APPENDIX ‘F’

GEOTECHNICAL REPORT

APPENDIX 'F' – GEOTECHNICAL REPORT

GEOTECHNICAL REPORT FOR:

I. Mathers Avenue from Ash Street to Waverley Street.
II. Renfrew Street from Academy Road to Wellington Crescent South
III. Mulvey Avenue from Stafford Street to Lilac Street
IV Calrossie Boulevard from Pembina Highway to Riverside Drive
V. Lyon Street from Oakenwald Avenue to Point Road

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

2015 REGIONAL STREET RENEWAL PROGRAM

MATHERS AVENUE BETWEEN WAVERLEY STREET AND ASH STREET

GEOTECHNICAL INVESTIGATION

Prepared for:
City Of Winnipeg
Engineering Division
Public Works Department
103 – 1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

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

January 16, 2015
Project No. 123311671

Stantec	Project No. 123311671	Drawn by: SB	Figure: 1	**Testhole Location Plan** **2015 Regional Street Renewal Program** **Mathers Avenue between** **Waverley Street and Ash Street**
	Date: Dec. 22, 2014	Reviewed by: GL	Scale: NTS	

TABLE 1
2015 REGIONAL STREET RENEWAL PROGRAM
MATHERS AVENUE BETWEEN WAVERLEY STREET AND ASH STREET
GEOTECHNICAL INVESTIGATION

Testhole ID	Testhole Location	Pavement Surface		Pavement Structure Material		Sample Description	Sample Depth (m)	Moisture Content (%)	Particle Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH1	15.0 m East of Northeast corner of Ash Street and Mathers Avenue, approximately 1.8 m South of North curb	Concrete	215	-	-	-	-	-	-	-	-	-	-	-	-
TH2	59.0 m East of Northeast corner of Ash Street and Mathers Avenue, approximately 2.5 m North of South curb	Concrete	220	-	-	-	-	-	-	-	-	-	-	-	-
TH3	29.0 m East of Northeast corner of Oak Street and Mathers Avenue, approximately 2.5 m South of North curb	Concrete	235	-	-	Clayey Silt	0.9	18	0.0	8.5	69.5	22.0	25	17	8
TH4	60.0 m East of Northeast corner of Oak Street and Mathers Avenue, approximately 2.5 m North of South curb	Concrete	200	-	-	-	-	-	-	-	-	-	-	-	-
TH5	20.0 m East of Northeast corner of Elm Street and Mathers Avenue, approximately 2.5 m South of North curb	Concrete	210	Granular Fill	400	-	-	-	-	-	-	-	-	-	-
TH6	57.0 m East of Northeast corner of Ash Street and Mathers Avenue, approximately 2.5 m North of South curb	Concrete	210	-	-	-	-	-	-	-	-	-	-	-	-
TH7	19.0 m East of Northeast corner of Montrose Street and Mathers Avenue, approximately 2.5 m South of North curb	Concrete	245	-	-	Clay	0.6	33	0.0	1.3	11	87.7	83	23	60
TH8	69.0 m East of Northeast corner of Ash Street and Mathers Avenue, approximately 2.5 m North of South curb	Concrete	230	-	-	-	-	-	-	-	-	-	-	-	-

TESTHOLE RECORD TH01

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mathers Avenue between Waverley Street and Ash Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO	Concrete		CORE		
	CH	Clay Fill - black, stiff, moist, high plasticity - trace organic material - trace fine to coarse sand		AS		25
				AS		18
1				AS		31
	CH	Clay - brown, stiff, moist, high plasticity - some silt - trace fine to coarse sand		AS		34
				AS		39
2				AS		41
		TESTHOLE LOCATION: 15.0 m East of Northeast corner of Ash Street and Mathers Avenue, approximately 1.8 m South of North Curb. • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		34
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

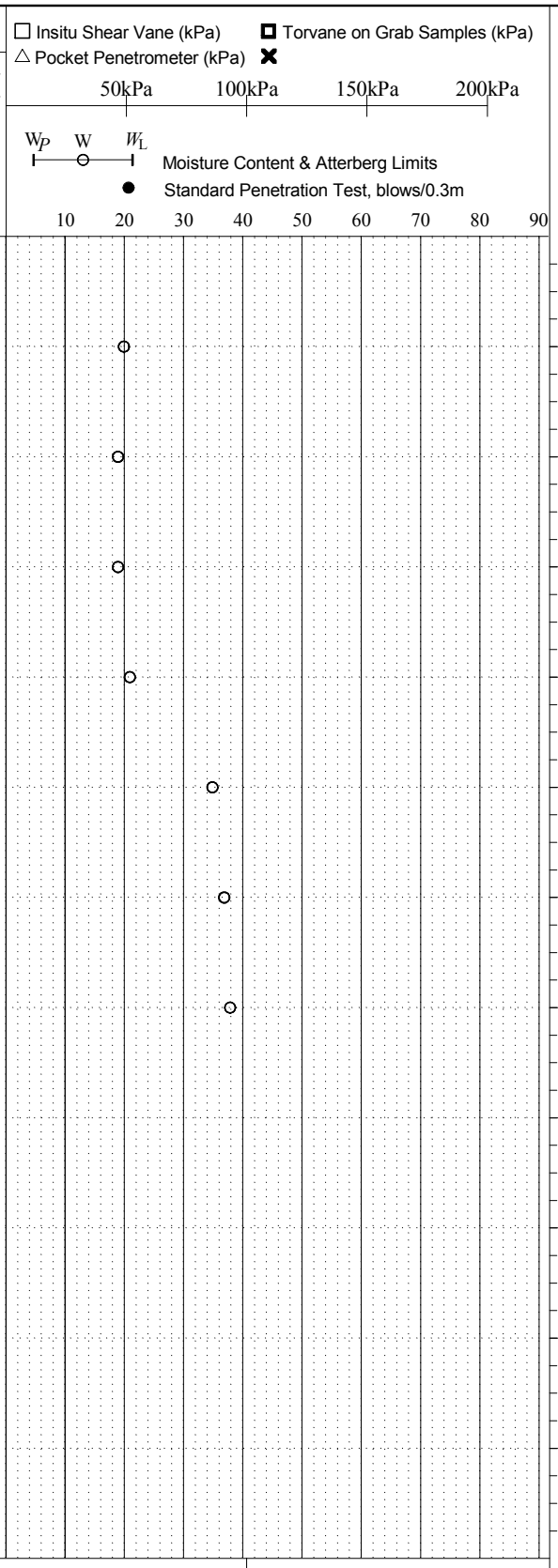
Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH02

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mathers Avenue between Waverley Street and Ash Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO	Concrete		CORE		
	CH	Clay Fill - black, firm, moist, high plasticity - trace organic material - trace fine to coarse sand		AS		20
				AS		19
1	CL ML	Clayey Silt - tan, soft, moist, low plasticity - some clay - trace fine to coarse sand		AS		19
				AS		21
	CH	Clay - brown, stiff, moist, high plasticity - some silt - trace fine to coarse sand		AS		35
2				AS		37
		TESTHOLE LOCATION: 59.0 m East of Northeast corner of Ash Street and Mathers Avenue, approximately 2.5 m North of South curb. • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		38
3						



DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

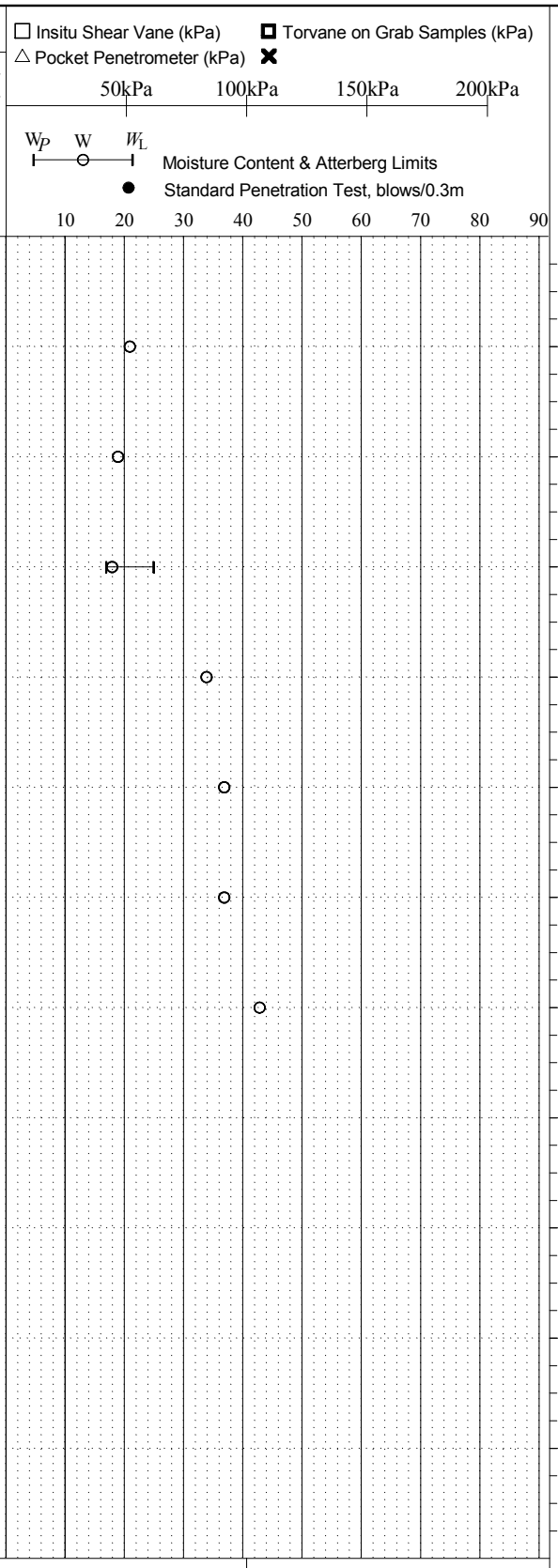
Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH03

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mathers Avenue between Waverley Street and Ash Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO	Concrete		CORE		
	CH	Clay Fill - black, firm, moist, high plasticity - trace organic material - trace fine to coarse sand		AS		21
	CL ML	Clayey Silt - tan, soft, moist, low plasticity - some clay - trace fine to coarse sand Particle Size Analysis at 0.9 m: 0.0% Gravel, 8.5% Sand, 69.5% Silt, 22.0% Clay		AS		19
1				AS		18
	CH	Clay - brown, stiff, moist, high plasticity - some silt - trace fine to coarse sand		AS		34
				AS		37
2				AS		37
		TESTHOLE LOCATION: 29.0 m East of Northeast corner of Oak Street and Mathers Avenue, approximately 2.5 m South of North curb. • The soil was frozen to a depth of 0.6 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		43
3						



DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

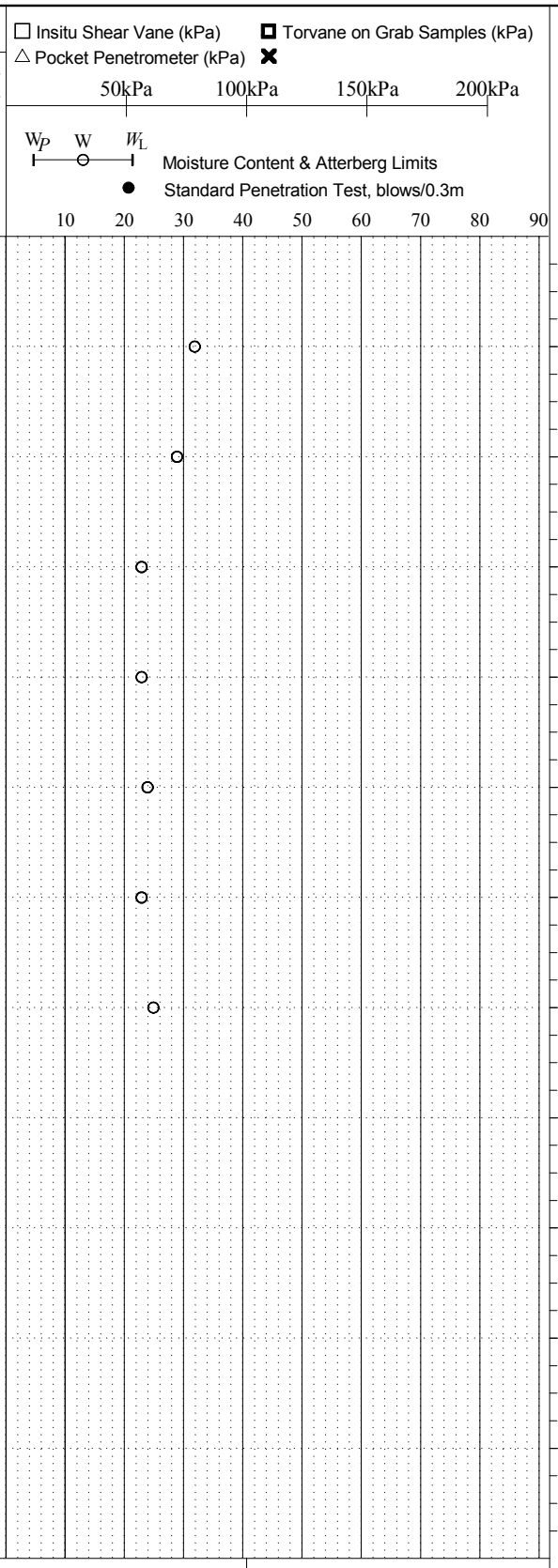
Stantec

TESTHOLE RECORD TH04

CLIENT City of Winnipeg
PROJECT 2015 Regional Street Renewal Program
LOCATION Mathers Avenue between Waverley Street and Ash Street
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd.

