APPENDIX ‘A’

GEOTECHNICAL REPORT

APPENDIX 'A' - GEOTECHNICAL REPORT

GEOTECHNICAL REPORTS FOR:

I. Bannerman Avenue from McPhillips Street to Airlies Street
II. Garden Grove Drive from Burrows Avenue to Fairgrove Bay (West Leg)
III. Fife Street from Burrows Avenue to College Avenue
IV. Chambers Street from Alexander Avenue to Logan Avenue

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.

2018 Local Street Renewals

Geotechnical Investigation for 2018 Local Street Renewals on Bannerman Avenue (McPhillips Street to Airlies Street)

Prepared for:
City of Winnipeg
Public Works Department
106-1155 Pacific Avenue
Winnipeg, MB
R3E 3P1

Prepared by:
Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB
R3B 2B9

December 20, 2017

2017-11-29
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2017/11/29 12:12 PM By: Boughton, Lee

Stantec

Stantec Consulting Ltd.
Suite 500, 311 Portage Avenue
Winnipeg MB Canada R3B 2B9
Tel. 204.489.5900 Fax. 204.453.9012
www.stantec.com

Legend

TESTHOLE

Notes

IMAGE SOURCE:
GOOGLE EARTH

Client/Project

CITY OF WINNIPEG, PUBLIC WORKS DEPARTMENT

2018 LOCAL STREET RENEWALS ON BANNERMAN AVENUE
MCPHILLIPS ST TO AIRLIES ST - WINNIPEG, MANITOBA

Figure No.

1

Title

TESTHOLE LOCATION PLAN

TABLE 1
BANNERMAN AVENUE
MCPHILLIPS STREET TO AIRLIES STREET

Testhole ID	Core 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
TH01	Bannerman Avenue Eastbound lane, 10 m east of McPhillips Street 1 m north of curb	Asphalt	20	Crushed Limestone	-	-	-	-	-	-	-	-	-	-	-
		Concrete	195												
TH02	Bannerman Avenue Center line of Bannerman Avenue, 125 m east of McPhillips Street	Asphalt	80	Crushed Limestone	-	-	-	-	-	-	-	-	-	-	-
		Concrete	190												
TH03	Bannerman Avenue Westbound lane, 240 m east of McPhillips Street 1 m south of curb	Asphalt	45	Crushed Limestone	-	-	-	-	-	-	-	-	-	-	-
		Concrete	260												
TH04	Bannerman Avenue Eastbound lane, 355 m east of McPhillips Street 1 m north of curb	Asphalt	70	Crushed Limestone	-	-	-	-	-	-	-	-	-	-	-
		Concrete	170												
TH05	Bannerman Avenue Center line of Bannerman Avenue, 470 m east of McPhillips Street	Asphalt	135	Crushed Limestone	-	-	-	-	-	-	-	-	-	-	-
		Concrete	160												
TH06	Bannerman Avenue Westbound lane, 585 m east of McPhillips Street 1 m south of curb	Asphalt	40	Crushed Limestone	-	-	-	-	-	-	-	-	-	-	-
		Concrete	190												

Figure 1 – TH01 Core

Figure 2 – TH02 Core

Figure 3 – TH03 Core

Figure 4 – TH04 Core

Figure 5 – TH05 Core

Figure 6 – TH06 Core

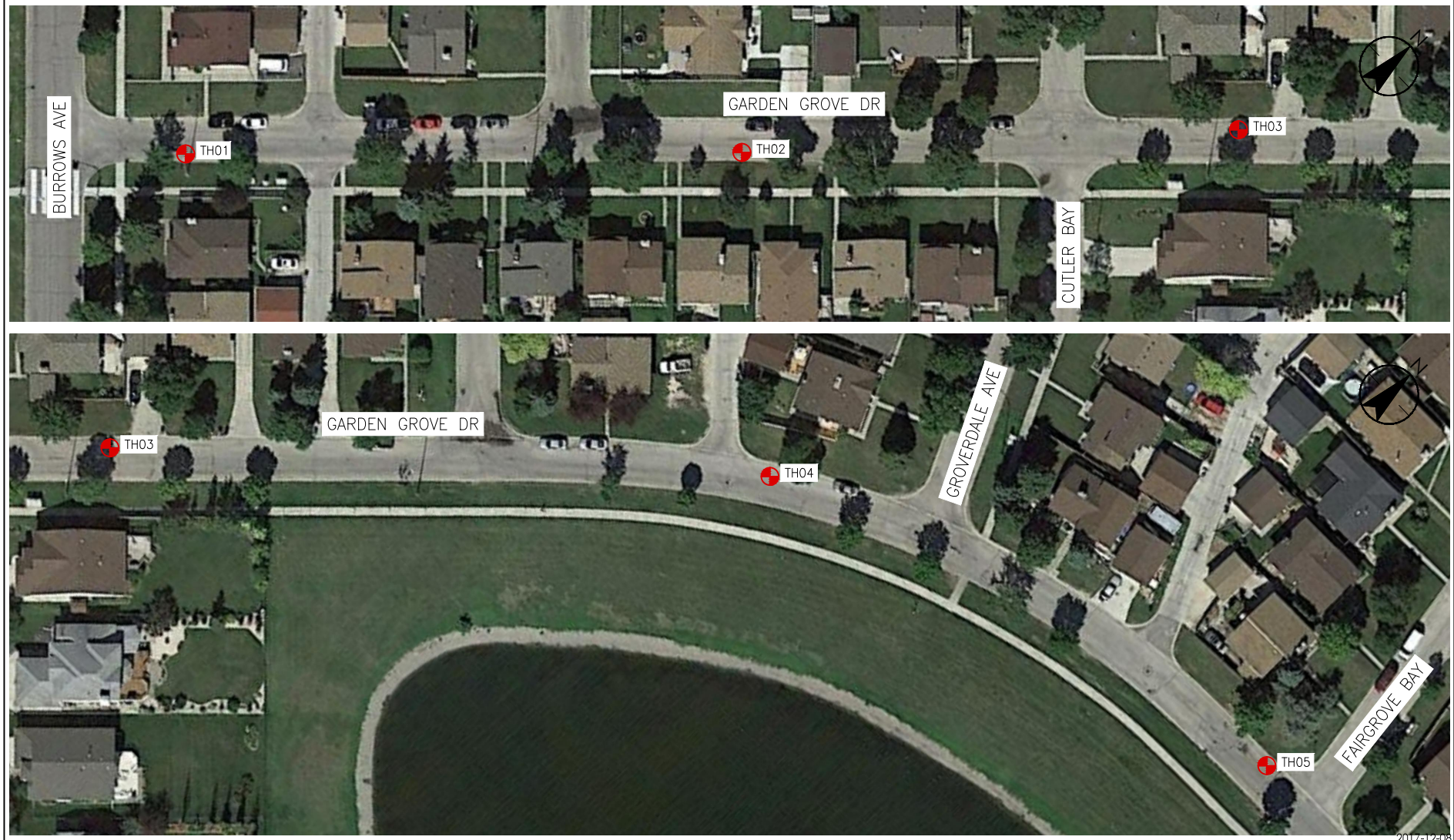
2018 Local Street Renewals

Geotechnical Investigation for 2018 Local Street Renewals on Garden Grove Drive (Burrows Avenue to Fairgrove Bay)

Prepared for:
City of Winnipeg
Public Works Department
106-1155 Pacific Avenue
Winnipeg, MB
R3E 3P1

Prepared by:
Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB
R3B 2B9

December 20, 2017



2017-12-08
123313460

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2017/12/18 10:33 AM By: Boughton, Lee

Stantec

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Suite 500, 311 Portage Avenue
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Legend

TESTHOLE

Notes

IMAGE SOURCE:
GOOGLE EARTH

Client/Project

CITY OF WINNIPEG, PUBLIC WORKS DEPARTMENT

2018 LOCAL STREET RENEWALS ON GARDEN GROVE DRIVE
BURROWS AVE TO FAIRGROVE BAY - WINNIPEG, MANITOBA

Figure No.

1

Title

TESTHOLE LOCATION PLAN

TABLE 1
GARDEN GROVE
BURROWS AVENUE TO FAIRGROVE BAY

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
TH01	Garden Grove Drive Eastbound lane, 16 m east of Burrows Avenue 1 m north of curb	Asphalt	105	Crushed Limestone	200	-	-	-	-	-	-	-	-	-	-
TH02	Garden Grove Drive Eastbound lane, 114 m east of Burrows Avenue 1 m north of curb	Asphalt	105	Crushed Limestone	200	-	-	-	-	-	-	-	-	-	-
TH03	Garden Grove Drive Westbound lane, 200 m east of Burrows Avenue 1 m soutth of curb	Asphalt	115	Crushed Limestone	200	-	-	-	-	-	-	-	-	-	-
TH04	Garden Grove Drive Westtbound lane, 24 m east of Groverdale Avenue 2 m south of curb	Asphalt	100	Crushed Limestone	200	-	-	-	-	-	-	-	-	-	-
TH05	Garden Grove Drive Eastbound lane, 7 m east of Fairgrove Bay 1 m south of curb	Asphalt	90	Crushed Limestone	200	-	-	-	-	-	-	-	-	-	-

Figure 1 – TH01 Core

Figure 2 – TH02 Core

Figure 3 – TH03 Core

Figure 4 – TH04 Core

Figure 5 – TH05 Core

TH01 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department PROJECT No. 123313460
PROJECT 2018 Local Street Renewals DATUM Geodetic NORTHING 5533584
LOCATION Garden Grove Dr (Burrows Ave to Fairgrove Bay) ELEVATION EASTING 628011
DRILLING DATE December 7, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	GW		Crushed Limestone	GS		16
	FL		FILL: stiff brown clay and silt - some fine to coarse sand, trace gravel - moist	GS		27
1	ML		SILT: light brown - some clay, trace fine sand - moist - Grain Size Analysis @ 1.0 m: 0.0% Gravel, 6.0% Sand, 74.0% Silt, 20.0% Clay	GS		21
				GS		21
				GS		21
2				GS		21
3			• TESTHOLE LOCATION: 16 m east of Garden Grove Drive and Burrows Avenue, eastbound lane, 1 m north of curb. • No groundwater seepage • Sloughing was observed upon completion of drilling, testhole open to 1.5 m . • Testhole terminated at depth of 2.0 m.			

□ Insitu Shear Vane (kPa) ■ Torvane on 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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH02 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department — PROJECT No. 123313460
PROJECT 2018 Local Street Renewals — DATUM Geodetic — NORTHING 5533654
LOCATION Garden Grove Dr (Burrows Ave to Fairgrove Bay) — ELEVATION — EASTING 628076
DRILLING DATE December 7, 2017 — DRILLING CO. Maple Leaf Drilling — DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	GW		Crushed Limestone	GS		8
	FL		FILL: stiff grey clay and silt - trace fine to coarse sand, trace gravel - moist	GS		22
1				GS		23
				GS		22
				GS		24
	CH		stiff grey fat CLAY (CH) - silty, trace fine sand - moist	GS		41
2						
3						

• TESTHOLE LOCATION: 114 m east of Garden Grove Drive and Burrows Avenue, eastbound lane, 1 m north of curb.
• No groundwater seepage or sloughing was observed upon completion of drilling.
• Testhole terminated at depth of 2.0 m.

