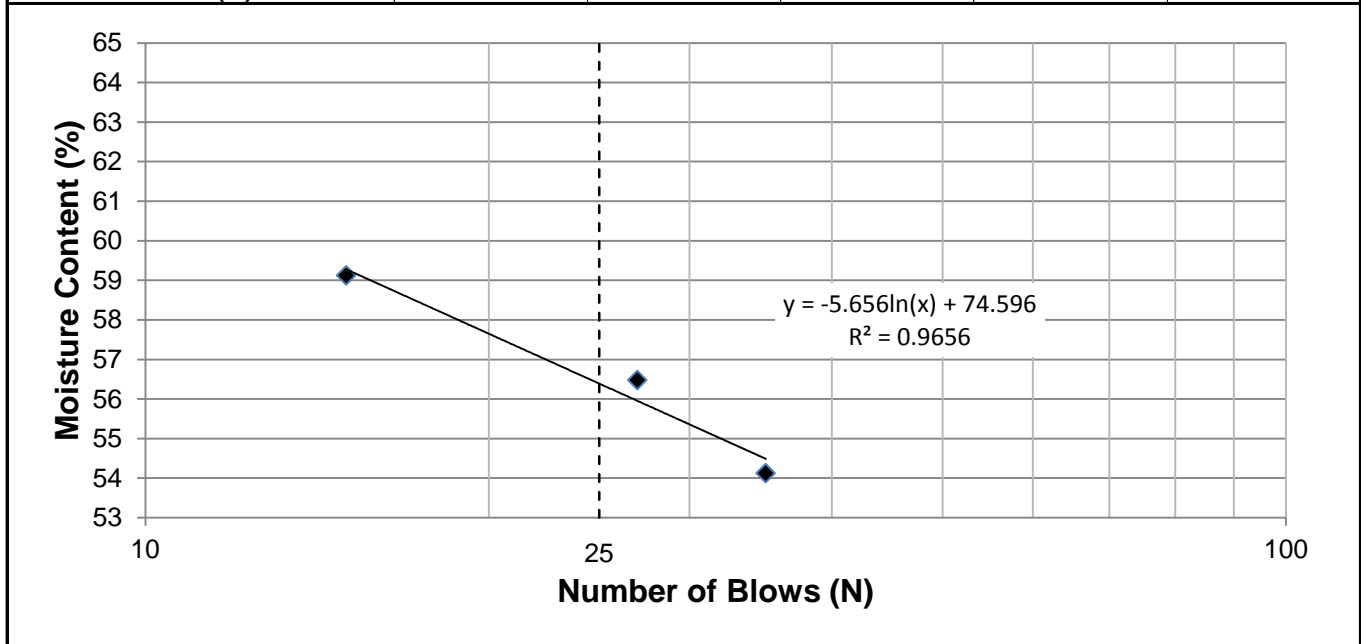
Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole MON13-02
Sample # G16
Depth (m) 0.6-0.7
Sample Date 22-May-13
Test Date 08-Jun-13
Technician Beta Taryana

Liquid Limit	56
Plastic Limit	20
Plasticity Index	37

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	35	27	15		
Mass Wet Soil + Tare (g)	26.140	24.608	27.594		
Mass Dry Soil + Tare (g)	21.875	20.793	22.641		
Mass Tare (g)	13.995	14.038	14.263		
Mass Water (g)	4.265	3.815	4.953		
Mass Dry Soil (g)	7.880	6.755	8.378		
Moisture Content (%)	54.124	56.477	59.119		