PROJECT No. 123311671
DATUM
ELEVATION
DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO		Concrete		CORE		
	CH		Clay Fill - black, firm, moist, high plasticity - trace organic material - trace fine to coarse sand		AS		32
					AS		29
1	CL ML		Clayey Silt - tan, soft, moist, low plasticity - some clay - trace fine to coarse sand		AS		23
					AS		23
					AS		24
2					AS		23
					AS		25
3			TESTHOLE LOCATION: 60.0 m East of Northeast corner of Oak Street and Mathers Avenue, approximately 2.5 m North of South curb. • The soil was frozen to a depth of 0.3 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				



DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings ⁘ Sand

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH05

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mathers Avenue between Waverley Street and Ash Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO		Concrete		CORE		
	GW		Granular Fill - 20 mm maximum size aggregate		AS		6
	CH		Clay - brown, stiff, moist, high plasticity - some clay - trace fine to coarse sand		AS		24
1					AS		27
					AS		33
					AS		33
2					AS		40
					AS		41
			TESTHOLE LOCATION: 20.0 m East of Northeast corner of Elm Street and Mathers Avenue, approximately 2.5 m South of North curb. • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3							

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

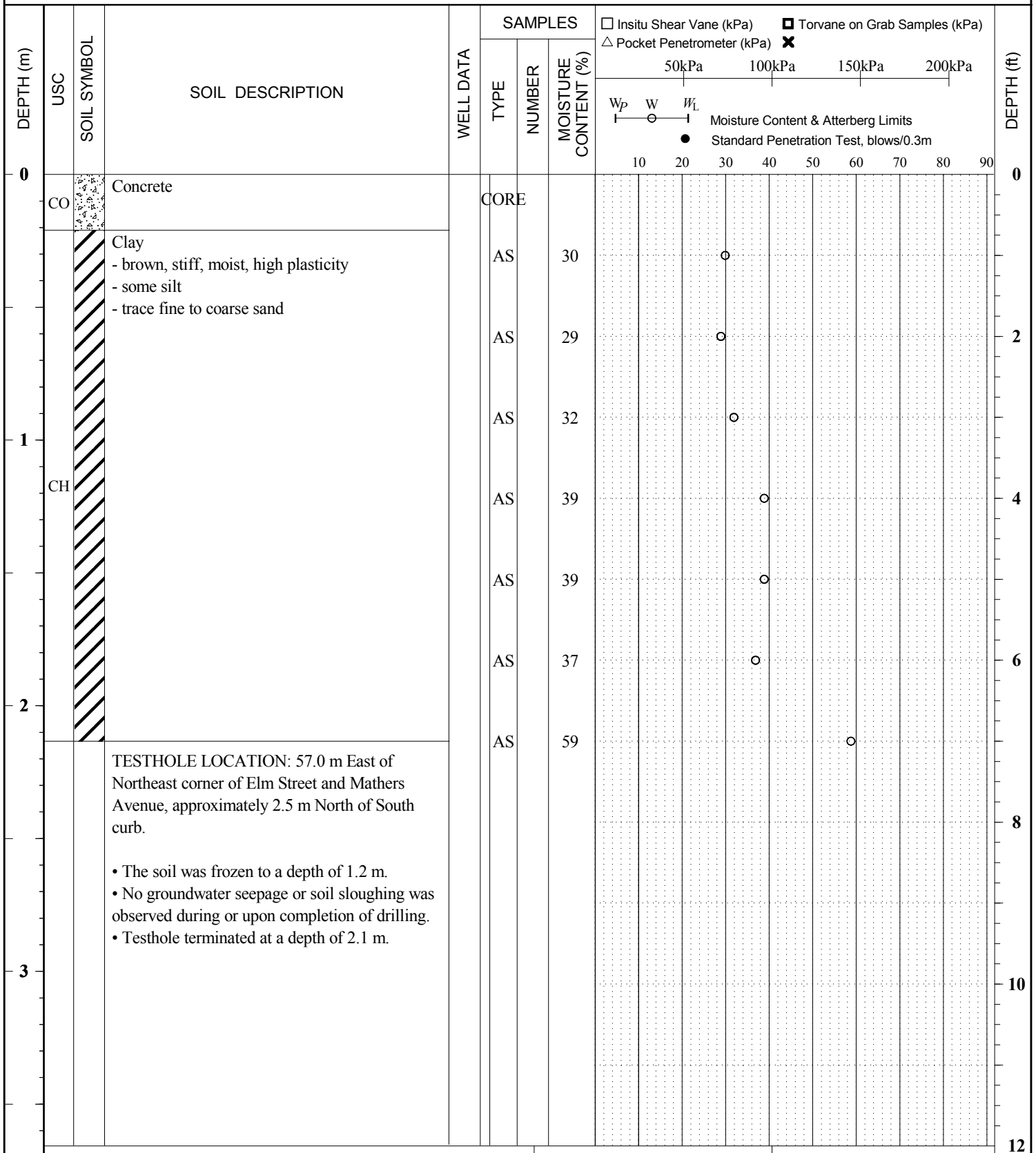
Sample Type: GS - Grab Sample SPT - Standard Penetration Test
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings ⁘ Sand

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH06

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mathers Avenue between Waverley Street and Ash Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA



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

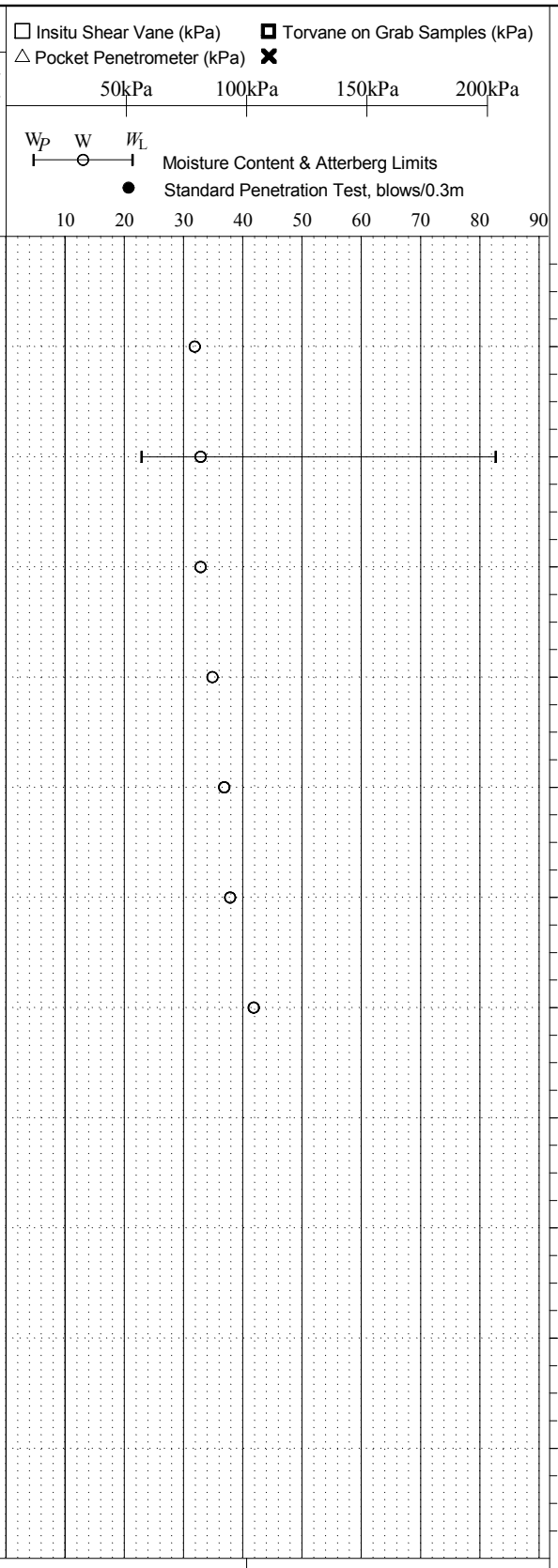
Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH07

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mathers Avenue between Waverley Street and Ash Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO		Concrete		CORE		
	CH		Clay - brown, stiff, moist, high plasticity - some silt - trace fine to coarse sand Particle Size Analysis at 0.6 m: 0.0% Gravel, 1.3% Sand, 11.0% Silt, 87.7% Clay		AS		32
1					AS		33
					AS		33
					AS		35
2					AS		37
					AS		38
			TESTHOLE LOCATION: 19.0 m East of Northeast corner of Montrose Street and Mathers Avenue, approximately 2.5 m South of North curb. • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		42
3							



DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH08

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mathers Avenue between Waverley Street and Ash Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO		Concrete		CORE		
	CH		Clay Fill - black, stiff, moist, high plasticity - trace fine to coarse sand		AS		22
					AS		27
1	CH		Clay - brown, stiff, moist, high plasticity - some silt - trace fine to coarse sand		AS		27
					AS		32
					AS		33
2					AS		34
					AS		38
3			TESTHOLE LOCATION: 69.0 m East of Northeast corner of Montrose Street and Mathers Avenue, approximately 2.5 m North of South curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				

☐ Insitu Shear Vane (kPa) ◘ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

Core sample from Testhole TH1

Core sample from Testhole TH2

Core sample from Testhole TH3

Core sample from Testhole TH4

Core sample from Testhole TH5

Core sample from Testhole TH6

Core sample from Testhole TH7

Core sample from Testhole TH8

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

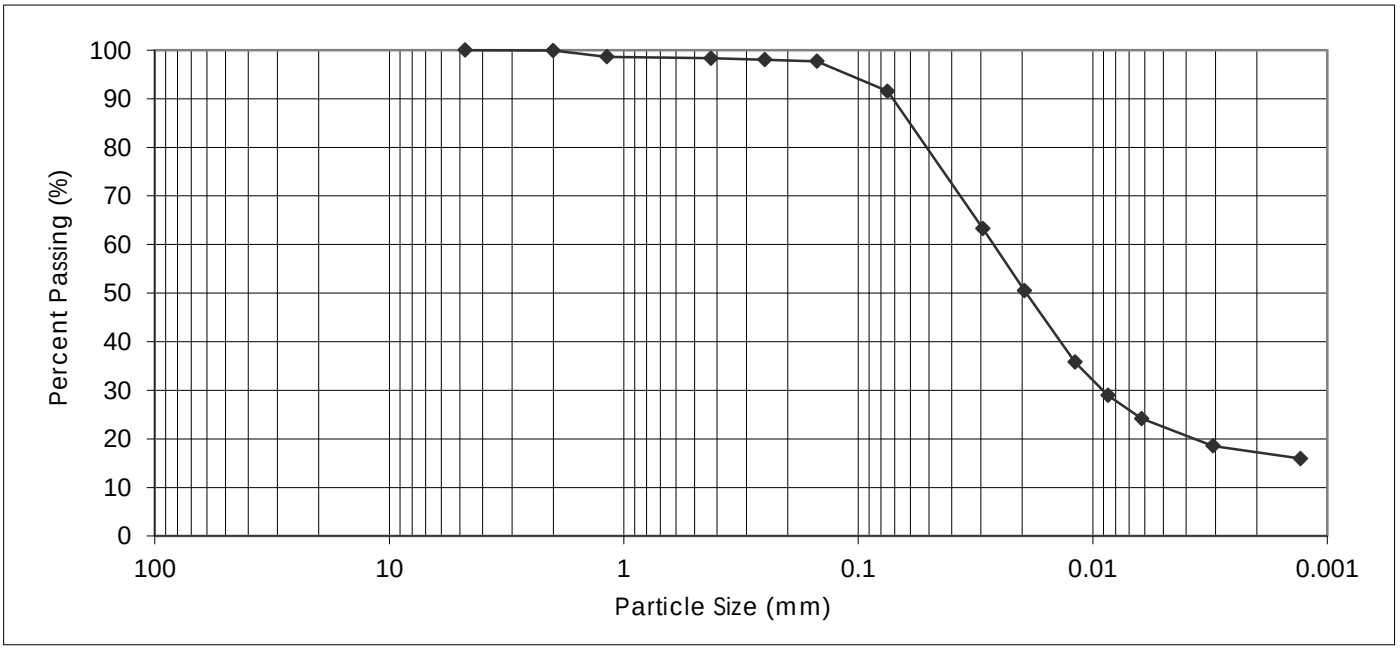
PARTICLE SIZE ANALYSIS
ASTM D422

City of Winnipeg
Engineering Division, Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1
Attention: Derek Teperto

PROJECT: 2015 Regional Street Renewal Program
Mathers Street between Waverley Street and Ash Street
PROJECT NO.: 123311671

SAMPLED BY: Nestor Abarca
SAMPLE ID: TH03 @ 0.91 m

DATE RECEIVED: January 2, 2015
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	100.0
2.00 mm	99.9

PARTICLE SIZE	PERCENT PASSING
1.18 mm	98.6
0.425 mm	98.3
0.250 mm	98.0
0.150 mm	97.7
0.075 mm	91.5
0.005 mm	22.0
0.002 mm	17.0
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.1	1.6	6.8	69.5	22.0	NT*

NT* Sample not tested for colloids

January 7, 2015

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

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

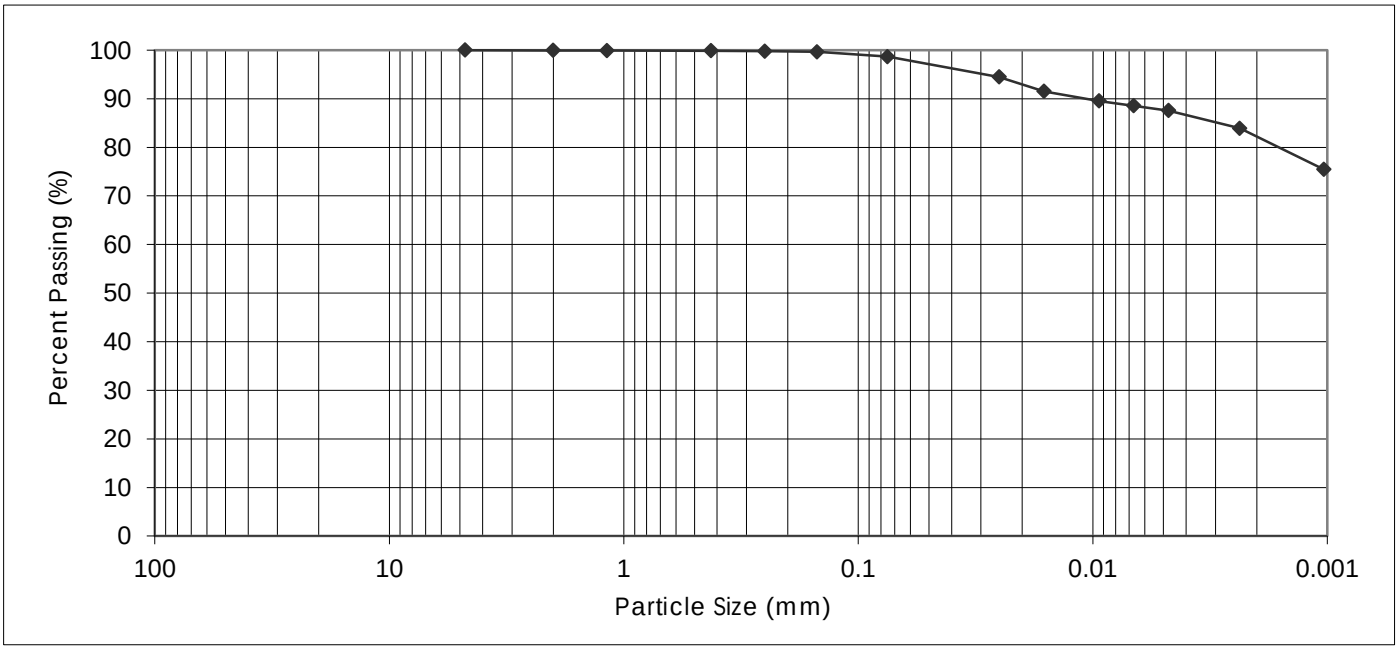
PARTICLE SIZE ANALYSIS
ASTM D422

City of Winnipeg
Engineering Division, Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1
Attention: Derek Teperto