Insitu Shear Vane (kPa) ■ Torvane on 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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

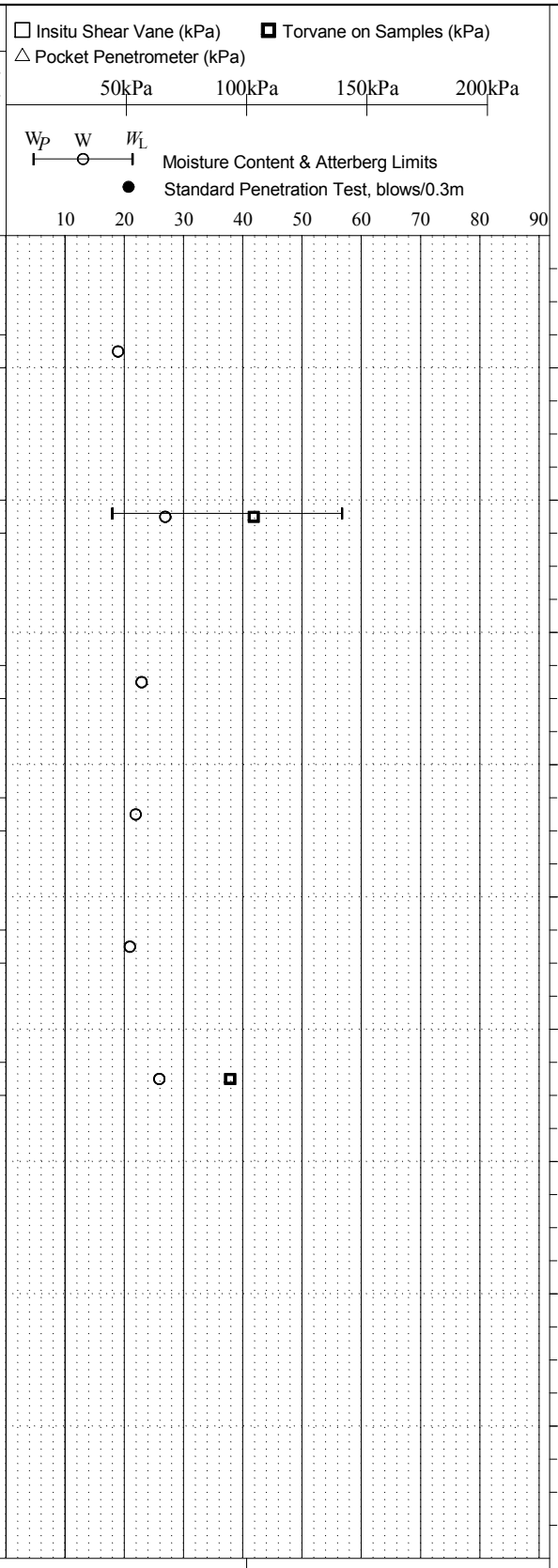
Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH03 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department — PROJECT No. 123313460
PROJECT 2018 Local Street Renewals — DATUM Geodetic — NORTHING 5533719
LOCATION Garden Grove Dr (Burrows Ave to Fairgrove Bay) — ELEVATION — EASTING 628132
DRILLING DATE December 7, 2017 — DRILLING CO. Maple Leaf Drilling — DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt			
	GW	Crushed Limestone	GS		19
	FL	FILL: very stiff grey clay and silt - some fine to coarse sand, trace gravel - moist			
		- Grain Size Analysis @ 0.7 m: 0.1% Gravel, 16.9% Sand, 40.0% Silt, 43.0% Clay	GS		27
1	ML	SILT: light brown - some clay, trace fine sand - moist	GS		23
			GS		22
			GS		21
2	CH	stiff grey fat CLAY (CH) - silty, trace fine sand - moist	GS		26
3		• TESTHOLE LOCATION: 200 m east of Garden Grove Drive and Burrows Avenue, westbound lane, 1 m south of curb. • No groundwater seepage • Sloughing was observed upon completion of drilling, testhole open to 1.5 m . • Testhole terminated at depth of 2.0 m			



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

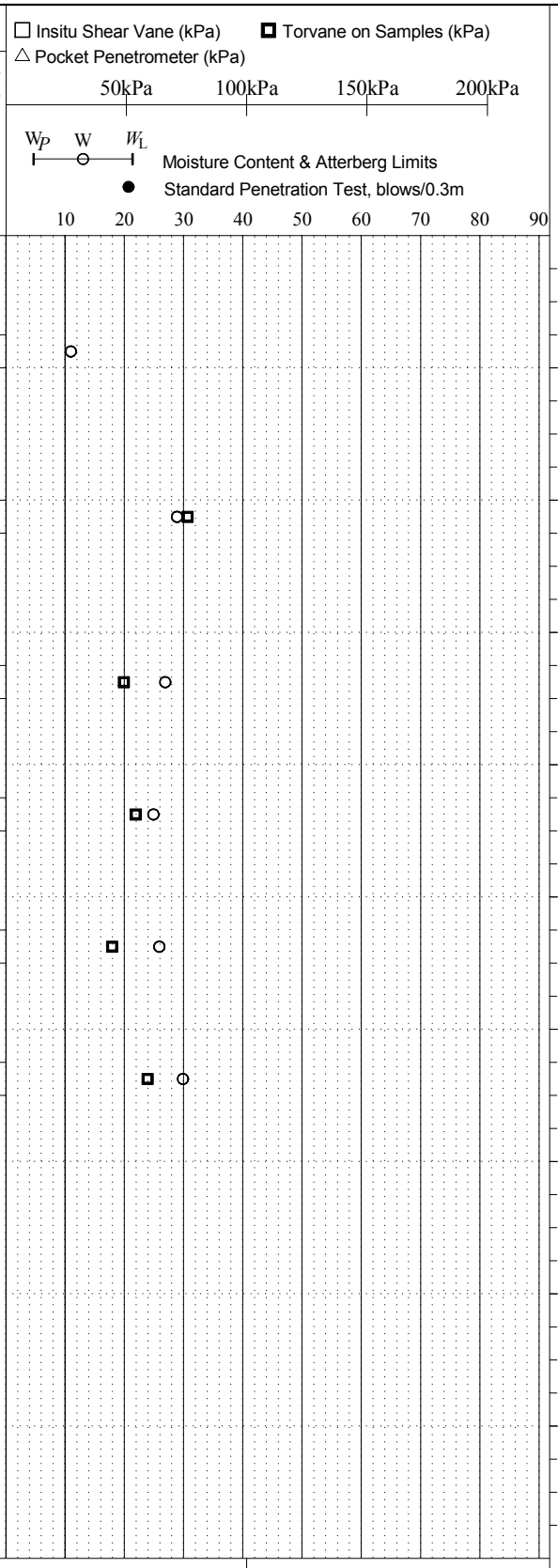
Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH04 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department — PROJECT No. 123313460
PROJECT 2018 Local Street Renewals — DATUM Geodetic — NORTHING 5533801
LOCATION Garden Grove Dr (Burrows Ave to Fairgrove Bay) — ELEVATION — EASTING 628216
DRILLING DATE December 7, 2017 — DRILLING CO. Maple Leaf Drilling — DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	GW		Crushed Limestone	GS		11
	FL		FILL: stiff grey clay and silt - trace fine to coarse sand, trace gravel, trace oxidation - moist	GS		29
1				GS		27
				GS		25
				GS		26
2				GS		30
3			• TESTHOLE LOCATION: 24 m east of Garden Grove Drive and Groverdale Avenue, westbound lane, 2 m north of curb. • No groundwater seepage or sloughing was observed upon completion of drilling. • Testhole terminated at depth of 2.0 m.			



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

Sample Type: GS - Grab Sample; SS - Split Spoon; RC - Rock Core; ST - Shelby Tube; PT - Piston Tube; VT - Shear Vane Test

Piezometer Backfill Type: Bentonite; Drill Cuttings; Sand; Slough

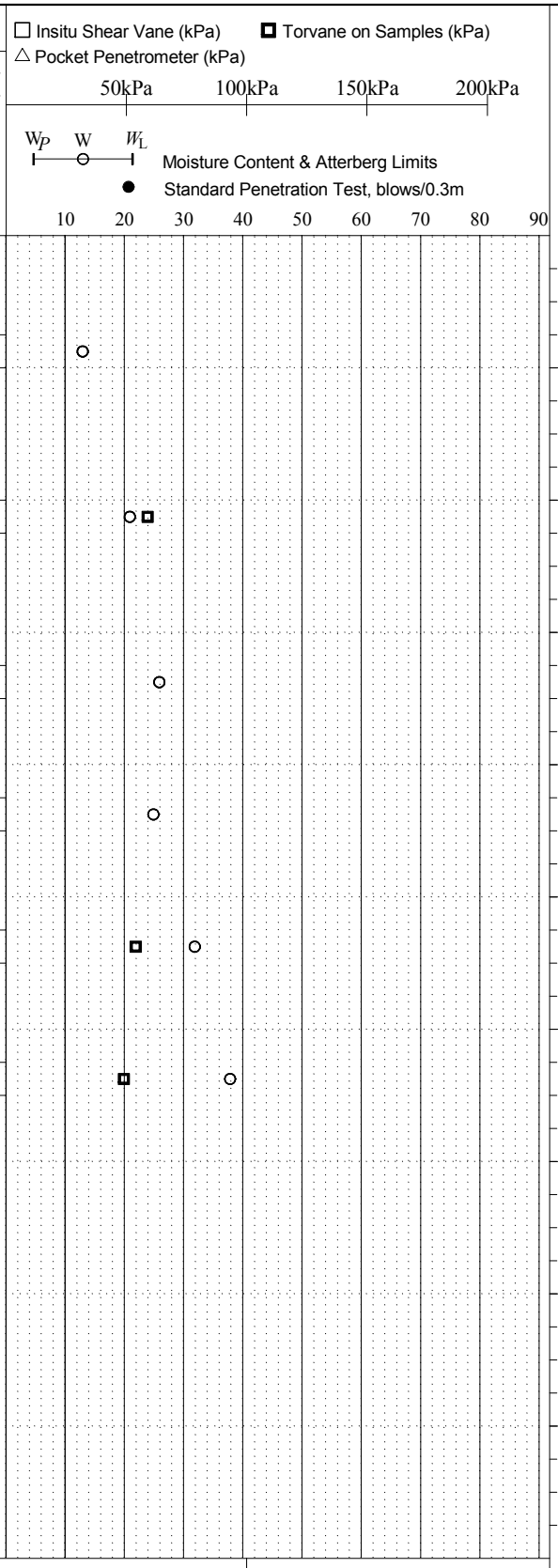
Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH05 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department — PROJECT No. 123313460
PROJECT 2018 Local Street Renewals — DATUM Geodetic — NORTHING 5533828
LOCATION Garden Grove Dr (Burrows Ave to Fairgrove Bay) — ELEVATION — EASTING 628309
DRILLING DATE December 7, 2017 — DRILLING CO. Maple Leaf Drilling — DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt			
	GW	Crushed Limestone	GS		13
	FL	FILL: stiff grey clay and silt - trace fine to coarse sand, trace gravel - moist	GS		21
1	ML	SILT: light brown - some clay, trace fine sand - moist	GS		26
			GS		25
	CH	stiff grey fat CLAY (CH) - silty, trace fine sand - moist	GS		32
2			GS		38
3		• TESTHOLE LOCATION: 7 m west of Garden Grove Drive and Fairgrove Bay, westbound lane, 1 m south of curb. • No groundwater seepage • Sloughing was observed upon completion of drilling, testhole open to 1.5 m . • Testhole terminated at depth of 2.0.			