Plastic Limit

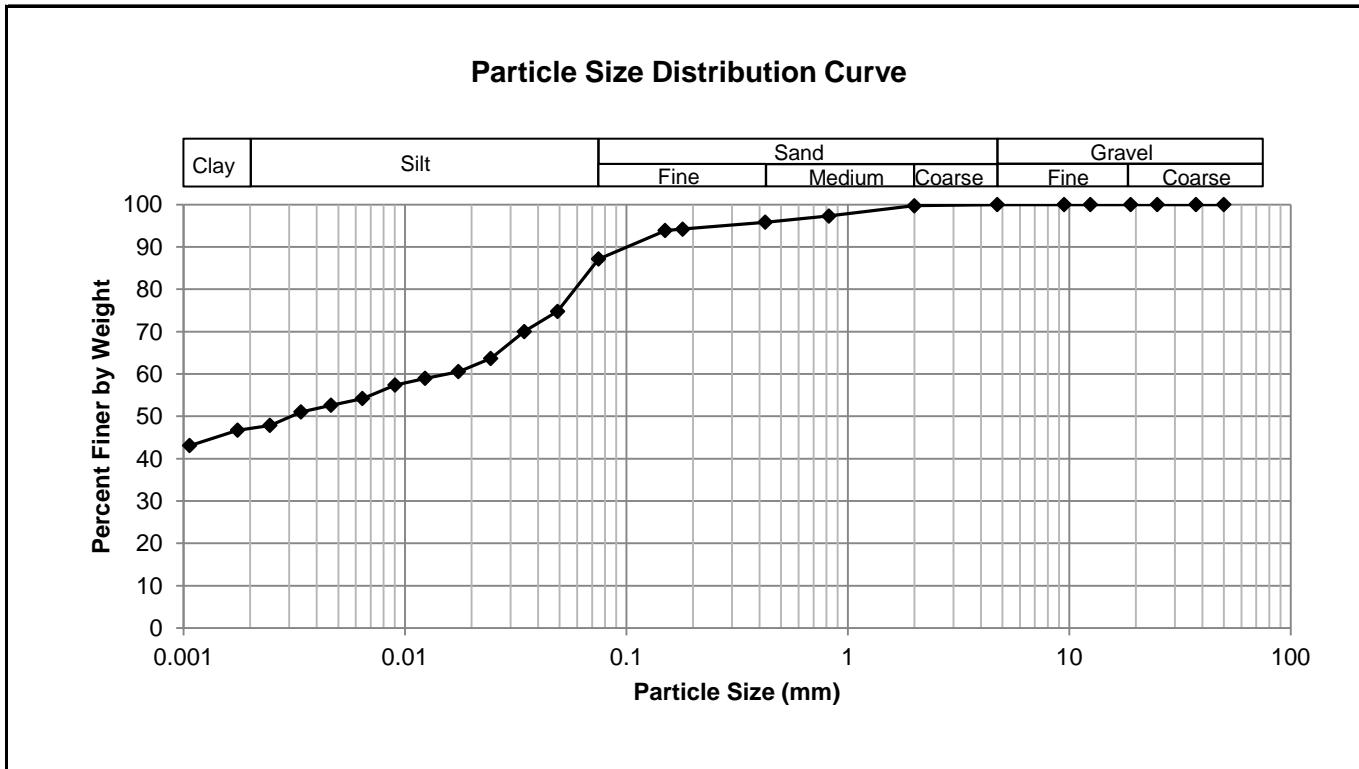
Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.348	20.081			
Mass Dry Soil + Tare (g)	19.327	19.092			
Mass Tare (g)	14.148	14.044			
Mass Water (g)	1.021	0.989			
Mass Dry Soil (g)	5.179	5.048			
Moisture Content (%)	19.714	19.592			



Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole MON13-02
Sample # G16
Depth (m) 0.6 - 0.7
Sample Date 22-May-13
Test Date 5-Jun-13
Technician Beta Taryana

Gravel	0.0%
Sand	12.9%
Silt	40.8%
Clay	46.3%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	87.13
37.5	100.00	2.00	99.75	0.0490	74.80
25.0	100.00	0.825	97.33	0.0346	70.04
19.0	100.00	0.425	95.84	0.0245	63.71
12.5	100.00	0.180	94.21	0.0175	60.54
9.50	100.00	0.150	93.87	0.0124	58.95
4.75	100.00	0.075	87.13	0.0090	57.37
				0.0064	54.20
				0.0046	52.62
				0.0034	51.03
				0.0025	47.87
				0.0018	46.74
				0.0011	43.11