PROJECT: 2015 Regional Street Renewal Program
Mathers Street between Waverley Street and Ash Street
PROJECT NO.: 123311671

SAMPLED BY: Nestor Abarca
SAMPLE ID: TH07 @ 0.61 m

DATE RECEIVED: January 2, 2015
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	100.0
2.00 mm	99.9

PARTICLE SIZE	PERCENT PASSING
1.18 mm	99.9
0.425 mm	99.9
0.250 mm	99.8
0.150 mm	99.6
0.075 mm	98.7
0.005 mm	87.7
0.002 mm	81.6
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.1	0.0	1.2	11.0	87.7	NT*

NT* Sample not tested for colloids

January 7, 2015

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

2015 REGIONAL STREET RENEWAL PROGRAM

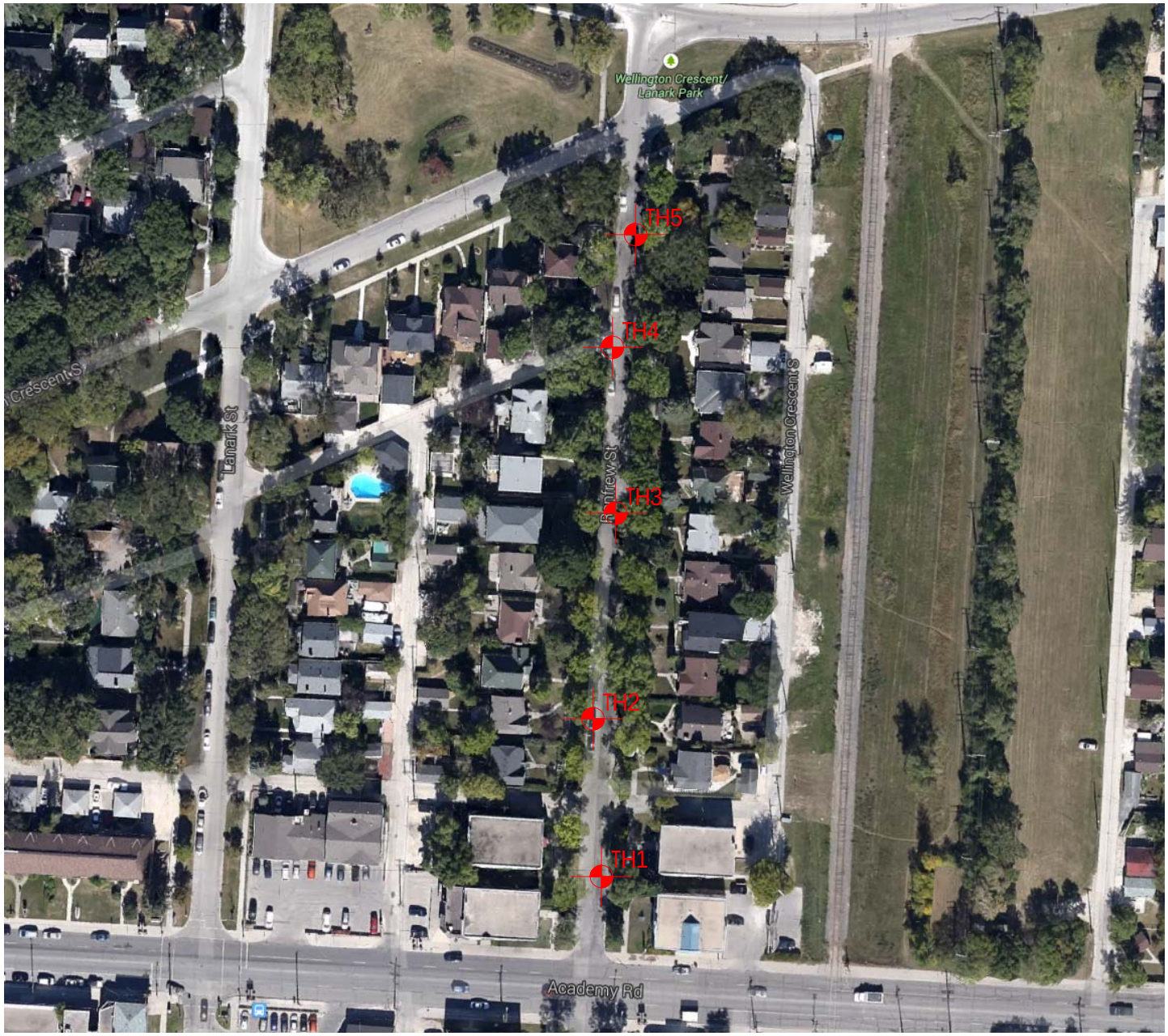
RENFREW STREET BETWEEN WELLINGTON CRESCENT AND ACADEMY ROAD

GEOTECHNICAL INVESTIGATION

Prepared for:
The City Of Winnipeg
Engineering Division
Public Works Department
103 – 1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

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

January 20, 2015
Project No. 123311671



Stantec	Project No. 123311671	Drawn by: SB	Figure: 1
	Date: Dec. 22, 2014	Reviewed by: GL	Scale: NTS

Testhole Location Plan
2015 Regional Street Renewal Program
Renfrew Street between
Wellington Crescent and Academy Road

TABLE 1
2015 REGIONAL STREET RENEWAL PROGRAM
RENFREW STREET BETWEEN WELLINGTON CRESCENT AND ACADEMY ROAD
GEOTECHNICAL INVESTIGATION

Testhole ID	Testhole Location	Pavement Surface		Pavement Structure Material		Sample Description	Sample Depth (m)	Moisture Content (%)	Particle Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH1	24.0 m North of Northeast corner of Academy Road and Renfrew Street, approximately 2.5 m West of East curb	Asphalt	60	-	-	-	-	-	-	-	-	-	-	-	-
		Concrete	210												
TH2	180.0 m South of Southwest corner of Wellington Crescent and Renfrew Street, approximately 2.5 m East of West curb	Asphalt	25	-	-	-	-	-	-	-	-	-	-	-	-
		Concrete	205												
TH3	125.0 m South of Southwest corner of Wellington Crescent and Renfrew Street, approximately 2.5 m West of East curb	Asphalt	40	-	-	Clayey Silt	1.5	24	0.0	4.3	61.3	34.4	35	16	19
		Concrete	180												
TH4	90.0 m South of Southwest corner of Wellington Crescent and Renfrew Street, approximately 2.5 m East of West curb	Asphalt	25	-	-	-	-	-	-	-	-	-	-	-	-
		Concrete	205												
TH5	52.0 m South of Southwest corner of Wellington Crescent and Renfrew Street, approximately 2.5 m West of East curb	Asphalt	60	-	-	Clay Fill	0.6	25	11.3	19.4	18.6	50.7	64	23	41
		Concrete	140												

TESTHOLE RECORD TH01

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Renfrew Street between Wellington Crescent and Academy Road ELEVATION
DRILLING DATE December 10, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
	CO	Concrete				
	CH	Clay Fill - black, firm, moist, high plasticity - some silt - trace fine to coarse sand - some fine gravel		AS		43
1				AS		25
				AS		34
				AS		36
	CH	Clay - brown, stiff, moist, high plasticity		AS		36
2				AS		36
				AS		36
		TESTHOLE LOCATION: 24.0 m North of Northeast corner of Academy Road and Renfrew Street, approximately 2.5 m West of East curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH02

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Renfrew Street between Wellington Crescent and Academy Road ELEVATION
DRILLING DATE December 10, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
	CO	Concrete				
	CH	Clay Fill - black, firm, moist, high plasticity - some silt - trace fine to coarse sand - some fine sand		AS		30
				AS		30
1	CH	Clay - brown, stiff, moist, high plasticity		AS		28
				AS		39
				AS		38
2				AS		41
		TESTHOLE LOCATION: 180.0 m South of Southwest corner of Wellington Crescent and Renfrew Street, approximately 2.5 m East of West curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		41
3						

☐ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH03

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Renfrew Street between Wellington Crescent and Academy Road ELEVATION
DRILLING DATE December 10, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	CO		Concrete				
	CH		Clay Fill - black, stiff, moist, high plasticity - trace organic material - some silt - trace fine to coarse sand - some fine sand		AS		33
					AS		38
1					AS		28
	CL ML		Clayey Silt - tan, soft, moist, medium plasticity - trace fine to coarse sand Particle Size Analysis at 1.5 m: 0.0% Gravel, 4.3% Sand, 61.3% Silt, 34.4% Clay		AS		24
					AS		24
					AS		22
2	CH		Clay - brown, stiff, moist, moist, high plasticity		AS		39
			TESTHOLE LOCATION: 125.0 m South of Southwest corner of Wellington Crescent and Renfrew Street, approximately 2.5 m West of East curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3							

☐ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH04

CLIENT City of Winnipeg
PROJECT 2015 Regional Street Renewal Program
LOCATION Renfrew Street between Wellington Crescent and Academy Road
DRILLING DATE December 10, 2014 DRILLING CO. Maple Leaf Drilling Ltd.

PROJECT No. 123311671
DATUM
ELEVATION
DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	CO		Concrete				
	CH		Clay Fill - black, stiff, moist, high plasticity - trace organic material - some silt - trace fine to coarse sand - some fine gravel		AS		35
					AS		36
1					AS		23
	CL ML		Clayey Silt - tan, soft, moist, medium plasticity - trace fine to coarse sand		AS		28
					AS		30
2					AS		23
			TESTHOLE LOCATION: 90.0 m South of Southwest corner of Wellington Crescent and Renfrew Street, approximately 2.5 m East of West curb. • The soil was frozen to a depth of 0.6 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		32
3							

☐ Insitu Shear Vane (kPa) ◘ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖

50kPa 100kPa 150kPa 200kPa

W_P W W_L Moisture Content & Atterberg Limits

● Standard Penetration Test, blows/0.3m

10 20 30 40 50 60 70 80 90

DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings ⁘ Sand

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH05

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Renfrew Street between Wellington Crescent and Academy Road ELEVATION
DRILLING DATE December 10, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	CO		Concrete				
	CH		Clay Fill - black, stiff, moist, high plasticity - trace organic material - some silt - trace fine to coarse sand - some fine gravel		AS		36
			Particle Size Analysis at 0.6 m: 11.3% Gravel, 19.4% Sand, 18.6% Silt, 50.7% Clay		AS		31
1	CH		Clay - brown, stiff, moist, high plasticity		AS		30
					AS		29
					AS		32
2					AS		36
					AS		40
			TESTHOLE LOCATION: 52.0 m South of Southwest corner of Wellington Crescent and Renfrew Street, approximately 2.5 m West of East curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3							

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

Core sample from Testhole TH1

Core sample from Testhole TH2

Core sample from Testhole TH3

Core sample from Testhole TH4

Core sample from Testhole TH5

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

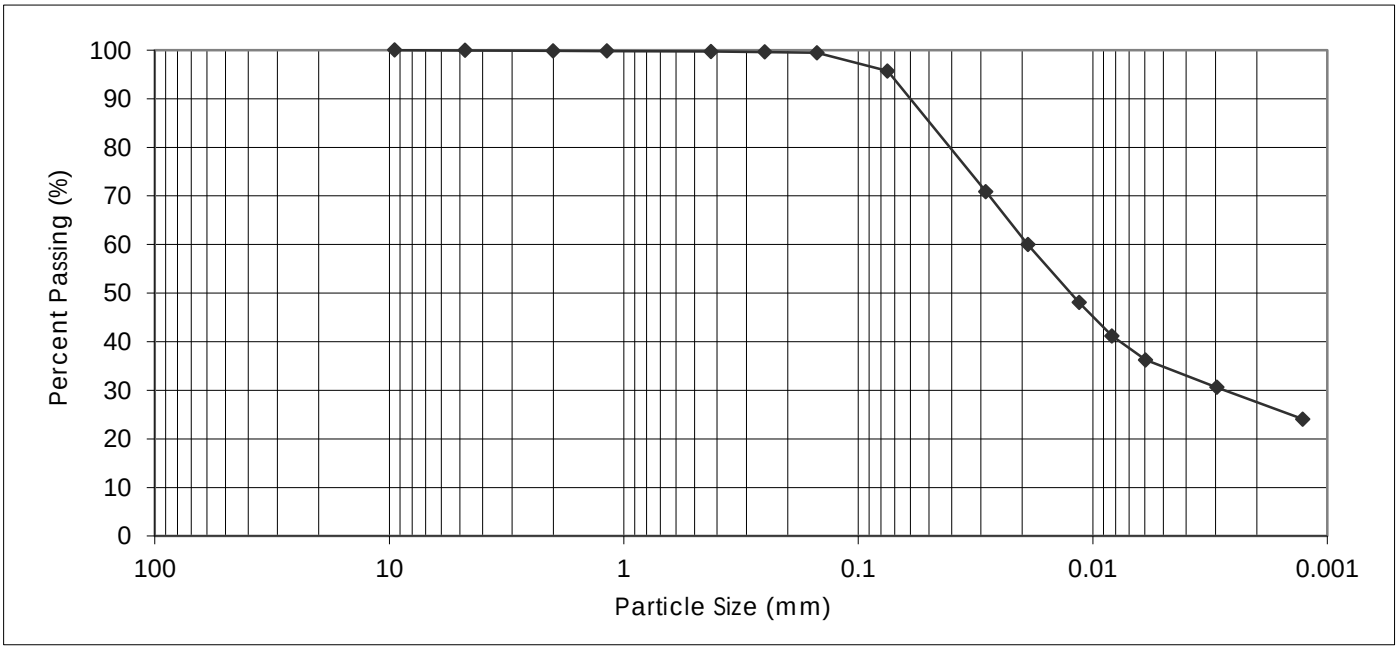
PARTICLE SIZE ANALYSIS
ASTM D422

City of Winnipeg
Engineering Division, Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1
Attention: Derek Teperto