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

Atterberg Limits
ASTM D4318
Method A- Multi-Point

Client:	Stantec Consulting Ltd.
Project Name:	2018 - In-house Street Renewals
	Garden Grove
Project No:	123313460
Date Received:	December 7, 2017
Date Tested:	December 13, 2017
Tested By:	Larry Presado

LABORATORY
199 Henlow Bay

Winnipeg, Manitoba
Canada R3Y 1G4
Tel: (204) 488-6999

Sample : TH01, 3.5'

LIQUID LIMIT

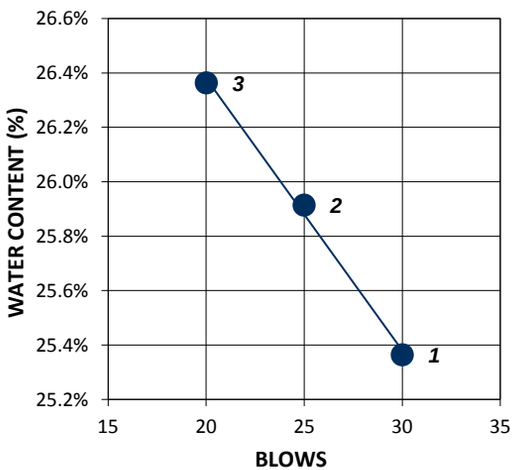
Trial	1	2	3
No. of Blows	30	25	20
Tare No.	510	792	501
Wt. Sa. (wet+tare)(g)	44	53	53
Wt. Sa. (dry+tare)(g)	40	48	48
Wt. Tare (g)	25	27	29
Wt. Dry Soil (g)	15.1	21.1	18.9
Wt. Water (g)	3.8	5.5	5.0
Water Content (%)	25.4%	25.9%	26.4%

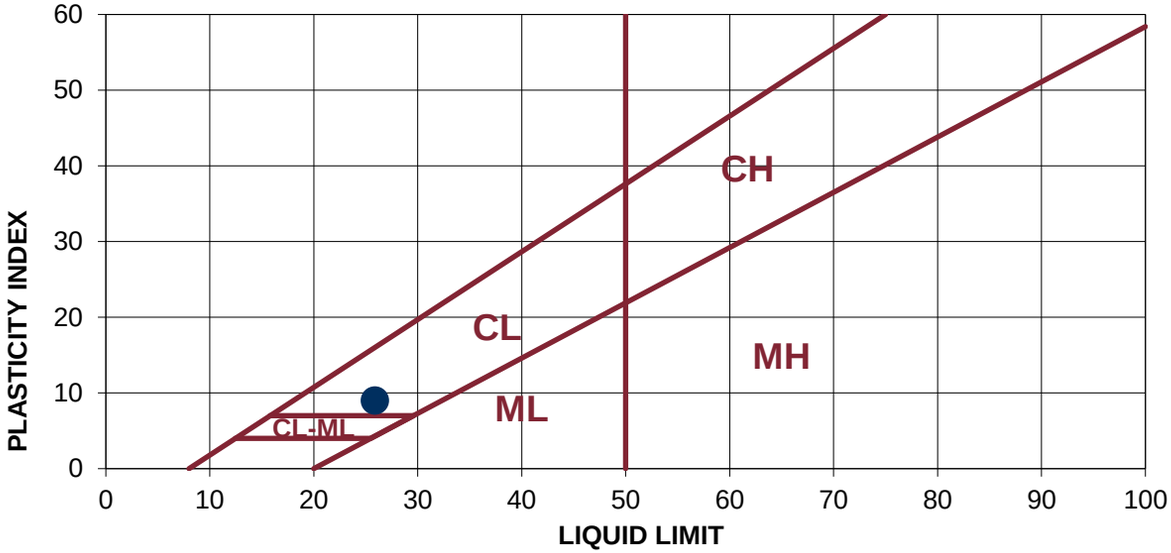
PLASTIC LIMIT

Trial	1	2
Tare No.	732	730
Wt. Sa. (wet+tare)(g)	37.69	41.56
Wt. Sa. (dry+tare)(g)	35.70	39.48
Wt. Tare (g)	24.16	27.4
Wt. Dry Soil (g)	11.5	12.1
Wt. Water (g)	2.0	2.1
Water Content (%)	17.2%	17.2%

RESULTS

LL	**26**
PL	**17**
PI	**9**
Natural MC (%)	
20.7%	





CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Reviewed By: Lee Boughton

Atterberg Limits
ASTM D4318
Method A- Multi-Point

Client:	Stantec Consulting Ltd.
Project Name:	2018 - In-house Street Renewals
	Garden Grove
Project No:	123313460
Date Received:	December 7, 2017
Date Tested:	December 13, 2017
Tested By:	Larry Presado

LABORATORY
199 Henlow Bay

Winnipeg, Manitoba
Canada R3Y 1G4
Tel: (204) 488-6999

Sample : TH03, 2.25'

LIQUID LIMIT

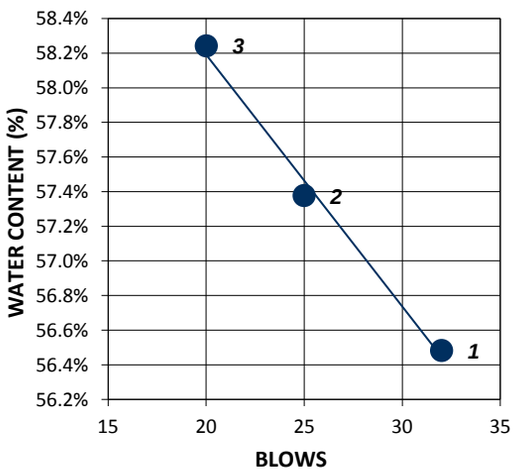
Trial	1	2	3
No. of Blows	32	25	20
Tare No.	746	745	463
Wt. Sa. (wet+tare)(g)	40	45	40
Wt. Sa. (dry+tare)(g)	34	39	34
Wt. Tare (g)	24	29	24
Wt. Dry Soil (g)	10.0	10.4	10.0
Wt. Water (g)	5.6	6.0	5.8
Water Content (%)	56.5%	57.4%	58.2%

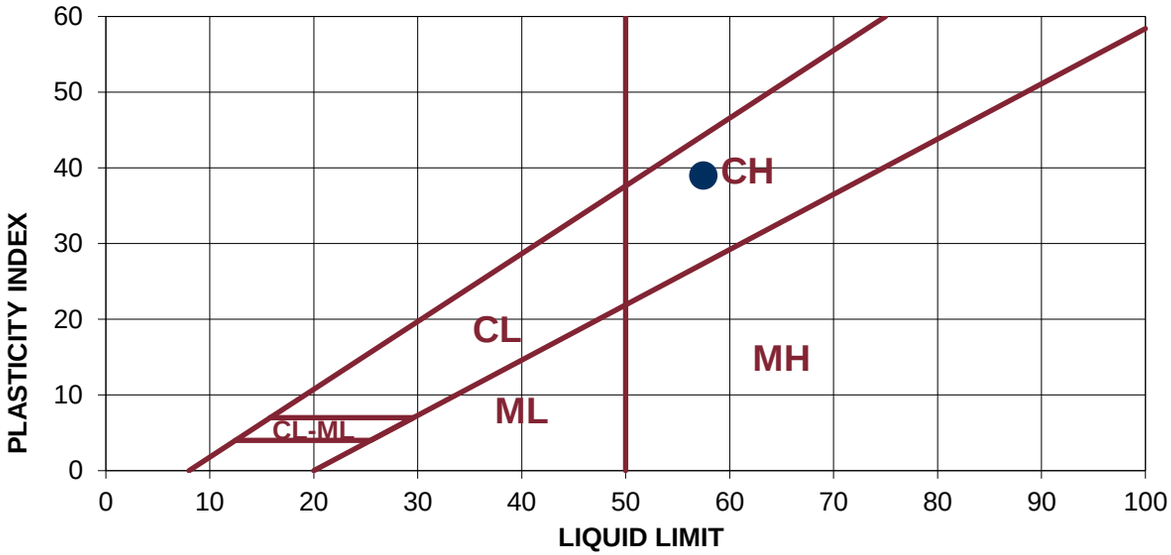
PLASTIC LIMIT

Trial	1	2
Tare No.	765	714
Wt. Sa. (wet+tare)(g)	39.48	33.87
Wt. Sa. (dry+tare)(g)	37.45	32.3
Wt. Tare (g)	26.46	23.78
Wt. Dry Soil (g)	11.0	8.5
Wt. Water (g)	2.0	1.6
Water Content (%)	18.5%	18.4%

RESULTS

LL	**57**
PL	**18**
PI	**39**
Natural MC (%)	
25.3%	





CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Reviewed By: Lee Boughton

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

PARTICLE SIZE ANALYSIS
ASTM D422

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, Manitoba
R3B 2B9

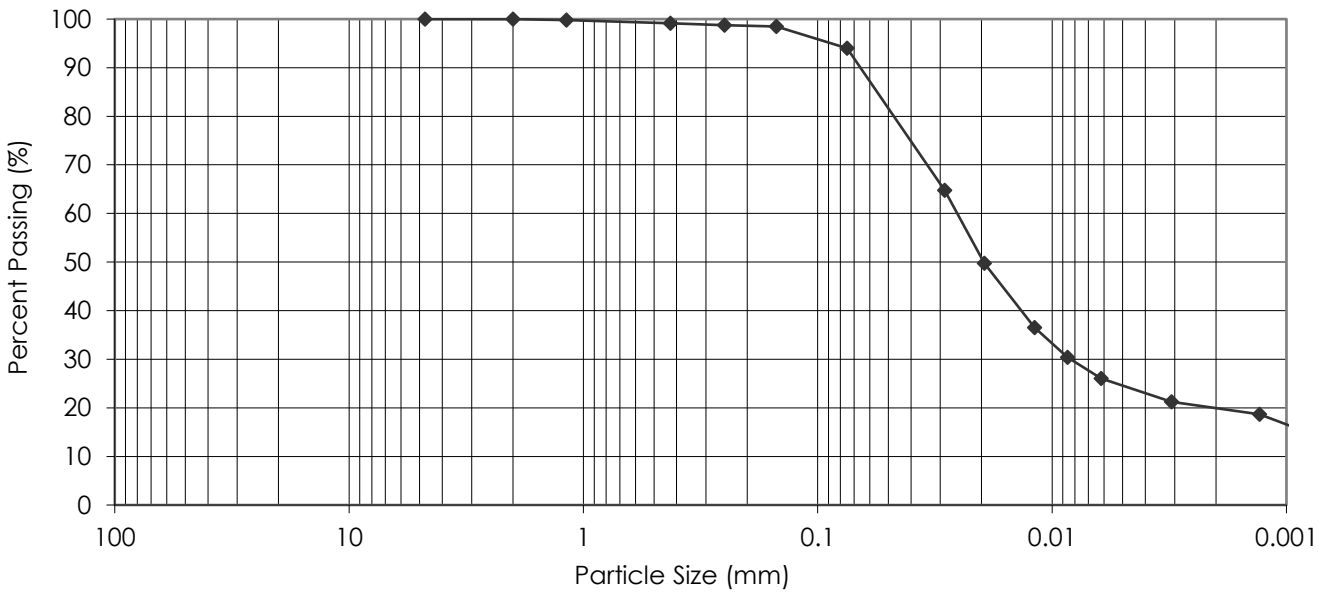
PROJECT: 2018 In-house Street Renewals
Garden Grove

Attention: Lee Boughton

PROJECT NO.: 123313460

SAMPLED BY: Lee Boughton
SAMPLE ID: TH01, 3.5'

DATE RECEIVED: December 7, 2017
TESTED BY: Tabea Kleineberg, M.Sc., GIT



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	99.8
0.425 mm	99.1
0.250 mm	98.8
0.150 mm	98.5
0.075 mm	94.0
0.005 mm	24.6
0.002 mm	20.0
0.001 mm	16.6