Appendix E

Alleyway between Toronto St and Victor St



Sub-Surface Log

Test Hole TOR13-01

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Winnipeg Agency Package PW File #: 13 RL 03 Location: Alleyway between Toronto St and Victoria St
 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground
 Method: 125mm Solid Stem Auger Acker MP8 Truck Mount Date Drilled: 23 May 2013

Sample Type: Grab (G) Shelby Tube (T) Spill Spoon (SS) Spill Barre (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/m ³)						Undrained Shear Strength (kPa)	
					16	17	18	19	20	21		
					Particle Size (%)							
					0	20	40	60	80	100		
					PL MC LL 0 20 40 60 80 100 0 50 100 150 200 250							
					Test Type △ Torvane △ ⊕ Pocket Pen ⊕ ⊠ Qu ⊠ ○ Field Vane ○							
0.0 - 0.1		CONCRETE 210 mm thick (in tact)		C01								
0.1 - 0.3		SILT (F) clayey, some sand, trace gravel back, moist, stiff, intermediate plasticity	<input checked="" type="checkbox"/>	G02							⊕	
0.3 - 1.5		CLAY silty dark brown to black frozen, moist and firm when thawed high plasticity	<input checked="" type="checkbox"/>	G03								
			<input checked="" type="checkbox"/>	G04								
			<input checked="" type="checkbox"/>	G05								
			<input checked="" type="checkbox"/>	G06								
			<input checked="" type="checkbox"/>	G07								
			<input checked="" type="checkbox"/>	G08								
			<input checked="" type="checkbox"/>	G09								
1.5 - 3.1		SILT clayey, trace fine sand brown frozen, wet and firm when thawed low plasticity	<input checked="" type="checkbox"/>	G10								
			<input checked="" type="checkbox"/>	G10								

END OF HOLE AT 3.1 m IN CLAY

Notes:

- 1) No sloughing or seepage observed.
- 2) Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- 3) Test hole located behind #765 Portage Ave, 4.4 m south and 9.0 m east of northwest curb of Toronto St and Alleyway.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay

SUB-SURFACE LOG 0012 004 - ALLEYWAY RENEWALS PROJ. LOGS - ORON O GPJ REK GEO ECHN CAL GD 14/6/13



Sub-Surface Log

Test Hole TOR13-02

1 of 1

Client: KGS Group Project Number: 0012 004 00
 Project Name: City of Wynnipeg Alley Package PW File #: 13 RL 03 Location: Alleyway between Toronto St and Victor St
 Contractor: TREK Geotechnical Inc. Ground Elevation: Existing Ground
 Method: 50 mm Hand Auger Date Drilled: 3 June 2013

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)	So. Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)						Undrained Shear Strength (kPa)			
					16	17	18	19	20	21	Test Type			
					Particle Size (%)									
					0	20	40	60	80	100				
					PL _____ MC _____ LL _____ 0 20 40 60 80 100									
					0 50 100 150 200 250									
0.0 - 0.1		CONCRETE 165 mm thick (intact)		C11										
0.1 - 0.2		SILT (F) clayey, some sand, trace gravel back, moist, stiff, intermediate plasticity		G12	●									
0.2 - 0.6		CLAY silty, trace organics dark brown to black moist, firm to stiff high plasticity greyish brown, no organics below 0.6 m		G13		●								
0.6 - 0.9		stiff below 0.9 m		G14		●						●		
0.9 - 1.2				G15		●						●		
1.2 - 1.4				G16		●								
1.4 - 1.7		frozen below 1.4 m, moist and stiff when thawed		G17		●								

END OF HOLE AT 1.7 m IN CLAY

Notes:

- No seepage or seepage observed.
- Test hole backfilled with auger cuttings and bentonite to 0.3 m below ground surface, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located behind #765 Portage Ave, 24.4 m north and 38.2 m east of northwest curb of Toronto St and Alleyway.