PROJECT: 2015 Regional Street Renewal Program
Renfrew St between Wellington Cres and Academy Rd
PROJECT NO.: 123311671

SAMPLED BY: Nestor Abarca
SAMPLE ID: TH03 @ 1.5 m

DATE RECEIVED: January 2, 2015
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	100.0
2.00 mm	99.8

PARTICLE SIZE	PERCENT PASSING
1.18 mm	99.8
0.425 mm	99.7
0.250 mm	99.6
0.150 mm	99.4
0.075 mm	95.7
0.005 mm	34.4
0.002 mm	26.9
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.2	0.1	4.0	61.3	34.4	NT*

NT* Sample not tested for colloids

January 7, 2015

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

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

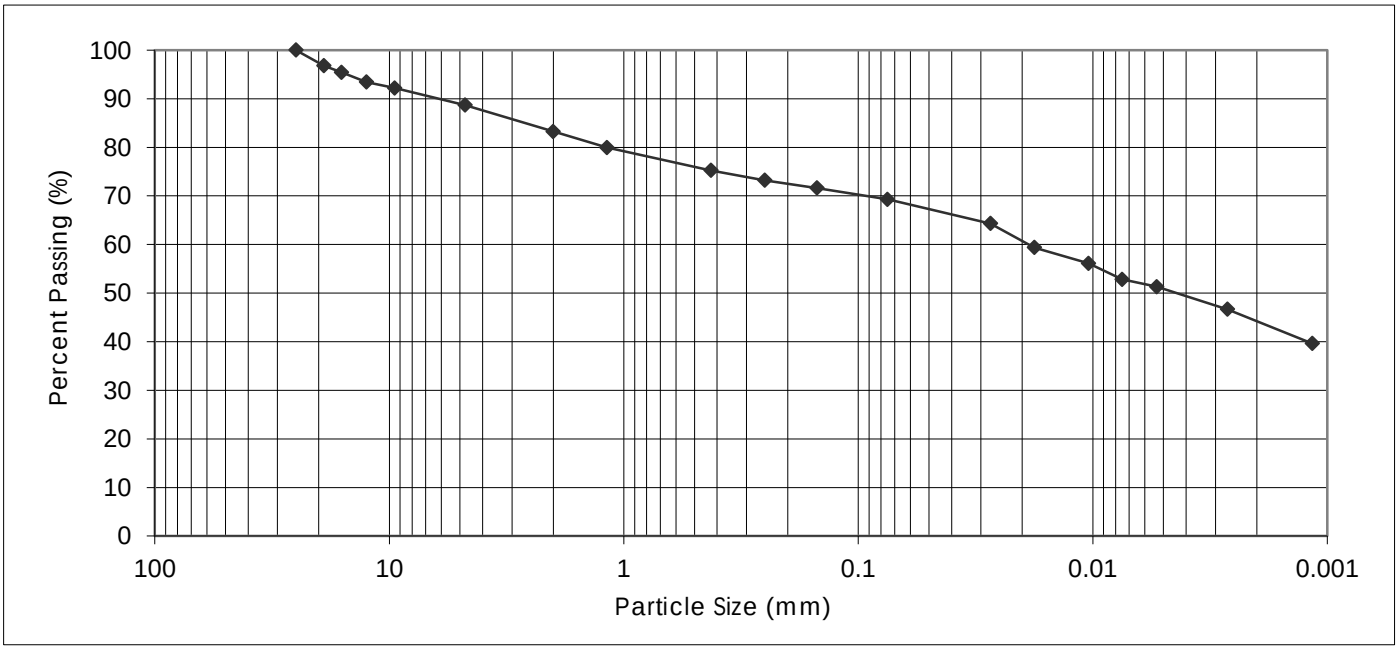
PARTICLE SIZE ANALYSIS
ASTM D422

City of Winnipeg
Engineering Division, Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1
Attention: Derek Teperto

PROJECT: 2015 Regional Street Renewal Program
Renfrew St between Wellington Cres and Academy Rd
PROJECT NO.: 123311671

SAMPLED BY: Nestor Abarca
SAMPLE ID: TH05 @ 0.61 m

DATE RECEIVED: January 2, 2015
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	96.8
16.00 mm	95.4
12.50 mm	93.4
9.50 mm	92.2
4.75 mm	88.7
2.00 mm	83.3

PARTICLE SIZE	PERCENT PASSING
1.18 mm	79.9
0.425 mm	75.2
0.250 mm	73.2
0.150 mm	71.6
0.075 mm	69.3
0.005 mm	50.7
0.002 mm	43.6
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
11.3	5.4	8.1	5.9	18.6	50.7	NT*

NT* Sample not tested for colloids

January 7, 2015

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

2015 REGIONAL STREET RENEWAL PROGRAM

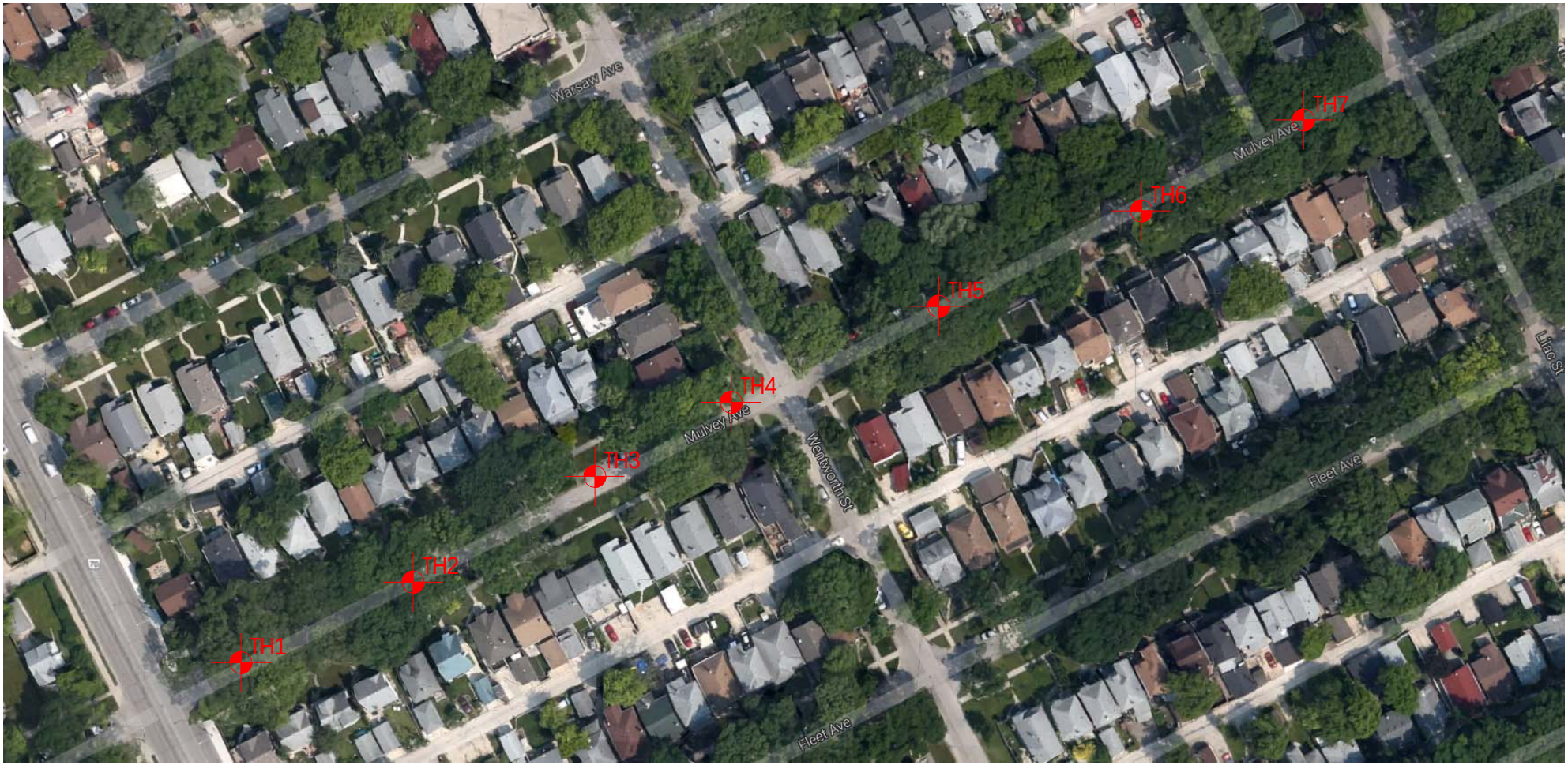
MULVEY AVENUE BETWEEN STAFFORD STREET AND LILAC STREET

GEOTECHNICAL INVESTIGATION

Prepared for:
The City Of Winnipeg
Engineering Division
Public Works Department
103 – 1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

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

January 19, 2015
Project No. 123311671



Stantec	Project No. 123311671	Drawn by: SB	Figure: 1	**Testhole Location Plan** **2015 Regional Street Renewal Program** **Mulvey Avenue between** **Stafford Street and Lilac Street**
	Date: Dec. 22, 2014	Reviewed by: GL	Scale: NTS	

TABLE 1
2015 REGIONAL STREET RENEWAL PROGRAM
MULVEY AVENUE BETWEEN STAFFORD STREET AND LILAC STREET
GEOTECHNICAL INVESTIGATION

Testhole ID	Testhole Location	Pavement Surface		Pavement Structure Material		Sample Description	Sample Depth (m)	Moisture Content (%)	Particle Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH1	15.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m South of North curb	Asphalt	30	-	-	-	-	-	-	-	-	-	-	-	-
		Concrete	150												
TH2	60.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m North of South curb	Asphalt	40	-	-	Silt	0.9	17	0.0	2.7	71.7	25.6	29	17	12
		Concrete	160												
TH3	109.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m South of North curb	Asphalt	20	-	-	-	-	-	-	-	-	-	-	-	-
		Concrete	140												
TH4	154.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m South of North curb	Asphalt	45	-	-	-	-	-	-	-	-	-	-	-	-
		Concrete	145												
TH5	200.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m South of North curb	Asphalt	40	-	-	-	-	-	-	-	-	-	-	-	-
		Concrete	145												
TH6	250.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m North of South curb	Asphalt	45	-	-	-	-	-	-	-	-	-	-	-	-
		Concrete	155												
TH7	305.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m South of North curb	Asphalt	160	-	-	Clay Fill	0.6	28	2.0	8.3	32.4	57.3	55	19	36
		Concrete	140												

TESTHOLE RECORD TH01

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mulvey Avenue between Stafford Street and Lilac Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt				
	CO	Concrete		CORE		
	CH	Clay Fill - black, stiff, moist, high plasticity - silty - trace fine to medium sand - trace fine gravel		AS		30
				AS		28
1	CH	Clay - brown, stiff, moist, high plasticity		AS		28
				AS		25
	ML	Silt - tan, soft, moist, low plasticity - clayey - trace fine to medium sand		AS		24
				AS		22
2				AS		21
		TESTHOLE LOCATION: 15.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3						

Insitu Shear Vane (kPa) ☐ Torvane on Grab Samples (kPa) ■
Pocket Penetrometer (kPa) △ ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH02

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mulvey Avenue between Stafford Street and Lilac Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	CO		Concrete				
	CH		Clay Fill - black, stiff, moist, high plasticity - silty - trace fine to medium sand - trace fine gravel		AS		27
	CH		Clay - brown, firm, moist, high plasticity - some silt		AS		33
1	ML		Silt - tan, soft, moist, low plasticity - clayey - trace fine to medium sand Particle Size Analysis at 0.9 m: 0.0% Gravel, 2.7% Sand, 71.7% Silt, 25.6% Clay		AS		17
					AS		33
					AS		23
2					AS		23
			TESTHOLE LOCATION: 60.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m North of South curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		24
3							