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.0	0.9	5.1	74.0	20.0	16.6

REPORT DATE: December 14, 2017

REVIEWED BY: Lee Boughton

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

PARTICLE SIZE ANALYSIS
ASTM D422

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, Manitoba
R3B 2B9

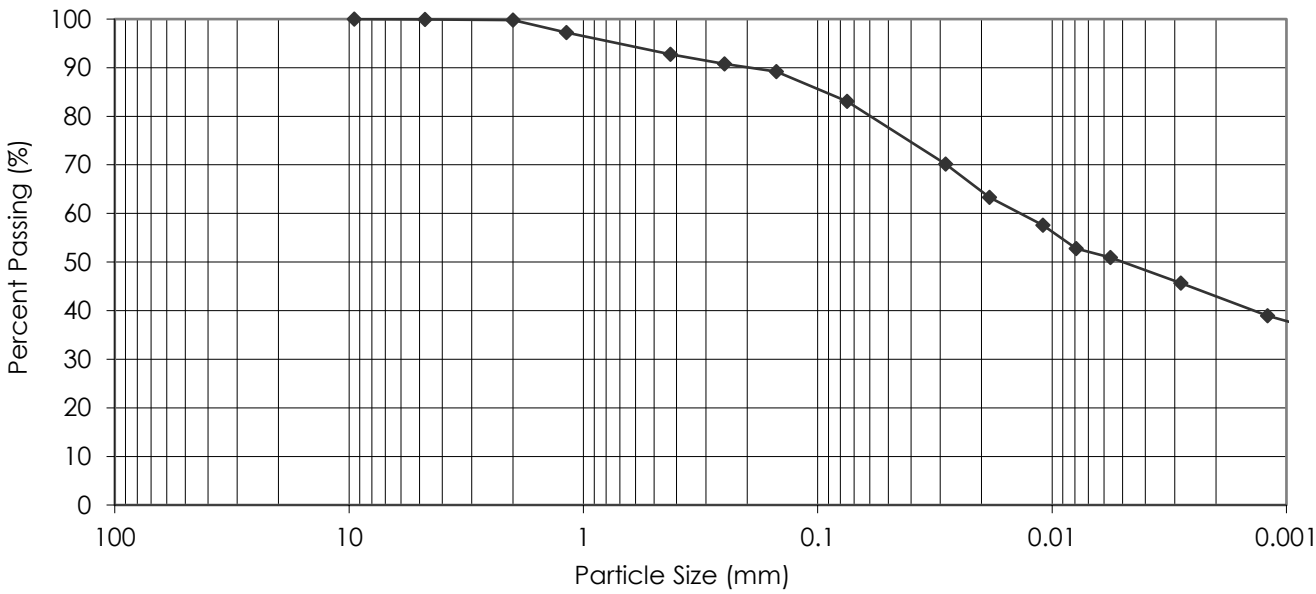
PROJECT: 2018 In-house Street Renewals
Garden Grove

Attention: Lee Boughton

PROJECT NO.: 123313460

SAMPLED BY: Lee Boughton
SAMPLE ID: TH03, 2.25'

DATE RECEIVED: December 7, 2017
TESTED BY: Tabea Kleineberg, M.Sc., GIT



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	99.9
2.00 mm	99.8

PARTICLE SIZE	PERCENT PASSING
1.18 mm	97.2
0.425 mm	92.7
0.250 mm	90.7
0.150 mm	89.2
0.075 mm	83.0
0.005 mm	50.0
0.002 mm	43.0
0.001 mm	37.9

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.1	0.1	7.1	9.7	40.0	43.0	37.9

REPORT DATE: December 14, 2017

REVIEWED BY: Lee Boughton

2018 Local Street Renewals

Geotechnical Investigation for 2018 Local Street Renewals on Fife Street (Burrows Avenue to College Avenue)

Prepared for:
City of Winnipeg
Public Works Department
106-1155 Pacific Avenue
Winnipeg, MB
R3E 3P1

Prepared by:
Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB
R3B 2B9

December 20, 2017

ORIGINAL SHEET - ISO 8.5x11 H - v17.05

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2017/11/29 12:14 PM By: Boughton, Lee

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Suite 500, 311 Portage Avenue
Winnipeg MB Canada R3B 2B9
Tel. 204.489.5900 Fax. 204.453.9012
www.stantec.com

Legend

TESTHOLE

Notes

IMAGE SOURCE:
GOOGLE EARTH

Client/Project

CITY OF WINNIPEG, PUBLIC WORKS DEPARTMENT

2018 LOCAL STREET RENEWALS ON FIFE STREET
BURROWS AVE TO COLLEGE AVE - WINNIPEG, MANITOBA

Figure No.

1

Title

TESTHOLE LOCATION PLAN

TABLE 1
FIFE STREET
BURROWS AVENUE TO COLLEGE AVENUE

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
TH01	Fife Street Northbound lane, 19 m north of Burrows Avenue 1 m west of curb	Concrete	180	Crushed Limestone	50	-	-	-	-	-	-	-	-	-	-
TH02	Fife Street Southbound lane, 65 m north of Burrows Avenue 1 m east of curb	Concrete	170	Crushed Limestone	50	Silt	1.0	23	1.5	3.4	66	29.1	31	17	14
TH03	Fife Street Northbound lane, 122 m north of Burrows Avenue 1 m west of curb	Concrete	165	Crushed Limestone	50	-	-	-	-	-	-	-	-	-	-
TH04	Fife Street Northbound lane, 179 m north of Burrows Avenue 1 m west of curb	Concrete	165	Crushed Limestone	50	Clay	1.0	31	0.3	3.3	25.2	71.2	69	21	48
TH05	Fife Street Northbound lane, 221 m north of Burrows Avenue 1 m west of curb	Concrete	170	Crushed Limestone	50	Fill	0.7	26	1.5	9.2	35.6	53.7	62	20	42
TH06	Fife Street Center line of Fife Street, 270 m north of Burrows Avenue	Asphalt Concrete	90 165	Crushed Limestone	50	-	-	-	-	-	-	-	-	-	-
TH07	Fife Street Northbound lane, 326 m north of Burrows Avenue 1 m west of curb	Asphalt Concrete	65 180	Crushed Limestone	50	-	-	-	-	-	-	-	-	-	-
TH08	Fife Street Northbound lane, 397 m north of Burrows Avenue 1 m west of curb	Asphalt Concrete	100 220	Crushed Limestone	50	-	-	-	-	-	-	-	-	-	-

Note:
1. TH02 was moved from the centerline to the southbound lane due to underground utilities.
2. TH03 was moved from the southbound lane to the northbound lane due to underground utilities.
3. TH05 was moved from the centerline to the northbound lane due to underground utilities.
4. TH06 was moved from the southbound lane to the centerline due to underground utilities.
5. TH08 was moved from the centerline to the northbound lane due to underground utilities.

Figure 1 – TH01 Core

Figure 2 – TH02 Core

Figure 3 – TH03 Core

Figure 4 – TH04 Core

Figure 5 – TH05 Core

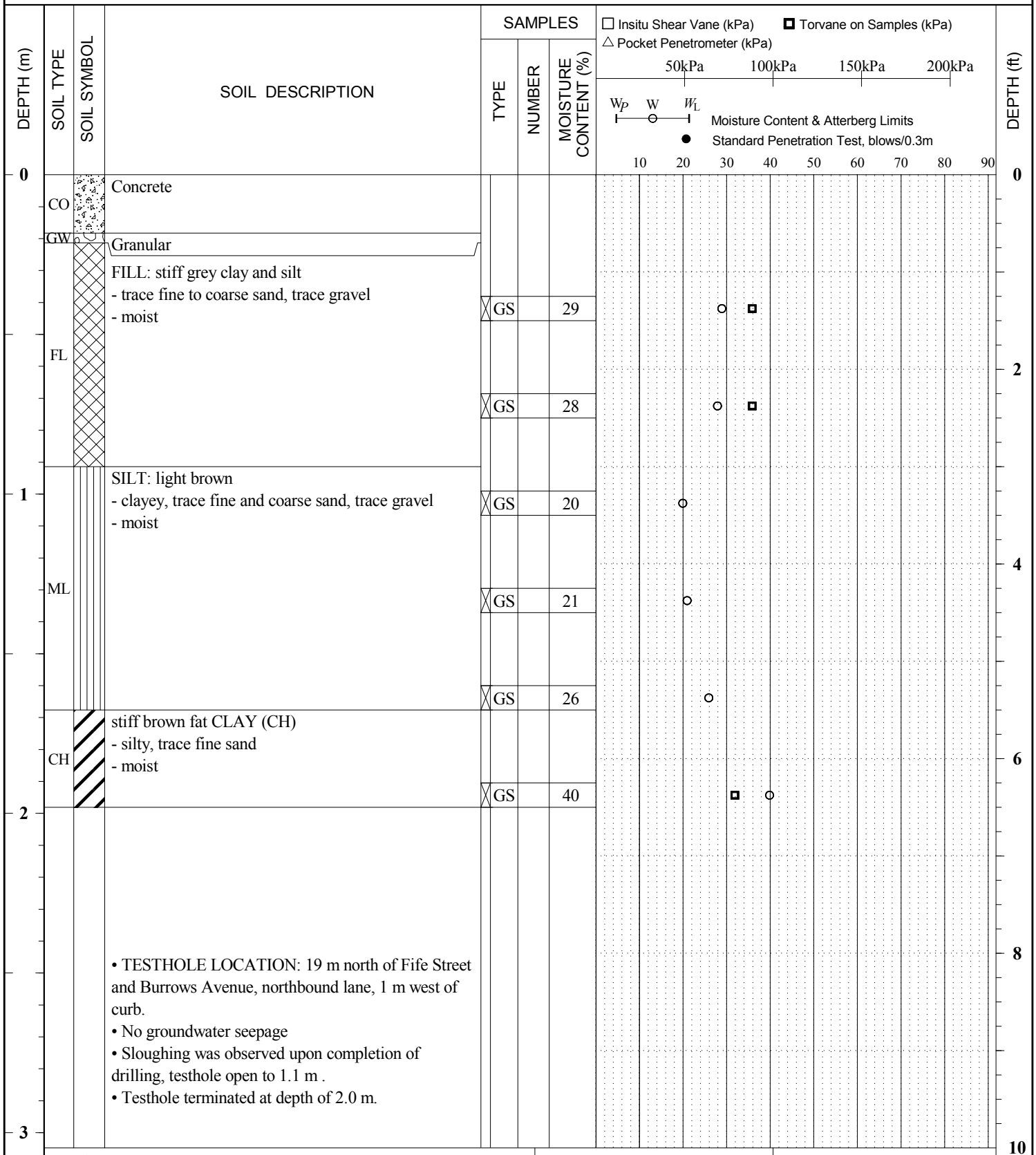
Figure 6 – TH06 Core

Figure 7 – TH07 Core

Figure 8 – TH08 Core

TH01 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department — PROJECT No. 123313460
PROJECT 2018 Local Street Renewals — DATUM Geodetic — NORTHING 5532334
LOCATION Fife Street (Burrows Ave to College Ave) — ELEVATION — EASTING 631000
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling — DRILLING METHOD 125 mm SSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH02 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department PROJECT No. 123313460
PROJECT 2018 Local Street Renewals DATUM Geodetic NORTHING 5532378
LOCATION Fife Street (Burrows Ave to College Ave) ELEVATION EASTING 631015
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO		Concrete			
	GW		Granular			
	FL		FILL: stiff grey clay and silt - trace fine to coarse sand, trace gravel - moist	GS		30
				GS		30
1	ML		SILT: light brown - clayey, trace fine and coarse sand, trace gravel - moist - Grain Size Analysis @ 1.0 m: 1.5% Gravel, 3.4% Sand, 66% Silt, 29.1% Clay	GS		23
				GS		23
				GS		23
2				GS		23
			• TESTHOLE LOCATION: 65 m north of Fife Street and Burrows Avenue, southbound lane, 1 m east of curb. • No groundwater seepage • Sloughing was observed upon completion of drilling, testhole open to 1.7 m . • Testhole terminated at depth of 2.0 m.			
3						