Logged By: Brent Hay Reviewed By: Nelson Ferreira Project Engineer: Brent Hay



Photo 1: Concrete Core Sample from Test Hole TOR13-01



Photo 2: Concrete Core Sample from Test Hole TOR13-02



www.trekgeotechnical.ca
 1712 St. James Street
 Winnipeg, MB R3H 0L3
 Tel: 204.975.9433 Fax: 204.975.9435

**Atterberg Limits
 ASTM D4318**

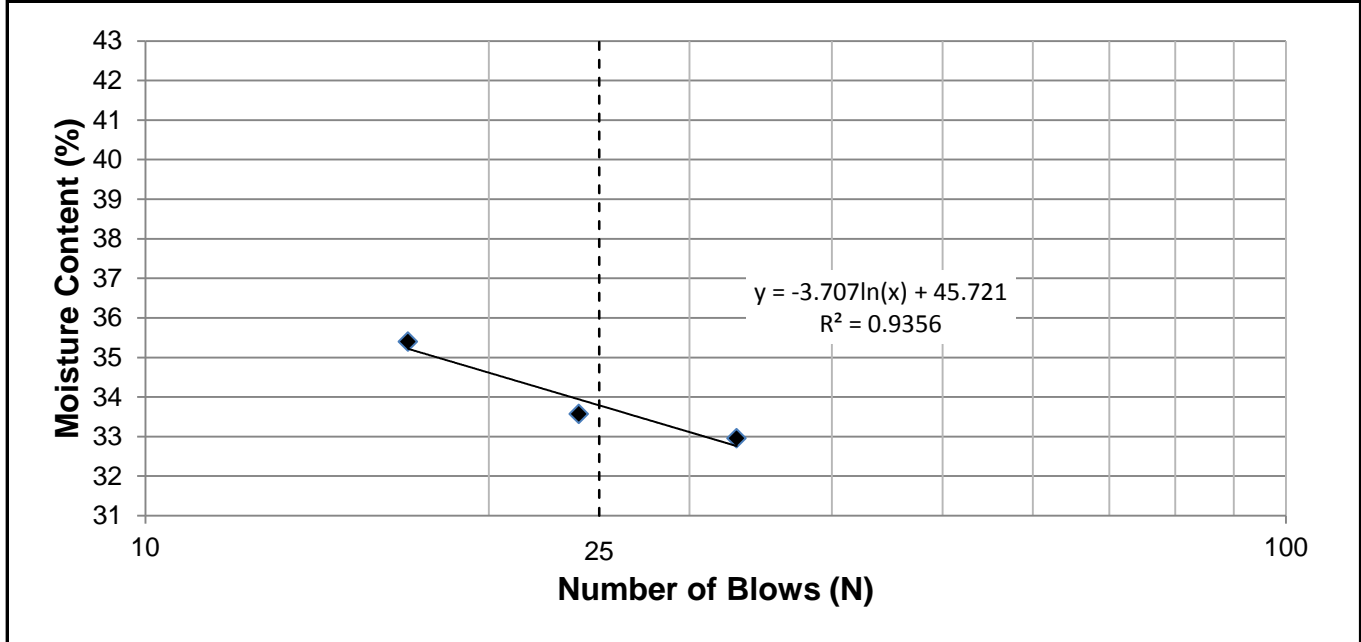
Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole TOR13-01
Sample # G02
Depth (m) 0.2-0.3
Sample Date 22-May-13
Test Date 06-Jun-13
Technician Beta Taryana

Liquid Limit	34
Plastic Limit	13
Plasticity Index	21

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	33	24	17		
Mass Wet Soil + Tare (g)	23.030	30.131	23.323		
Mass Dry Soil + Tare (g)	20.805	26.121	20.899		
Mass Tare (g)	14.053	14.175	14.051		
Mass Water (g)	2.225	4.010	2.424		
Mass Dry Soil (g)	6.752	11.946	6.848		
Moisture Content (%)	32.953	33.568	35.397		