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

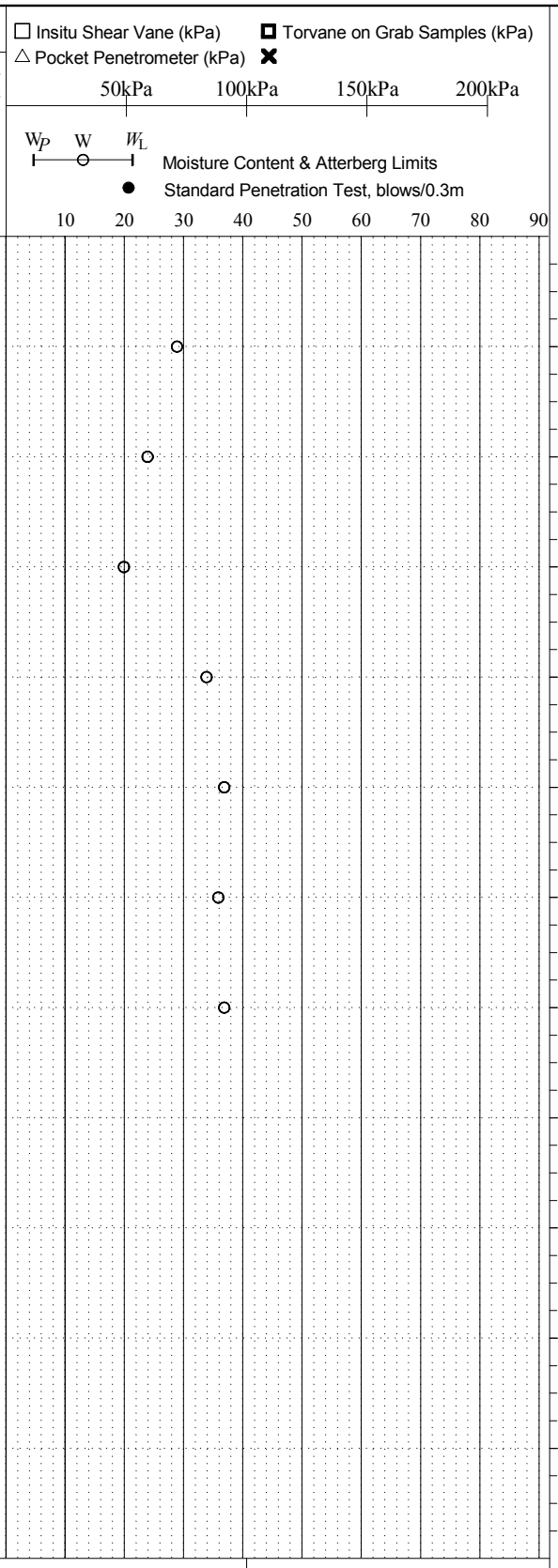
Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH03

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mulvey Avenue between Stafford Street and Lilac Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	CO		Concrete				
	CH		Clay Fill - black, stiff, moist, high plasticity - silty - trace fine to medium sand - trace fine gravel		AS		29
					AS		24
1	ML		Silt - tan, firm, moist, low plasticity - clayey - trace fine to medium sand		AS		20
	CH		Clay - brown, stiff, moist, high plasticity - some silt below 1.7 m		AS		34
					AS		37
2					AS		36
			TESTHOLE LOCATION: 109.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		37
3							



DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH04

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mulvey Avenue between Stafford Street and Lilac Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
	CO	Concrete				
	CH	Clay Fill - black, stiff, moist, high plasticity - trace organic material - silty - trace fine to medium sand - trace fine gravel		AS		30
				AS		33
1				AS		31
	CH	Clay - brown, stiff, moist, high plasticity		AS		28
				AS		26
	ML	Silt - tan, soft, moist, low plasticity - clayey - trace fine to medium sand		AS		24
2				AS		25
		TESTHOLE LOCATION: 154.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

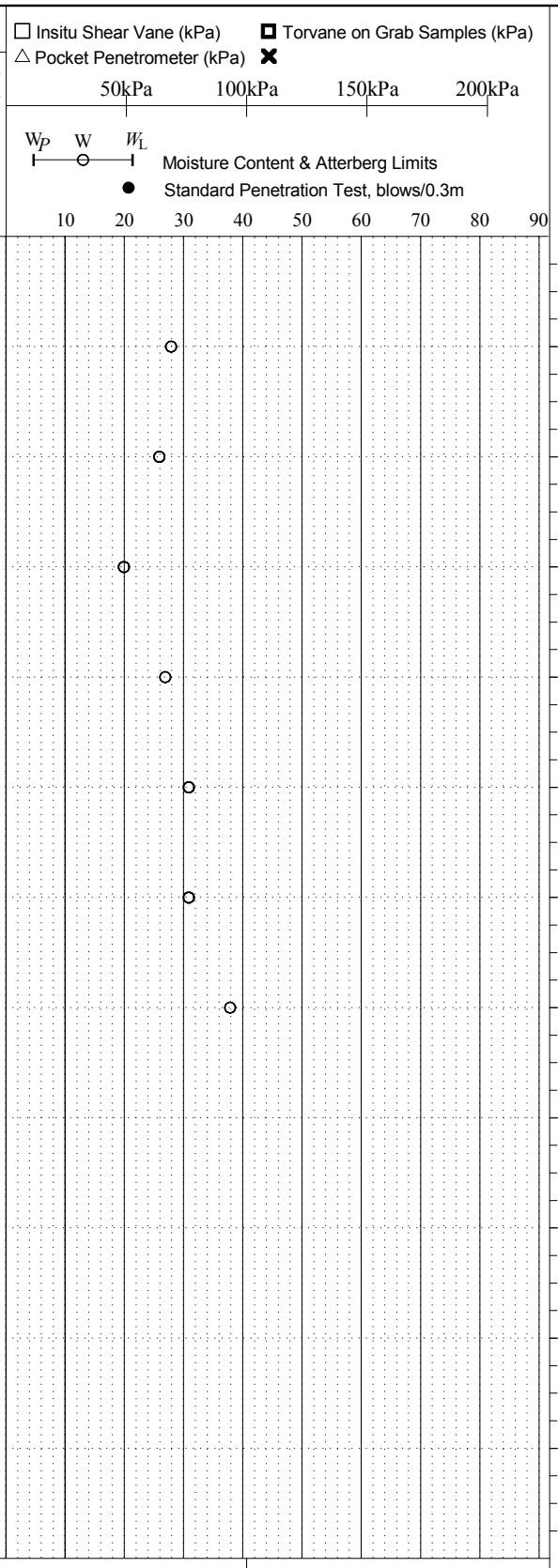
Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH05

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mulvey Avenue between Stafford Street and Lilac Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	CO		Concrete				
	CH		Clay Fill - black, stiff, moist, high plasticity - silty - trace fine to medium sand - trace fine gravel		AS		28
					AS		26
1	ML		Silt - tan, soft, moist, low plasticity - clayey - trace fine to medium sand		AS		20
	CH		Clay - brown, stiff, moist, high plasticity		AS		27
					AS		31
2					AS		31
			TESTHOLE LOCATION: 200.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		38
3							



DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH06

CLIENT City of Winnipeg
PROJECT 2015 Regional Street Renewal Program
LOCATION Mulvey Avenue between Stafford Street and Lilac Street
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd.

PROJECT No. 123311671
DATUM
ELEVATION
DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
	CO	Concrete				
	CH	Clay Fill - black, stiff, moist, high plasticity - trace organic material - silty - trace fine to medium sand - trace fine gravel		AS		37
				AS		29
1				AS		29
	CH	Clay - brown, stiff, moist, high plasticity		AS		23
	ML	Silt - tan, soft, moist, low plasticity - clayey - trace fine to medium sand		AS		23
				AS		24
2				AS		22
		TESTHOLE LOCATION: 250.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m North of South curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖

50kPa 100kPa 150kPa 200kPa

W_P W W_L Moisture Content & Atterberg Limits

● Standard Penetration Test, blows/0.3m

10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Piezometer Backfill Type: Bentonite Drill Cuttings Sand

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH07

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Mulvey Avenue between Stafford Street and Lilac Street ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
	CO	Concrete				
	CH	Clay Fill - black, stiff, moist, high plasticity - silty - trace fine to medium sand - trace fine gravel Particle Size Analysis at 0.6 m: 2.0% Gravel, 8.3% Sand, 32.4% Silt, 57.3% Clay		AS		19
1				AS		23
				AS		24
	CH	Clay - brown, stiff, moist, high plasticity - trace fine to coarse sand		AS		26
				AS		27
2				AS		21
		TESTHOLE LOCATION: 305.0 m East of Northeast corner of Stafford Street and Mulvey Avenue, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		28
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

Core sample from Testhole TH1

Core sample from Testhole TH2

Core sample from Testhole TH3

Core sample from Testhole TH4

Core sample from Testhole TH5

Core sample from Testhole TH6

Core sample from Testhole TH7

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

PARTICLE SIZE ANALYSIS
ASTM D422

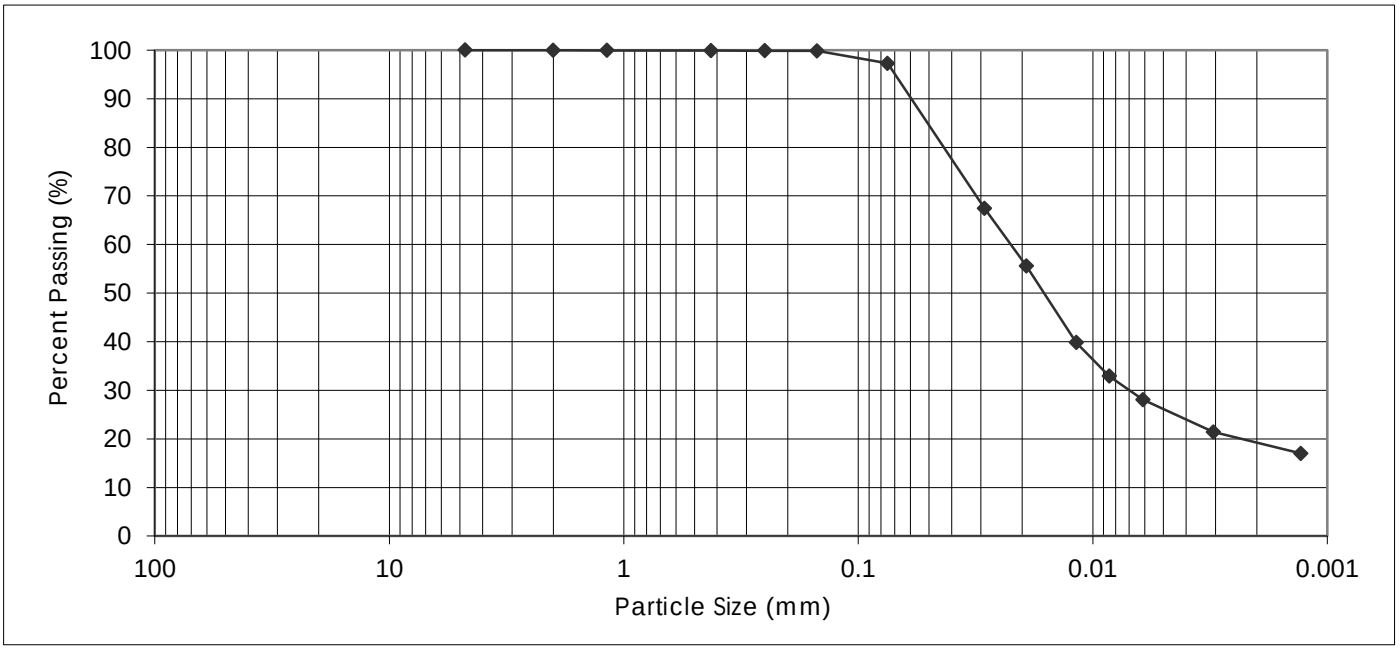
City of Winnipeg
Engineering Division, Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1
Attention: Derek Teperto

PROJECT: 2015 Regional Street Renewal Program
Mulvey Avenue between Stafford Street and Lilac Street

PROJECT NO.: 123311671

SAMPLED BY: Nestor Abarca
SAMPLE ID: TH02 @ 0.91 m

DATE RECEIVED: January 2, 2015
TESTED BY: Sothea Bun, C.E.T.



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

PARTICLE SIZE	PERCENT PASSING
1.18 mm	100.0
0.425 mm	99.9
0.250 mm	99.9
0.150 mm	99.8
0.075 mm	97.3
0.005 mm	25.6
0.002 mm	18.8
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.0	0.1	2.6	71.7	25.6	NT*

NT* Sample not tested for colloids

January 7, 2015

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

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

PARTICLE SIZE ANALYSIS
ASTM D422

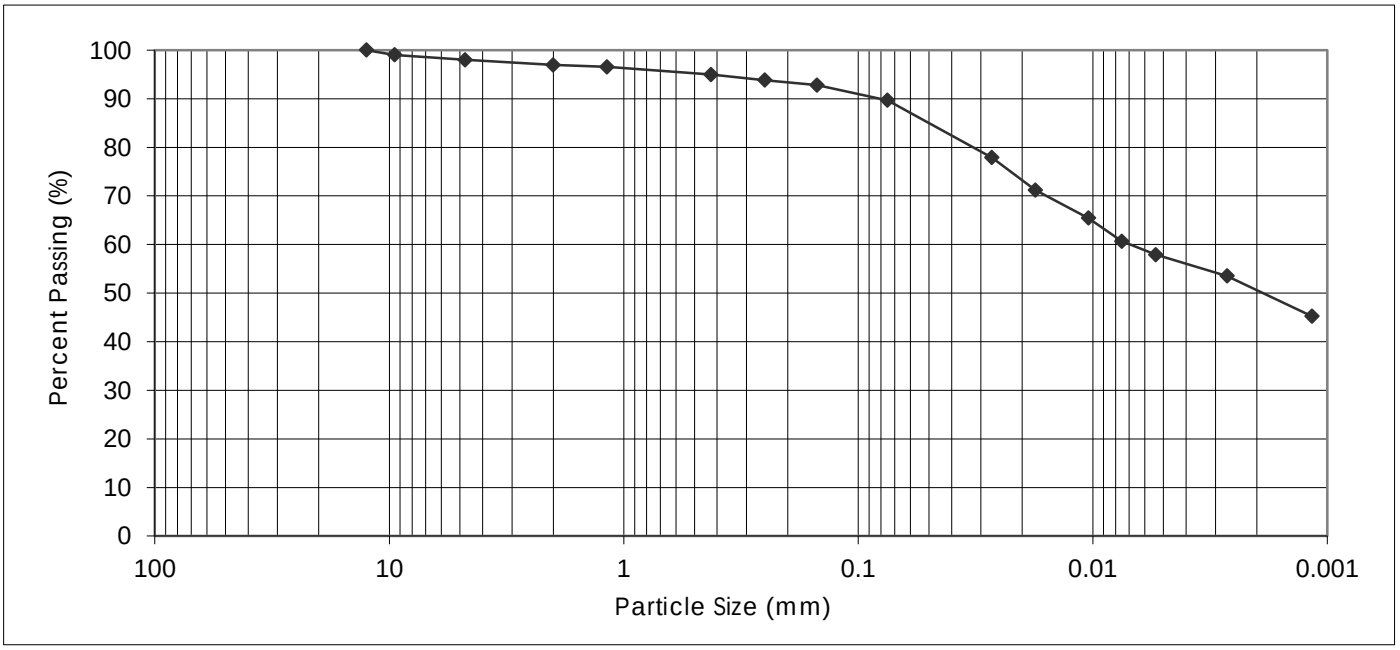
City of Winnipeg
Engineering Division, Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1
Attention: Derek Teperto