□ Insitu Shear Vane (kPa) ■ Torvane on 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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH03 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department PROJECT No. 123313460
PROJECT 2018 Local Street Renewals DATUM Geodetic NORTHING 5532428
LOCATION Fife Street (Burrows Ave to College Ave) ELEVATION EASTING 631043
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO	Concrete			
	GW	Granular			
	FL	FILL: stiff grey clay and silt - trace fine to coarse sand, trace gravel - moist	GS		21
			GS		21
1	ML	SILT: light brown - clayey, trace fine and coarse sand, trace gravel - moist	GS		22
			GS		32
			GS		40
	CH	stiff brown fat CLAY (CH) - silty, trace fine sand - moist	GS		41
2		• TESTHOLE LOCATION: 122 m north of Fife Street and Burrows Avenue, northbound lane, 1 m west of curb. • No groundwater seepage or loughing was observed upon completion of drilling. • Testhole terminated at depth of 2.0 m.			
3					

□ Insitu Shear Vane (kPa) ■ Torvane on 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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

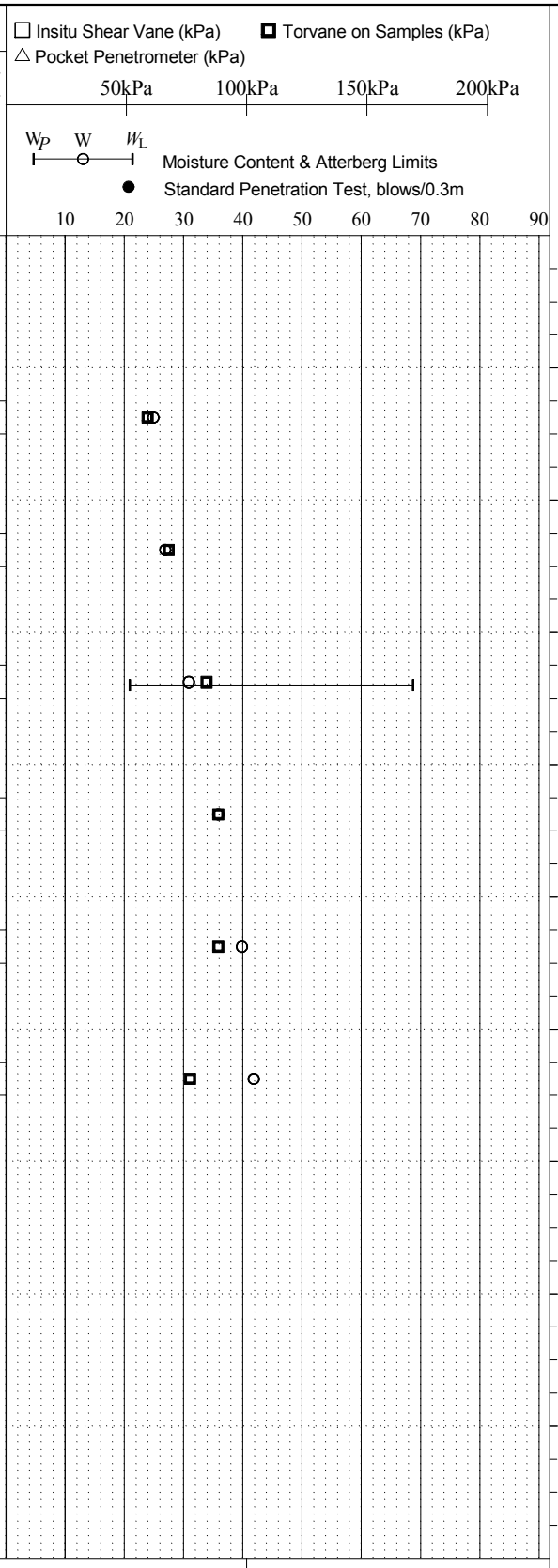
Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH04 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department PROJECT No. 123313460
PROJECT 2018 Local Street Renewals DATUM Geodetic NORTHING 5532479
LOCATION Fife Street (Burrows Ave to College Ave) ELEVATION EASTING 631068
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO	Concrete			
	GW	Granular			
	FL	FILL: stiff grey clay and silt - trace fine to coarse sand, trace gravel - moist	GS		25
	CH	stiff grey fat CLAY (CH) - silty, trace fine sand - moist	GS		27
1		- Grain Size Analysis @ 1.0 m: 0.3% Gravel, 3.3% Sand, 25.2% Silt, 71.2% Clay	GS		31
			GS		36
			GS		40
2			GS		42
		• TESTHOLE LOCATION: 179 m north of Fife Street and Burrows Avenue, northbound lane, 1 m west of curb. • No groundwater seepage • Sloughing was observed upon completion of drilling, testhole open to 1.5 m . • Testhole terminated at depth of 2.0 m.			
3					



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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

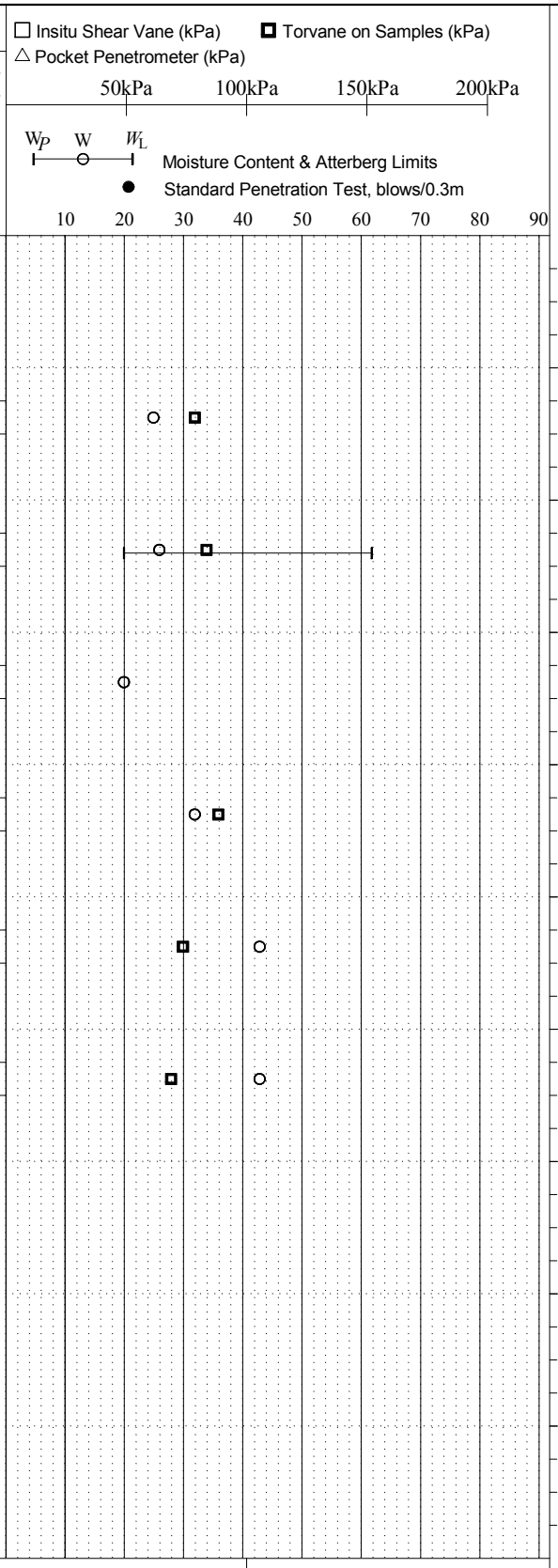
Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH05 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department PROJECT No. 123313460
PROJECT 2018 Local Street Renewals DATUM Geodetic NORTHING 5532518
LOCATION Fife Street (Burrows Ave to College Ave) ELEVATION EASTING 631084
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	CO	Concrete			
	GW	Granular			
	FL	FILL: stiff grey clay and silt - trace fine to coarse sand, trace gravel - moist	GS		25
		- Grain Size Analysis @ 0.7 m: 1.5% Gravel, 9.2% Sand, 35.6% Silt, 53.7% Clay	GS		26
1	ML	SILT: light brown - clayey, trace fine and coarse sand, trace gravel, moist	GS		20
	CH	stiff grey fat CLAY (CH) - silty, trace fine sand - moist	GS		32
			GS		43
2			GS		43
		• TESTHOLE LOCATION: 221 m north of Fife Street and Burrows Avenue, northbound lane, 1 m west of curb. • No groundwater seepage or loughing was observed upon completion of drilling. • Testhole terminated at depth of 2.0 m.			
3					



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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH06 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department — PROJECT No. 123313460
PROJECT 2018 Local Street Renewals — DATUM Geodetic — NORTHING 5532564
LOCATION Fife Street (Burrows Ave to College Ave) — ELEVATION — EASTING 631102
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling — DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete			
	GW		Granular			
	FL		FILL: stiff grey clay and silt - trace fine to coarse sand, trace gravel - moist	GS		28
				GS		18
1	ML		SILT: light brown - clayey, trace fine and coarse sand, trace gravel - moist	GS		20
				GS		30
				GS		36
	CH		stiff brown fat CLAY (CH) - silty, trace fine sand - moist	GS		35
2			• TESTHOLE LOCATION: 270 m north of Fife Street and Burrows Avenue, centerline of Fife Street. • No groundwater seepage • Sloughing was observed upon completion of drilling, testhole open to 1.5 m . • Testhole terminated at depth of 2.0 m.			
3						

□ Insitu Shear Vane (kPa) ■ Torvane on 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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH07 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department PROJECT No. 123313460
PROJECT 2018 Local Street Renewals DATUM Geodetic NORTHING 5532615
LOCATION Fife Street (Burrows Ave to College Ave) ELEVATION EASTING 631126
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt			
	CO	Concrete			
	GW	Granular			
	FL	FILL: stiff grey clay and silt - trace fine to coarse sand, trace gravel - moist	GS		33
			GS		31
1	ML	SILT: light brown - clayey, trace fine and coarse sand, trace gravel - moist	GS		19
			GS		20
			GS		19
2			GS		22
3		• TESTHOLE LOCATION: 326 m north of Fife Street and Burrows Avenue, northbound lane, 1 m west of curb. • No groundwater seepage • Sloughing was observed upon completion of drilling, testhole open to 1.5 m . • Testhole terminated at depth of 2.0 m.			