Plastic Limit

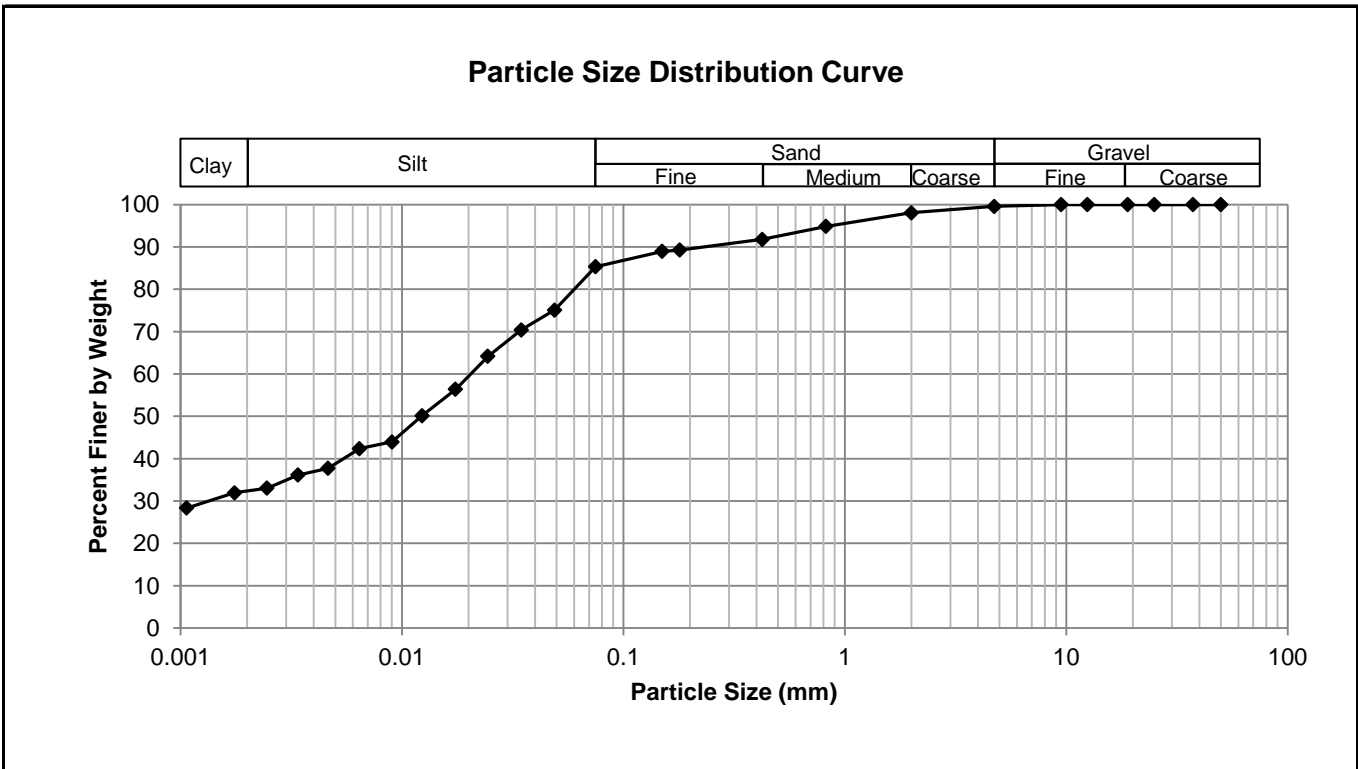
Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.369	20.161			
Mass Dry Soil + Tare (g)	19.662	19.475			
Mass Tare (g)	14.014	13.996			
Mass Water (g)	0.707	0.686			
Mass Dry Soil (g)	5.648	5.479			
Moisture Content (%)	12.518	12.521			



Project No. 0012 004 00
Client KGS Group
Project 2013 City of Winnipeg Alley Package

Test Hole TOR13-01
Sample # G02
Depth (m) 0.2 - 0.3
Sample Date 23-May-13
Test Date 4-Jun-13
Technician Beta Taryana

Gravel	0.4%
Sand	14.2%
Silt	53.9%
Clay	31.5%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	99.59	0.0750	85.35
37.5	100.00	2.00	98.08	0.0490	75.10
25.0	100.00	0.825	94.88	0.0346	70.43
19.0	100.00	0.425	91.80	0.0245	64.20
12.5	100.00	0.180	89.26	0.0175	56.41
9.50	100.00	0.150	88.97	0.0124	50.18
4.75	99.59	0.075	85.35	0.0090	43.95
				0.0064	42.39
				0.0046	37.72
				0.0034	36.16
				0.0025	33.05
				0.0018	31.94
				0.0011	28.37