PROJECT: 2015 Regional Street Renewal Program
Mulvey Avenue between Stafford Street and Lilac Street

PROJECT NO.: 123311671

SAMPLED BY: Nestor Abarca
SAMPLE ID: TH07 @ 0.61 m

DATE RECEIVED: January 2, 2015
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	99.0
4.75 mm	98.0
2.00 mm	97.0

PARTICLE SIZE	PERCENT PASSING
1.18 mm	96.6
0.425 mm	95.0
0.250 mm	93.8
0.150 mm	92.8
0.075 mm	89.7
0.005 mm	57.3
0.002 mm	49.8
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
2.0	1.0	2.0	5.3	32.4	57.3	NT*

NT* Sample not tested for colloids

January 7, 2015

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

2015 REGIONAL STREET RENEWAL PROGRAM

CALROSSIE BOULEVARD BETWEEN PEMBINA HIGHWAY AND RIVERSIDE DRIVE

GEOTECHNICAL INVESTIGATION

Prepared for:
City Of Winnipeg
Engineering Division
Public Works Department
106 – 1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

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

January 15, 2015
Project No. 123311671

Stantec	Project No. 123311671	Drawn by: SB	Figure: 1	**Testhole Location Plan** **2015 Regional Street Renewal Program** **Calrossie Boulevard from Pembina Highway to Riverside Drive** **Winnipeg, Manitoba**
	Date: Dec. 17, 2014	Reviewed by: GL	Scale: NTS	

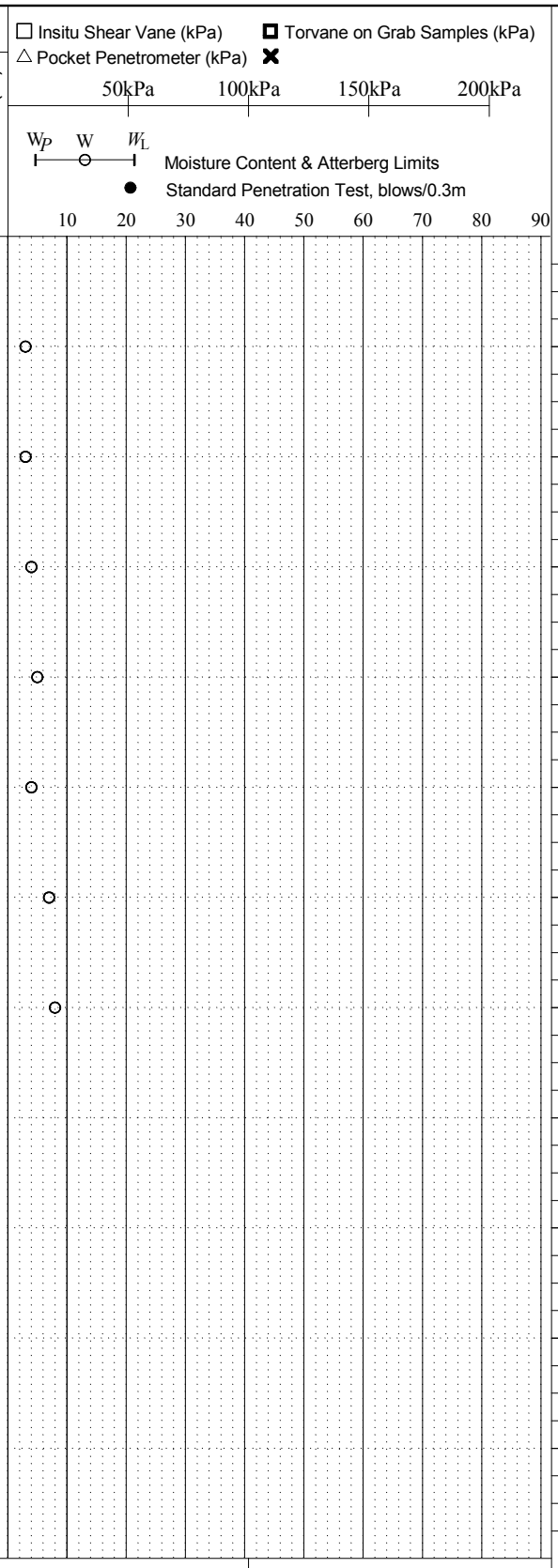
TABLE 1
2015 REGIONAL STREET RENEWAL PROGRAM
CALROSSIE BOULEVARD BETWEEN PEMBINA HIGHWAY AND RIVERSIDE DRIVE
GEOTECHNICAL INVESTIGATION

Testhole ID	Testhole Location	Pavement Surface		Pavement Structure Material		Sample Description	Sample Depth (m)	Moisture Content (%)	Particle Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH1	15.0 m East of Pembina Highway, approximately 1.5 m South of North curb	Asphalt	65	Granular Fill	2035	-	-	-	-	-	-	-	-	-	-
TH2	50.0 m East of Pembina Highway, approximately 1.5 m North of South curb	Asphalt	75	Granular Fill	480	-	-	-	-	-	-	-	-	-	-
TH3	105.0 m East of Pembina Highway, approximately 1.5 m South of North curb	Asphalt	70	Granular Fill	800	-	-	-	-	-	-	-	-	-	-
TH4	155.0 m East of Pembina Highway, approximately 1.5 m South of North curb	Asphalt	45	Granular Fill	405	-	-	-	-	-	-	-	-	-	-
TH5	200.0 m East of Pembina Highway, approximately 1.5 m South of North curb	Asphalt	65	Granular Fill	205	Clay Fill	0.6	24	0.4	8.2	22	69.4	59	18	41
						Clay	1.2	32	0.0	0.9	9.1	90.0	85	24	61
TH6	251.0 m East of Pembina Highway, approximately 1.5 m South of North curb	Asphalt	60	Granular Fill	1765	-	-	-	-	-	-	-	-	-	-
TH7	300.0 m East of Pembina Highway, approximately 1.5 m South of North curb	Asphalt	60	Granular Fill	850	-	-	-	-	-	-	-	-	-	-

TESTHOLE RECORD TH01

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Calrossie Boulevard between Pembina Highway and Riverside Drive ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
		Granular Fill - 20 mm maximum size aggregate - medium to coarse sand below 1.8 m		AS		3
				AS		3
1	GW			AS		4
				AS		5
				AS		4
				AS		7
2				AS		8
		TESTHOLE LOCATION : 15.0 m East of Pembina Highway, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 1.2 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3						



DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH02

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Calrossie Boulevard between Pembina Highway and Riverside Drive ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
	GW	Granular Fill - 20 mm maximum size aggregate		AS		8
	CH	Clay Fill - black, stiff, moist, high plasticity - trace fine to coarse sand - trace fine gravel - some silt		AS		30
1				AS		24
	ML	Silt - tan, soft, moist, low plasticity		AS		19
				AS		23
				AS		20
2				AS		24
		TESTHOLE LOCATION : 50.0 m East of Pembina Highway, approximately 1.5 m North of South curb. • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

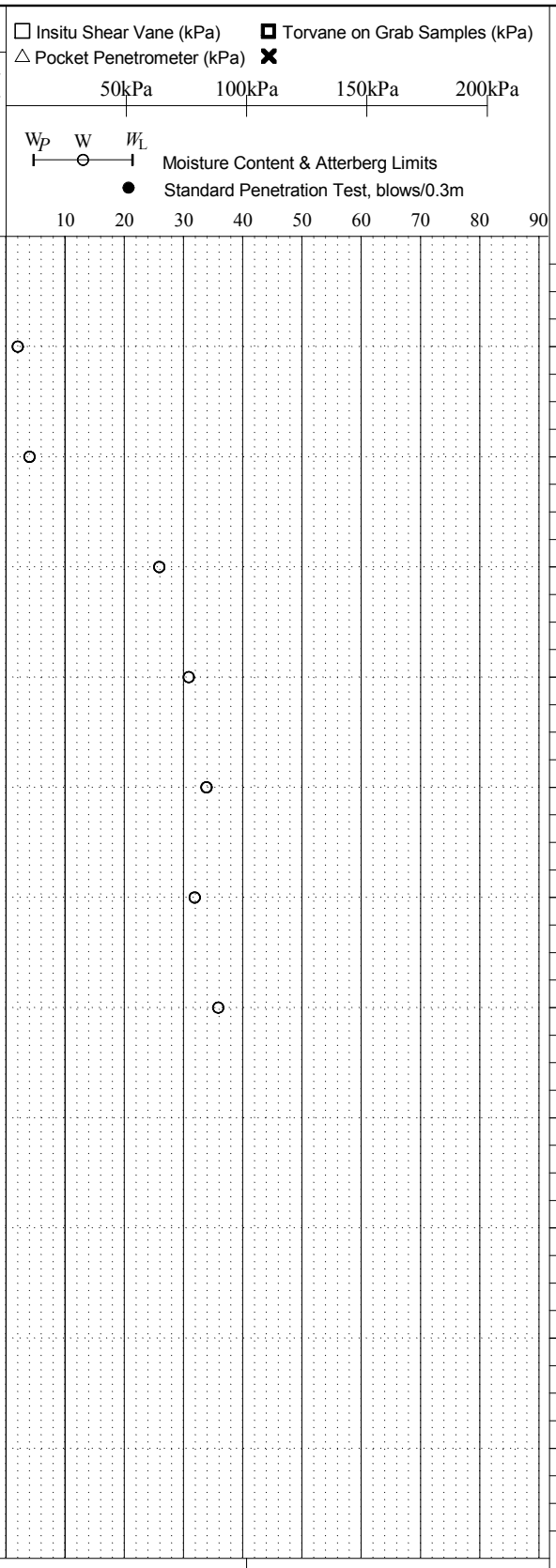
Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH03

CLIENT City of Winnipeg
PROJECT 2015 Regional Street Renewal Program
LOCATION Calrossie Boulevard between Pembina Highway and Riverside Drive
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd.
PROJECT No. 123311671
DATUM
ELEVATION
DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	GW		Granular Fill - 20 mm maximum size aggregate		AS	2	
					AS	4	
1	CH		Clay Fill - black, stiff, moist, high plasticity - trace organic material - trace fine to coarse sand - trace fine gravel - some silt		AS	26	
					AS	31	
					AS	34	
2					AS	32	
			TESTHOLE LOCATION : 105.0 m East of Pembina Highway, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 1.1 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS	36	
3							



DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

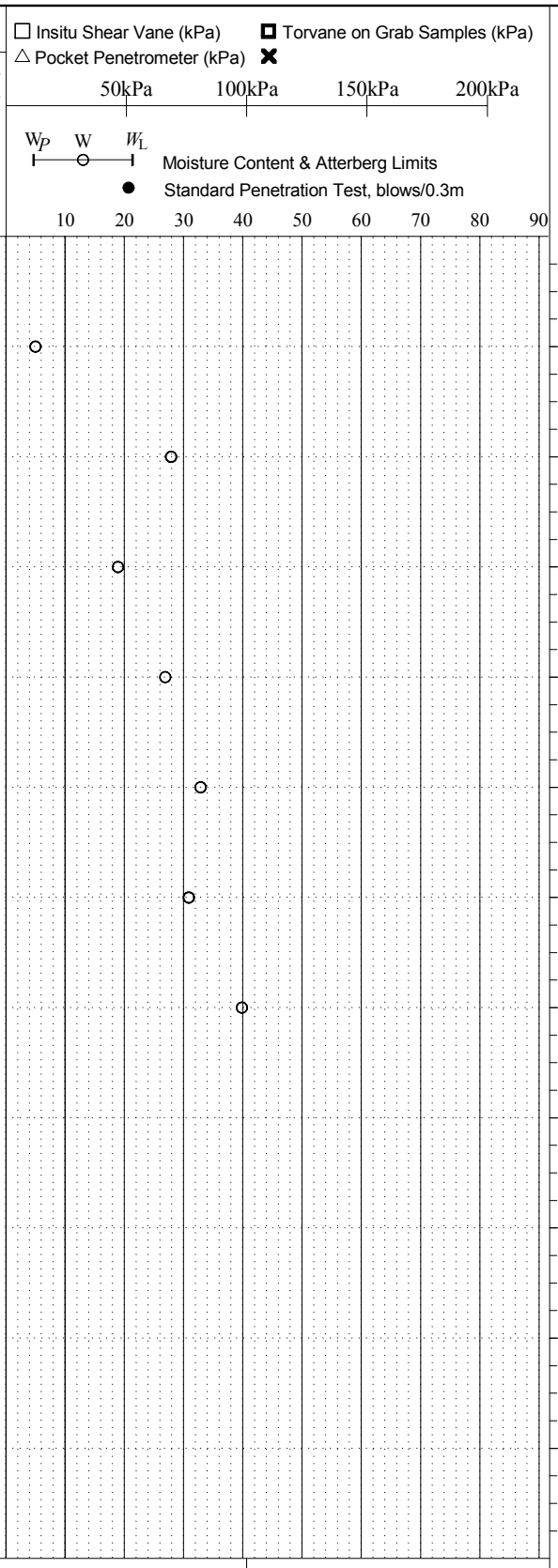
Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH04

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Calrossie Boulevard between Pembina Highway and Riverside Drive ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
	GW	Granular Fill - 20 mm maximum size aggregate		AS		5
	CH	Clay Fill - black, stiff, moist, high plasticity - trace fine to coarse sand - trace fine gravel - some silt		AS		28
1				AS		19
	CH	Clay - brown, stiff, moist, high plasticity - trace fine to medium sand - trace silt		AS		27
				AS		33
2				AS		31
		TESTHOLE LOCATION : 155.0 m East of Pembina Highway, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 1.1 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		40
3						



DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH05

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Calrossie Boulevard between Pembina Highway and Riverside Drive ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	GW		Granular Fill - 20 mm maximum size aggregate		AS		4
	CH		Clay Fill - black, stiff, moist, high plasticity - trace organic material - trace fine to coarse sand - trace fine gravel - some silt		AS		24
1			Particle Size Analysis at 0.6 m: 0.4% Gravel, 8.2% Sand, 22.0% Silt, 69.4% Clay		AS		28
	CH		Clay - brown, stiff, moist, high plasticity - trace fine to medium sand - trace silt		AS		32
			Particle Size Analysis at 1.2 m: 0.0% Gravel, 0.9% Sand, 9.1% Silt, 90.0% Clay		AS		35
2					AS		30
			TESTHOLE LOCATION : 200.0 m East of Pembina Highway, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 1.1 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		37
3							

Insitu Shear Vane (kPa) ☐ Torvane on Grab Samples (kPa) ■
Pocket Penetrometer (kPa) △ ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

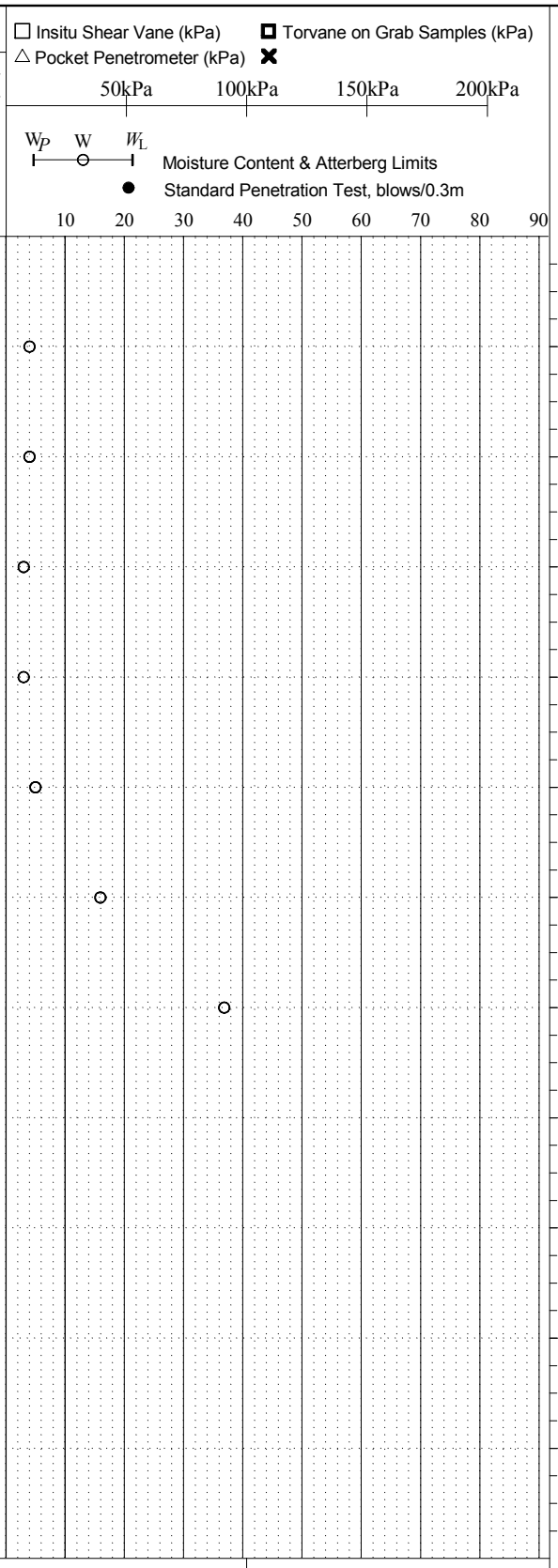
Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH06

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Calrossie Boulevard between Pembina Highway and Riverside Drive ELEVATION
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
		Granular Fill - 20 mm maximum size aggregate		AS		4
				AS		4
	GW			AS		3
1				AS		3
				AS		5
	ML	Silt - tan, soft, moist, low plasticity		AS		16
2	CH	Clay - brown, stiff, moist, high plasticity - trace fine to medium sand - trace silt		AS		37
		TESTHOLE LOCATION : 251.0 m East of Pembina Highway, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 1.1 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole was terminated at a depth of 2.1 m.				
3						



DEPTH (ft): 0, 2, 4, 6, 8, 10, 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH07

CLIENT City of Winnipeg
PROJECT 2015 Regional Street Renewal Program
LOCATION Calrossie Boulevard between Pembina Highway and Riverside Drive
DRILLING DATE December 11, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

PROJECT No. 123311671
DATUM
ELEVATION

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
	GW	Granular Fill - 20 mm maximum size aggregate		AS		3
				AS		5
1	CH	Clay Fill - black, firm, moist, medium plasticity - trace organic material - trace fine to coarse sand - trace fine gravel - some silt		AS		23
				AS		41
	CH	Clay - brown, stiff, moist, high plasticity - trace fine to medium sand - trace silt		AS		40
2				AS		35
		TESTHOLE LOCATION : 300.0 m East of Pembina Highway, approximately 1.5 m South of North curb. • The soil was frozen to a depth of 1.1 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole was terminated at a depth of 2.1 m.		AS		41
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

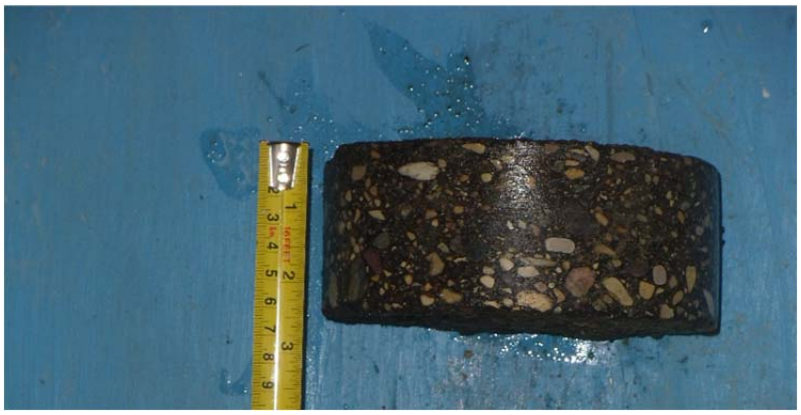
Core sample from Testhole TH1

Core sample from Testhole TH2

Core sample from Testhole TH3

Core sample from Testhole TH4

Core sample from Testhole TH5



Core sample from Testhole TH6

Core sample from Testhole TH7

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

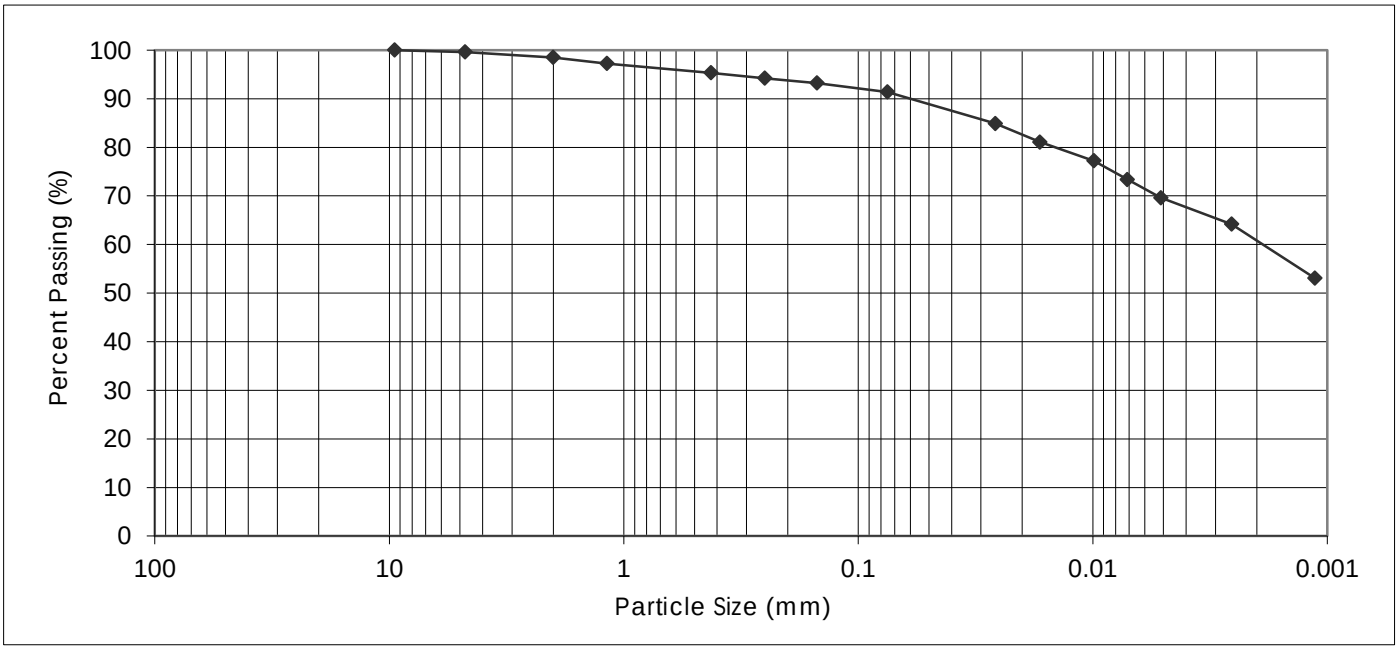
PARTICLE SIZE ANALYSIS
ASTM D422

City of Winnipeg
Engineering Division, Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1
Attention: Derek Teperto

PROJECT: 2015 Regional Street Renewal Program
Calrossie Blvd between Pembina Hwy and Riverside Dr
PROJECT NO.: 123311671

SAMPLED BY: Nestor Abarca
SAMPLE ID: TH05 @ 0.61 m

DATE RECEIVED: January 2, 2015
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	99.6
2.00 mm	98.5

PARTICLE SIZE	PERCENT PASSING
1.18 mm	97.2
0.425 mm	95.3
0.250 mm	94.2
0.150 mm	93.2
0.075 mm	91.4
0.005 mm	69.4
0.002 mm	59.8
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.4	1.1	3.2	3.9	22.0	69.4	NT*

NT* Sample not tested for colloids

January 12, 2014

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

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

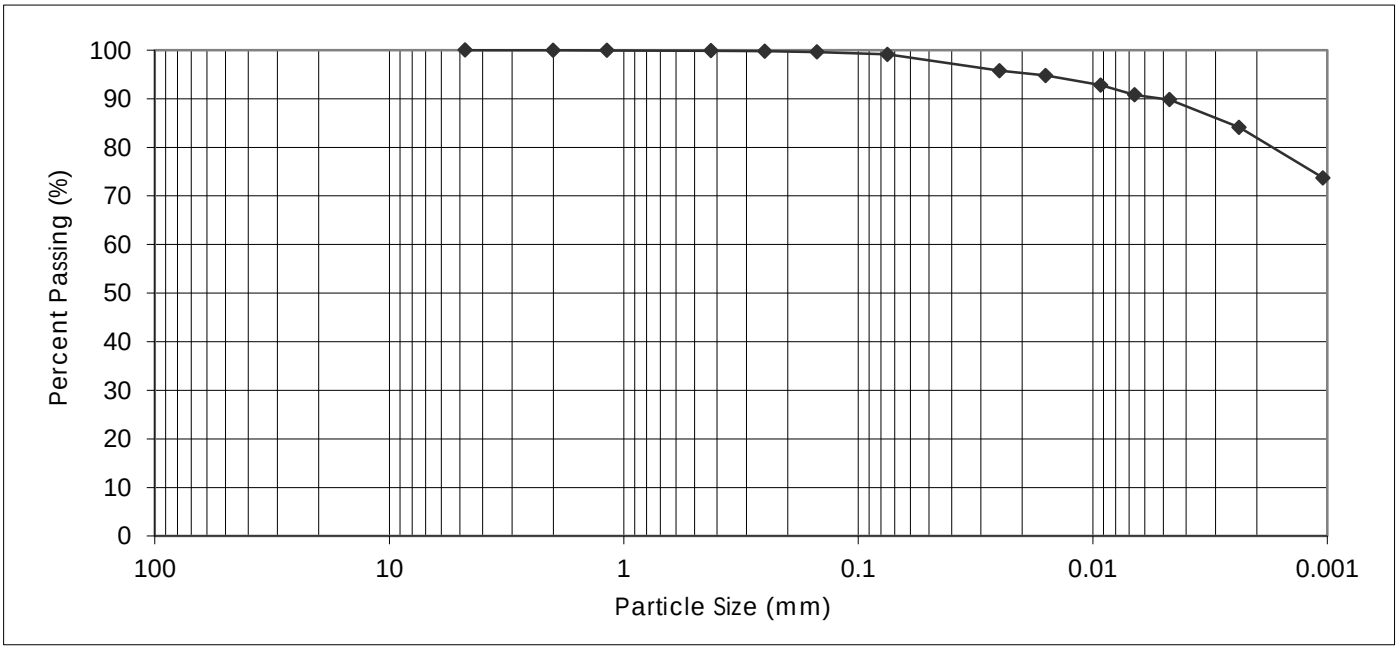
PARTICLE SIZE ANALYSIS
ASTM D422

City of Winnipeg
Engineering Division, Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1
Attention: Derek Teperto

PROJECT: 2015 Regional Street Renewal Program
Calrossie Blvd between Pembina Hwy and Riverside Dr
PROJECT NO.: 123311671

SAMPLED BY: Nestor Abarca
SAMPLE ID: TH05 @ 1.2 m

DATE RECEIVED: January 2, 2015
TESTED BY: Sothea Bun, C.E.T.