□ Insitu Shear Vane (kPa) ■ Torvane on 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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

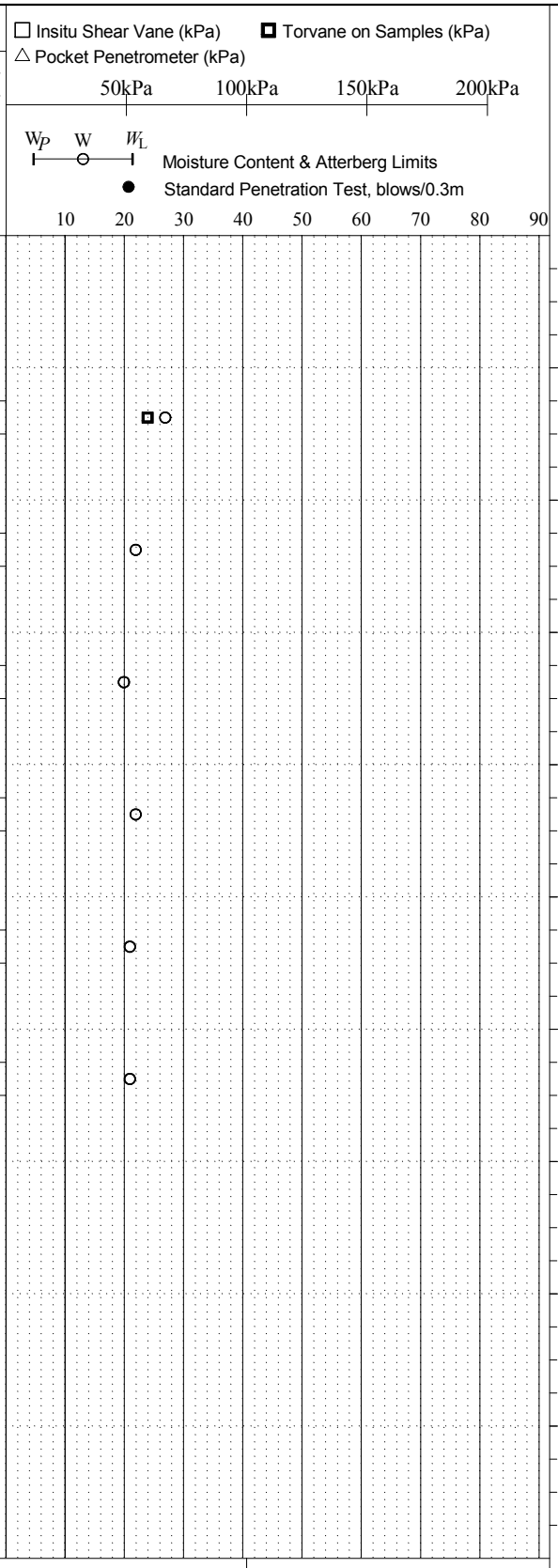
Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH08 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department PROJECT No. 123313460
PROJECT 2018 Local Street Renewals DATUM Geodetic NORTHING 5532679
LOCATION Fife Street (Burrows Ave to College Ave) ELEVATION EASTING 631157
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS	Asphalt			
	CO	Concrete			
	GW	Granular			
	FL	FILL: stiff grey clay and silt - trace fine to coarse sand, trace gravel - moist	GS		27
			GS		22
	ML	SILT: light brown - clayey, trace fine and coarse sand, trace gravel - moist	GS		20
1			GS		22
			GS		21
			GS		21
2		• TESTHOLE LOCATION: 397 m north of Fife Street and Burrows Avenue, northbound lane, 1 m west of curb. • No groundwater seepage • Sloughing was observed upon completion of drilling, testhole open to 1.1 m . • Testhole terminated at depth of 2.0 m.			
3					



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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test

Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

Atterberg Limits
ASTM D4318
Method A- Multi-Point

Client: Stantec Consulting Ltd.
Project Name: 2018 Street Renewals Fife

Project No: 123313460
Date Received: November 20, 2017
Date Tested: November 24, 2017
Tested By: Nestor Abarca

LABORATORY
199 Henlow Bay

Winnipeg, Manitoba
Canada R3Y 1G4
Tel: (204) 488-6999

Sample : TH02, 3.5'

LIQUID LIMIT

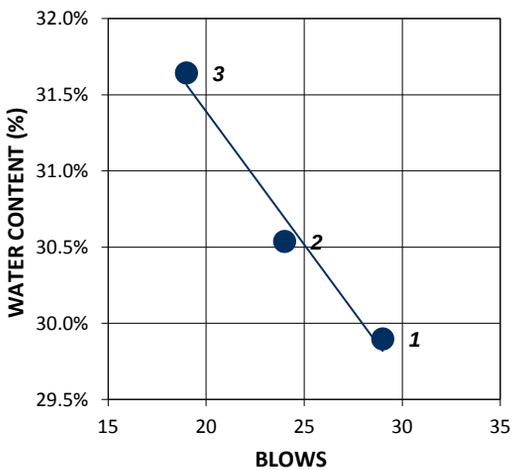
Trial	1	2	3
No. of Blows	29	24	19
Tare No.	135	173	233
Wt. Sa. (wet+tare)(g)	41	47	44
Wt. Sa. (dry+tare)(g)	36	40	38
Wt. Tare (g)	20	19	20
Wt. Dry Soil (g)	16.4	21.3	18.3
Wt. Water (g)	4.9	6.5	5.8
Water Content (%)	29.9%	30.5%	31.6%

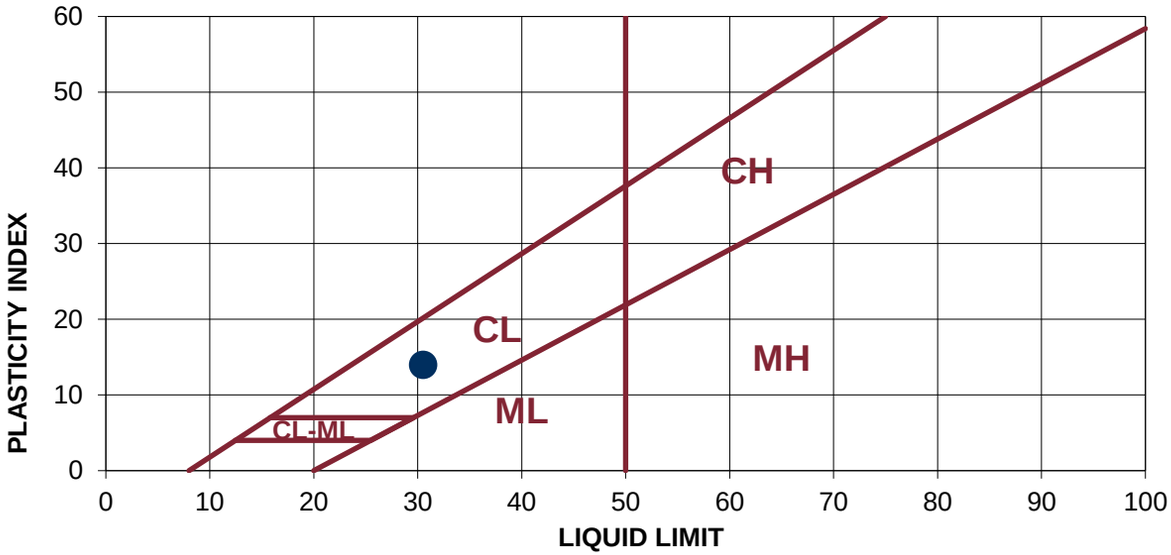
PLASTIC LIMIT

Trial	1	2
Tare No.	254	310
Wt. Sa. (wet+tare)(g)	35.37	33.67
Wt. Sa. (dry+tare)(g)	33.06	31.7
Wt. Tare (g)	19.71	20.26
Wt. Dry Soil (g)	13.4	11.4
Wt. Water (g)	2.3	2.0
Water Content (%)	17.3%	17.2%

RESULTS

LL	**31**
PL	**17**
PI	**14**
Natural MC (%)	
22.8%	





Reviewed By: Lee Boughton

Atterberg Limits
ASTM D4318
Method A- Multi-Point

Client: Stantec Consulting Ltd.
Project Name: 2018 Street Renewals Fife

Project No: 123313460
Date Received: November 20, 2017
Date Tested: November 24, 2017
Tested By: Nestor Abarca

LABORATORY
199 Henlow Bay

Winnipeg, Manitoba
Canada R3Y 1G4
Tel: (204) 488-6999

Sample : TH04, 3.5'

LIQUID LIMIT

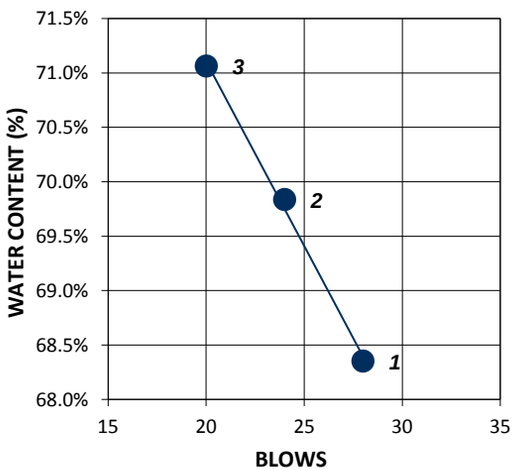
Trial	1	2	3
No. of Blows	28	24	20
Tare No.	149	157	188
Wt. Sa. (wet+tare)(g)	38	40	38
Wt. Sa. (dry+tare)(g)	30	32	30
Wt. Tare (g)	19	20	19
Wt. Dry Soil (g)	11.3	11.5	10.9
Wt. Water (g)	7.7	8.0	7.8
Water Content (%)	68.4%	69.8%	71.1%

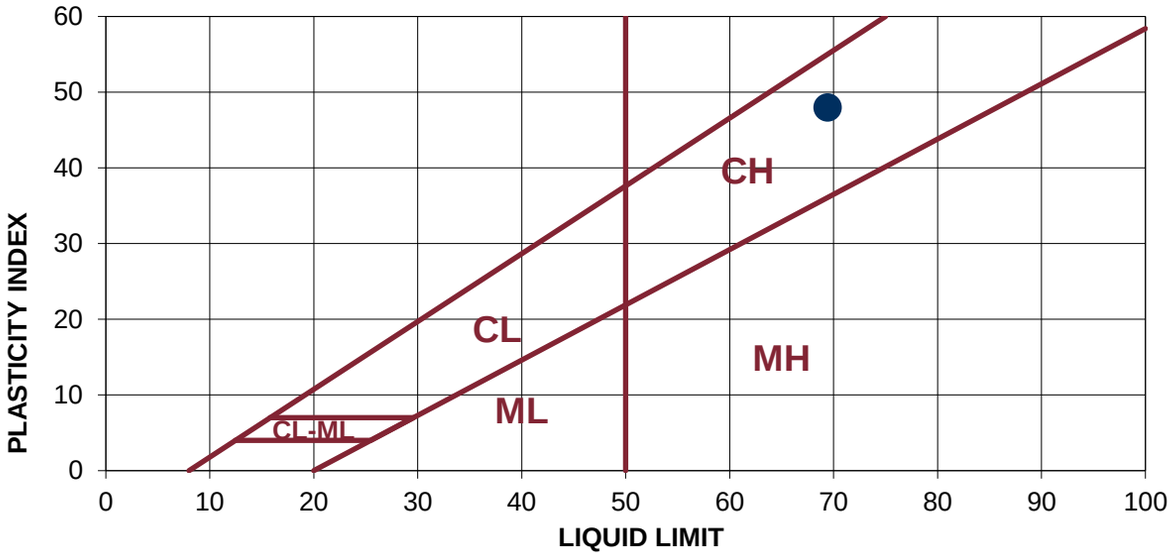
PLASTIC LIMIT

Trial	1	2
Tare No.	292	317
Wt. Sa. (wet+tare)(g)	30.00	26.15
Wt. Sa. (dry+tare)(g)	28.39	25.13
Wt. Tare (g)	20.60	20.18
Wt. Dry Soil (g)	7.8	5.0
Wt. Water (g)	1.6	1.0
Water Content (%)	20.7%	20.6%

RESULTS

LL	**69**
PL	**21**
PI	**48**
Natural MC (%)	
30.6%	





CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Reviewed By: Lee Boughton

Atterberg Limits
ASTM D4318
Method A- Multi-Point

Client: Stantec Consulting Ltd.
Project Name: 2018 Street Renewals Fife

Project No: 123313460
Date Received: November 20, 2017
Date Tested: November 24, 2017
Tested By: Nestor Abarca

LABORATORY
199 Henlow Bay

Winnipeg, Manitoba
Canada R3Y 1G4
Tel: (204) 488-6999

Sample : TH05, 2.5'

LIQUID LIMIT

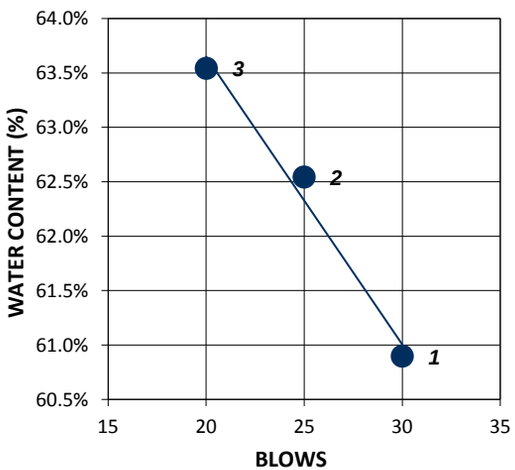
Trial	1	2	3
No. of Blows	30	25	20
Tare No.	208	242	281
Wt. Sa. (wet+tare)(g)	39	39	39
Wt. Sa. (dry+tare)(g)	32	32	32
Wt. Tare (g)	20	20	21
Wt. Dry Soil (g)	12.3	11.7	11.4
Wt. Water (g)	7.5	7.3	7.3
Water Content (%)	60.9%	62.5%	63.5%

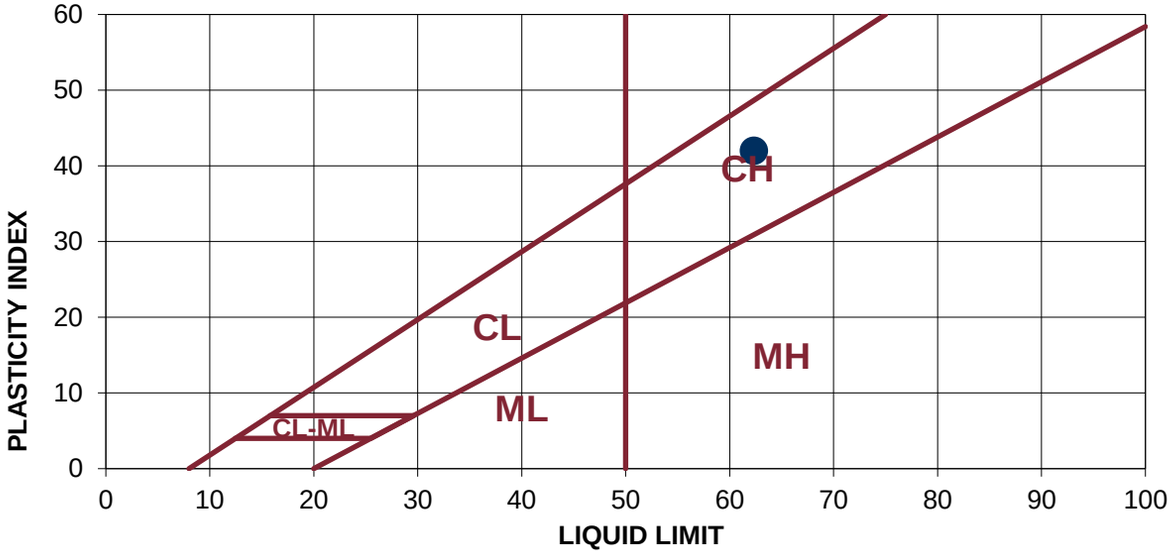
PLASTIC LIMIT

Trial	1	2
Tare No.	297	298
Wt. Sa. (wet+tare)(g)	30.39	31.56
Wt. Sa. (dry+tare)(g)	28.82	29.64
Wt. Tare (g)	20.91	19.82
Wt. Dry Soil (g)	7.9	9.8
Wt. Water (g)	1.6	1.9
Water Content (%)	19.8%	19.6%

RESULTS

LL	**62**
PL	**20**
PI	**42**
Natural MC (%)	
26.2%	





CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Reviewed By: Lee Boughton

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

PARTICLE SIZE ANALYSIS
ASTM D422

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, Manitoba
R3B 2B9

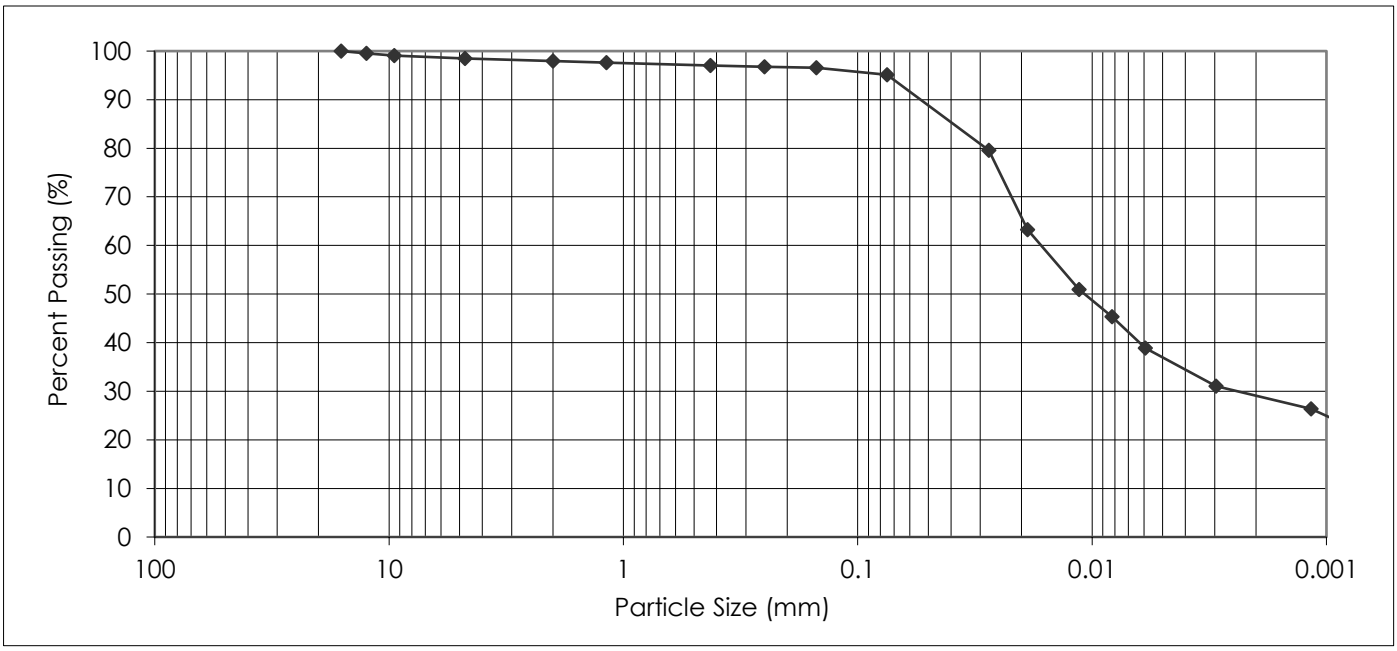
PROJECT: 2018 Street Renewals Fife

Attention: Lee Boughton

PROJECT NO.: 123313460

SAMPLED BY: Lee Boughton
SAMPLE ID: TH02, 3.5'

DATE RECEIVED: November 20, 2017
TESTED BY: Tabea Kleineberg, M.Sc., GIT



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	99.6
9.50 mm	99.1
4.75 mm	98.5
2.00 mm	97.9

PARTICLE SIZE	PERCENT PASSING
1.18 mm	97.6
0.425 mm	97.0
0.250 mm	96.8
0.150 mm	96.6
0.075 mm	95.1
0.005 mm	36.9
0.002 mm	29.1
0.001 mm	24.9

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
1.5	0.6	0.9	1.9	66.0	29.1	24.9

REPORT DATE: November 27, 2017

REVIEWED BY: Lee Boughton

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

PARTICLE SIZE ANALYSIS
ASTM D422

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, Manitoba
R3B 2B9

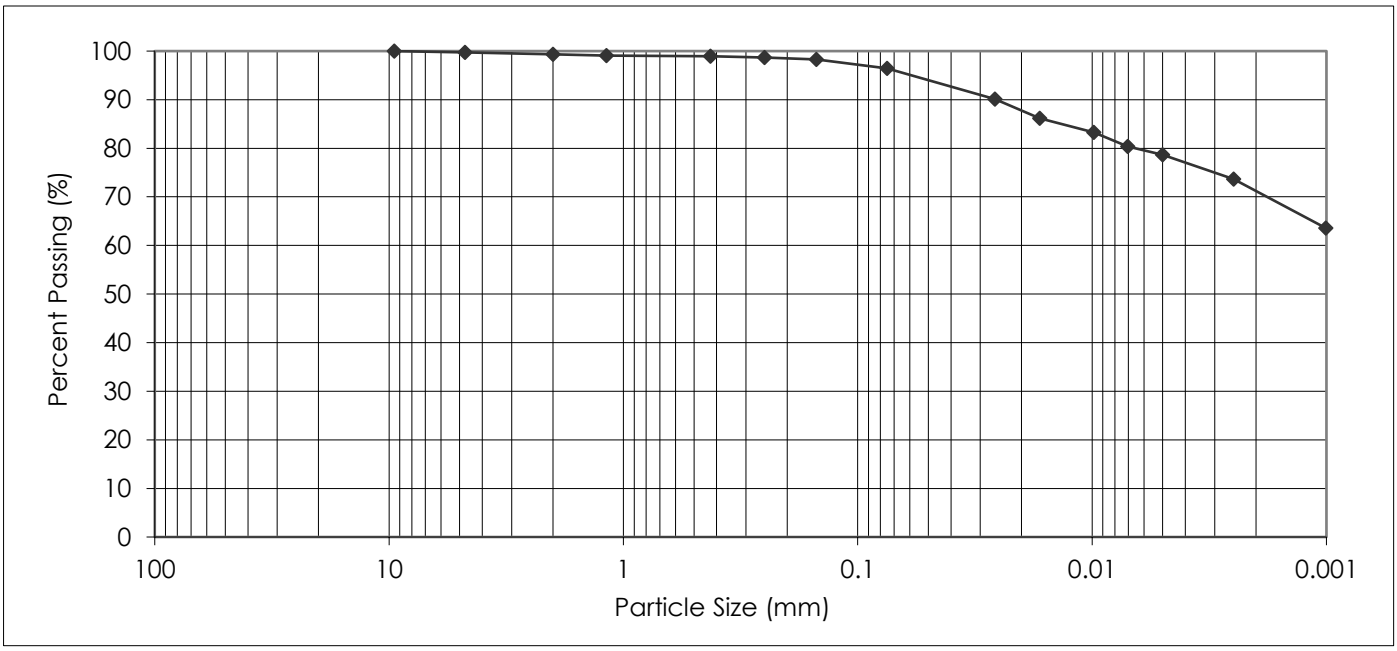
PROJECT: 2018 Street Renewals Fife

Attention: Lee Boughton

PROJECT NO.: 123313460

SAMPLED BY: Lee Boughton
SAMPLE ID: TH04, 3.5'