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

PARTICLE SIZE	PERCENT PASSING
1.18 mm	99.9
0.425 mm	99.9
0.250 mm	99.8
0.150 mm	99.6
0.075 mm	99.1
0.005 mm	90.0
0.002 mm	81.2
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.0	0.1	0.8	9.1	90.0	NT*

NT* Sample not tested for colloids

January 12, 2014

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

2015 REGIONAL STREET RENEWAL PROGRAM

LYON STREET BETWEEN POINT ROAD AND OAKENWALD AVENUE

GEOTECHNICAL INVESTIGATION

Prepared for:
City Of Winnipeg
Engineering Division
Public Works Department
106 – 1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

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

January 15, 2015
Project No. 123311671

Stantec	Project No. 123311671	Drawn by: SB	Figure: 1
	Date: Dec. 22, 2014	Reviewed by: GL	Scale: NTS

Testhole Location Plan
2015 Regional Street Renewal Program
Lyon Street between Point Road and Oakenwald Avenue

TABLE 1
2015 REGIONAL STREET RENEWAL PROGRAM
LYON STREET BETWEEN POINT ROAD AND OAKENWALD AVENUE
GEOTECHNICAL INVESTIGATION

Testhole ID	Testhole Location	Pavement Surface		Pavement Structure Material		Sample Description	Sample Depth (m)	Moisture Content (%)	Particle Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH1	17.0 m North of Northwest corner of Oakenwald Avenue and Lyon Street, approximately 2.5 m East of West curb	Asphalt	95	Crushed Limestone	800	-	-	-	-	-	-	-	-	-	-
TH2	30.0 m South of Southwest corner of Riverwood Avenue and Lyon Street, approximately 2.5 m East of West curb	Asphalt	70	-	-	Silt	1.2	19	0.3	6.4	71.1	22.2	26	16	10
TH3	9.0 m North of Northeast corner of Riverwood Avenue and Lyon Street, approximately 2.4 m West of East curb	Asphalt	60	-	-	Clay Fill	0.6	21	2.5	11	34.2	52.3	48	15	33
TH4	47.0 m North of Northwest Corner of Riverwood Avenue and Lyon Street, approximately 2.3 m East of West curb	Asphalt	50	-	-	-	-	-	-	-	-	-	-	-	-
TH5	29.0 m South of Southeast corner of Point Road and Lyon Street, approximately 2.5 m West of East curb	Asphalt	65	-	-	-	-	-	-	-	-	-	-	-	-

TESTHOLE RECORD TH01

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Lyon Street between Point Road and Oakenwald Avenue ELEVATION
DRILLING DATE December 10, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	GW		Crushed Limstone - 20 mm maximum size aggregate		AS		8
					AS		6
1	CH		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel		AS		21
					AS		23
	ML		Silt - tan, soft, moist, low plasticity - some clay - trace fine to coarse sand - trace fine gravel		AS		20
					AS		21
2	CH		Clay - brown, stiff, moist, high plasticity		AS		27
			TESTHOLE LOCATION: 17.0 m North of Northwest corner of Oakenwald Avenue and Lyon Street, approximately 2.5 m East of West curb. • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3							

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH02

CLIENT City of Winnipeg
PROJECT 2015 Regional Street Renewal Program
LOCATION Lyon Street between Point Road and Oakenwald Avenue
DRILLING DATE December 10, 2014 DRILLING CO. Maple Leaf Drilling Ltd.

PROJECT No. 123311671
DATUM
ELEVATION
DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	CH		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel		AS		25
					AS		25
1					AS		28
	ML		Silt - tan, soft, moist, low plasticity - some clay - trace fine to coarse sand - trace fine gravel Particle Size Analysis at 1.2 m: 0.3% Gravel, 6.4% Sand, 71.1% Silt, 22.2% Clay		AS		19
					AS		21
2					AS		23
			TESTHOLE LOCATION: 30.0 m South of Southwest corner of Riverwood Avenue and Lyon Street, approximately 2.5 m East of West curb. • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.		AS		29
3							

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖

50kPa 100kPa 150kPa 200kPa

W_P W W_L Moisture Content & Atterberg Limits

● Standard Penetration Test, blows/0.3m

10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings ⁘ Sand

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH03

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Lyon Street between Point Road and Oakenwald Avenue ELEVATION
DRILLING DATE December 10, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	CH		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel Particle Size Analysis at 0.6 m: 2.5% Gravel, 11.0% Sand, 34.2% Silt, 52.3% Clay		AS		19
					AS		21
1	ML		Silt - tan, soft, moist, low plasticity - some clay - trace fine to coarse sand - trace fine gravel		AS		25
					AS		35
	CH		Clay - brown, stiff, moist, high plasticity		AS		37
2					AS		40
					AS		43
3			TESTHOLE LOCATION: 9.0 m North of Northeast corner of Riverwood Avenue and Lyon Street, approximately 2.4 m West of East curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				

Insitu Shear Vane (kPa) ☐ Torvane on Grab Samples (kPa) ■
Pocket Penetrometer (kPa) △ ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH04

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Lyon Street between Point Road and Oakenwald Avenue ELEVATION
DRILLING DATE December 10, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt		CORE		
		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel		AS		8
				AS		8
	CH			AS		21
1				AS		21
				AS		34
		Clay - brown, stiff, moist, high plasticity		AS		39
	CH			AS		38
2		TESTHOLE LOCATION: 47.0 m North of Northwest corner of Riverwood Avenue and Lyon Street, approximately 2.3 m East of West curb. • The soil was frozen to a depth of 1.5 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3						

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

TESTHOLE RECORD TH05

CLIENT City of Winnipeg PROJECT No. 123311671
PROJECT 2015 Regional Street Renewal Program DATUM
LOCATION Lyon Street between Point Road and Oakenwald Avenue ELEVATION
DRILLING DATE December 10, 2014 DRILLING CO. Maple Leaf Drilling Ltd. DRILLING METHOD 125 mm SSA

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt		CORE		
	CH		Clay Fill - black, firm, moist, medium plasticity - silty - trace fine to coarse sand - trace fine gravel		AS		19
					AS		32
1			Clay - brown, stiff, moist, high plasticity		AS		35
					AS		38
	CH				AS		41
2					AS		40
					AS		42
			TESTHOLE LOCATION: 29.0 m South of Southeast corner of Point Road and Lyon Street, approximately 2.5 m West of East curb. • The soil was frozen to a depth of 0.8 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.				
3							

□ Insitu Shear Vane (kPa) ■ Torvane on Grab Samples (kPa)
△ Pocket Penetrometer (kPa) ✖
50kPa 100kPa 150kPa 200kPa
W_P W W_L Moisture Content & Atterberg Limits
● Standard Penetration Test, blows/0.3m
10 20 30 40 50 60 70 80 90

DEPTH (ft): 0 2 4 6 8 10 12

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

Logged by: Nestor Abarca
Reviewed by: German Leal

Stantec

Core sample from Testhole TH1

Core sample from Testhole TH2

Core sample from Testhole TH3

Core sample from Testhole TH4

Core sample from Testhole TH5

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

PARTICLE SIZE ANALYSIS
ASTM D422

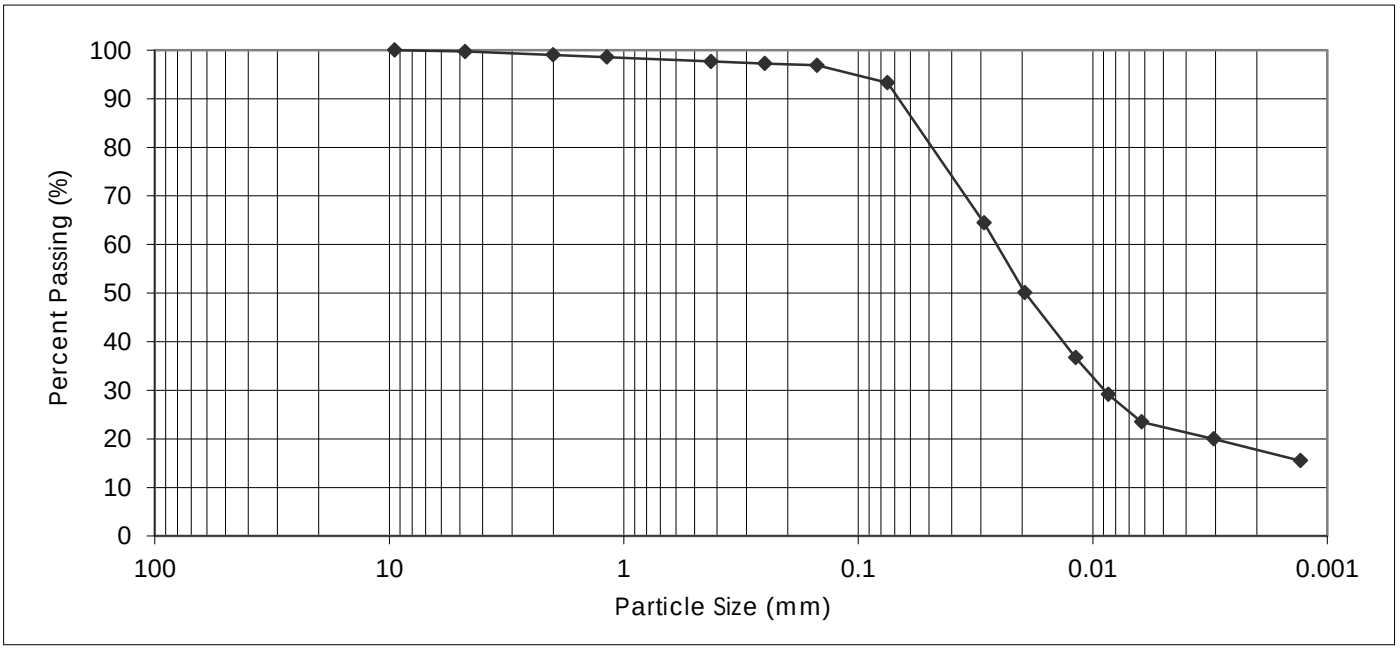
City of Winnipeg
Engineering Division, Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1
Attention: Derek Teperto

PROJECT: 2015 Regional Street Renewal Program
Lyon St between Point Rd and Oakenwald Ave

PROJECT NO.: 123311671

SAMPLED BY: Nestor Abarca
SAMPLE ID: TH02 @ 1.2 m

DATE RECEIVED: January 2, 2015
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	99.7
2.00 mm	99.0

PARTICLE SIZE	PERCENT PASSING
1.18 mm	98.6
0.425 mm	97.7
0.250 mm	97.3
0.150 mm	96.9
0.075 mm	93.3
0.005 mm	22.2
0.002 mm	17.3
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.3	0.7	1.3	4.4	71.1	22.2	NT*

NT* Sample not tested for colloids

January 7, 2015

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

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

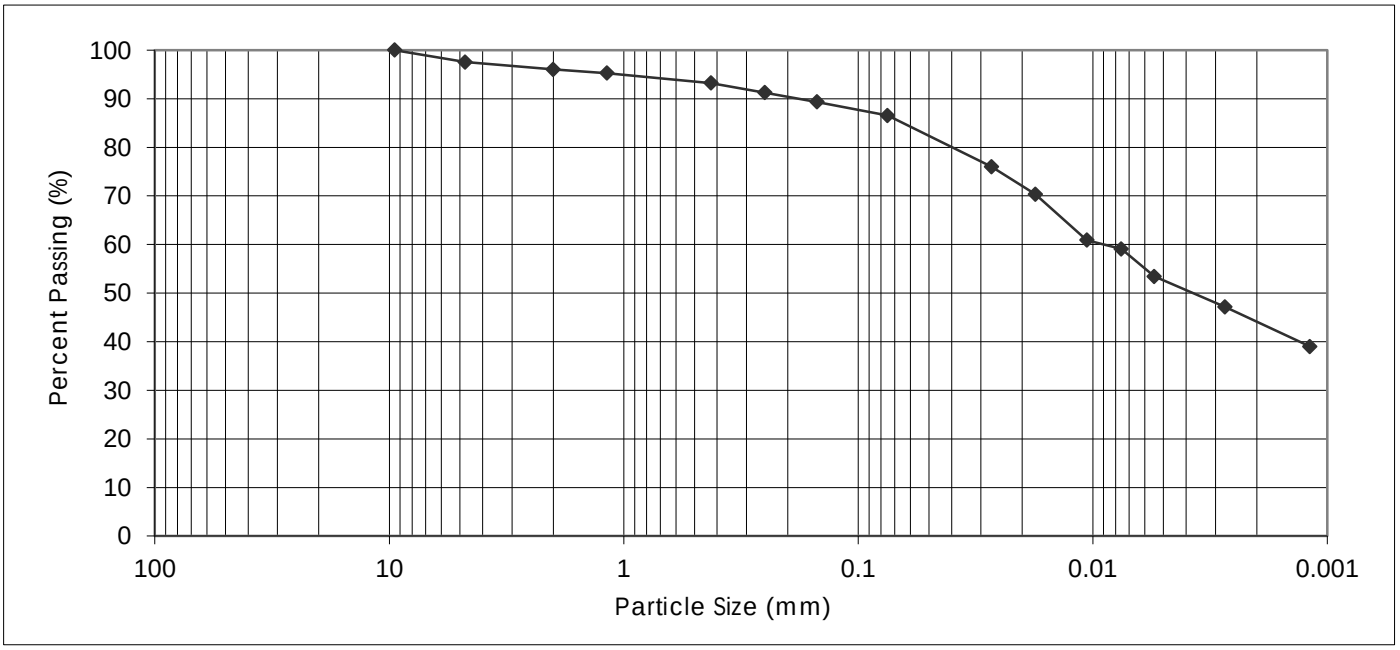
PARTICLE SIZE ANALYSIS
ASTM D422

City of Winnipeg
Engineering Division, Public Works Department
106-1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1
Attention: Derek Teperto

PROJECT: 2015 Regional Street Renewal Program
Lyon St between Point Rd and Oakenwald Ave
PROJECT NO.: 123311671

SAMPLED BY: Nestor Abarca
SAMPLE ID: TH03 @ 0.61 m

DATE RECEIVED: January 2, 2015
TESTED BY: Sothea Bun, C.E.T.



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	97.5
2.00 mm	96.0

PARTICLE SIZE	PERCENT PASSING
1.18 mm	95.3
0.425 mm	93.2
0.250 mm	91.3
0.150 mm	89.3
0.075 mm	86.5
0.005 mm	52.3
0.002 mm	43.3
0.001 mm	NT*

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.005 mm	Clay, % <0.005 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
2.5	1.5	2.8	6.7	34.2	52.3	NT*

NT* Sample not tested for colloids

January 7, 2015

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