DATE RECEIVED: November 20, 2017
TESTED BY: Tabea Kleineberg, M.Sc., GIT



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	99.3

PARTICLE SIZE	PERCENT PASSING
1.18 mm	99.1
0.425 mm	98.9
0.250 mm	98.7
0.150 mm	98.3
0.075 mm	96.4
0.005 mm	78.7
0.002 mm	71.2
0.001 mm	63.6

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.3	0.4	0.4	2.5	25.2	71.2	63.6

REPORT DATE: November 27, 2017

REVIEWED BY: Lee Boughton

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

PARTICLE SIZE ANALYSIS
ASTM D422

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, Manitoba
R3B 2B9

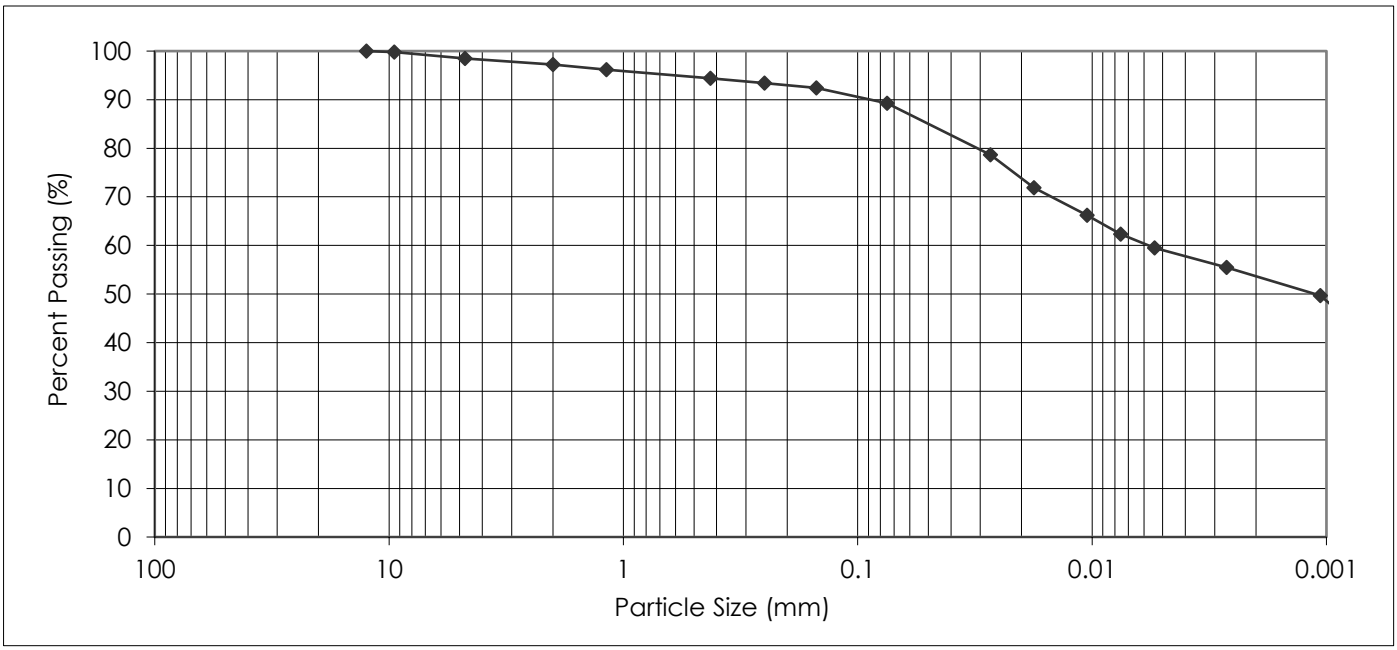
PROJECT: 2018 Street Renewals Fife

Attention: Lee Boughton

PROJECT NO.: 123313460

SAMPLED BY: Lee Boughton
SAMPLE ID: TH05, 2.5'

DATE RECEIVED: November 20, 2017
TESTED BY: Tabea Kleineberg, M.Sc., GIT



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	99.8
4.75 mm	98.5
2.00 mm	97.3

PARTICLE SIZE	PERCENT PASSING
1.18 mm	96.2
0.425 mm	94.4
0.250 mm	93.4
0.150 mm	92.4
0.075 mm	89.3
0.005 mm	59.1
0.002 mm	53.7
0.001 mm	48.6

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
1.5	1.2	2.9	5.1	35.6	53.7	48.6

REPORT DATE: November 27, 2017

REVIEWED BY: Lee Boughton

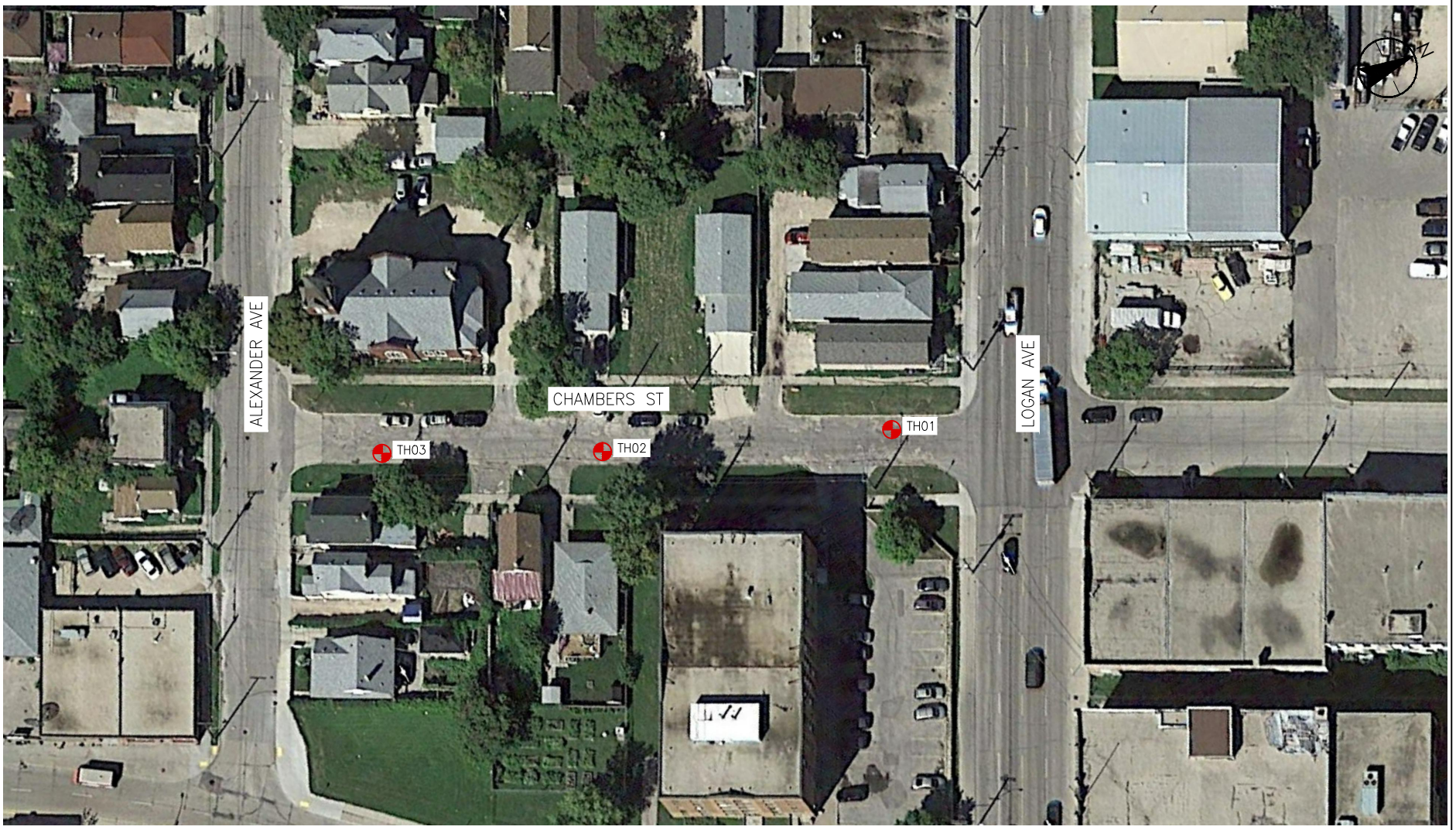
2018 Local Street Renewals

Geotechnical Investigation for 2018 Local Street Renewals on Chambers Street (Logan Avenue to Alexander Avenue)

Prepared for:
City of Winnipeg
Public Works Department
106-1155 Pacific Avenue
Winnipeg, MB
R3E 3P1

Prepared by:
Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB
R3B 2B9

December 20, 2017



2017-11-29
123313460

ORIGINAL SHEET - ISO 8.5x11 H - v17.05

V:\1233\active\123313460\0300_drawing\0302_sheet_files\02_civil\13460_thlp-chambers.dwg ISO_8x11_HORIZ
2017/11/29 12:13 PM By: Boughton, Lee

Stantec

Stantec Consulting Ltd.
Suite 500, 311 Portage Avenue
Winnipeg MB Canada R3B 2B9
Tel. 204.489.5900 Fax. 204.453.9012
www.stantec.com

Legend

TESTHOLE

Notes

IMAGE SOURCE:
GOOGLE EARTH

Client/Project

CITY OF WINNIPEG, PUBLIC WORKS DEPARTMENT

2018 LOCAL STREET RENEWALS ON CHAMBERS STREET
LOGAN AVE TO ALEXANDER AVE - WINNIPEG, MANITOBA

Figure No.

1

Title

TESTHOLE LOCATION PLAN

TABLE 1
CHAMBERS STREET
LOGAN AVENUE TO ALEXANDER AVENUE

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
TH01	Chambers Street Southbound lane, 13 m south of Logan Avenue 1 m east of curb	Asphalt	30	Clay (Fill)	-	-	-	-	-	-	-	-	-	-	-
		Concrete	220												
TH02	Chambers Street Northbound lane, 57 m south of Logan Avenue 1 m west of curb	Asphalt	35	Crushed Limestone	50	Clay	1.0	44	0.0	0.4	9.2	90.4	103	27	76
		Concrete	265												
TH03	Chambers Street Northbound lane, 90 m south of Logan Avenue 1 m west of curb	Asphalt	45	Crushed Limestone	50	Silt	0.7	22	0.0	4.7	80.2	15.1	20	10	10
		Concrete	225												

Note: 1. TH01 was moved from the centerline to the northbound lane due to underground utilities.

Figure 1 – TH01 Core

Figure 2 – TH02 Core

Figure 3 – TH03 Core

TH01 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department — PROJECT No. 123313460
PROJECT 2018 Local Street Renewals — DATUM Geodetic — NORTHING 5530048.7
LOCATION Chambers Street (Logan Ave to Alexander Ave) — ELEVATION — EASTING 632567.6
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling — DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete			
	FL		FILL: very stiff dark grey fat clay - silty, trace organics, trace fine sand, moist	GS		33
	ML		SILT: light brown - some clay, trace fine sand - moist	GS		19
1	CH		stiff brown fat CLAY (CH) - some silt - moist	GS		35
	ML		SILT: light brown - some clay, trace fine sand - moist	GS		23
				GS		24
	CH		stiff brown fat CLAY (CH) - some silt - moist	GS		40
2			• TESTHOLE LOCATION: 13 m south of Chambers Street and Logan Avenue, southbound lane, 1 m east of curb.. • No groundwater seepage • Sloughing was observed upon completion of drilling, testhole open to 1.7 m . • Testhole terminated at depth of 2.0 m.			
3						

□ Insitu Shear Vane (kPa) ■ Torvane on 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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

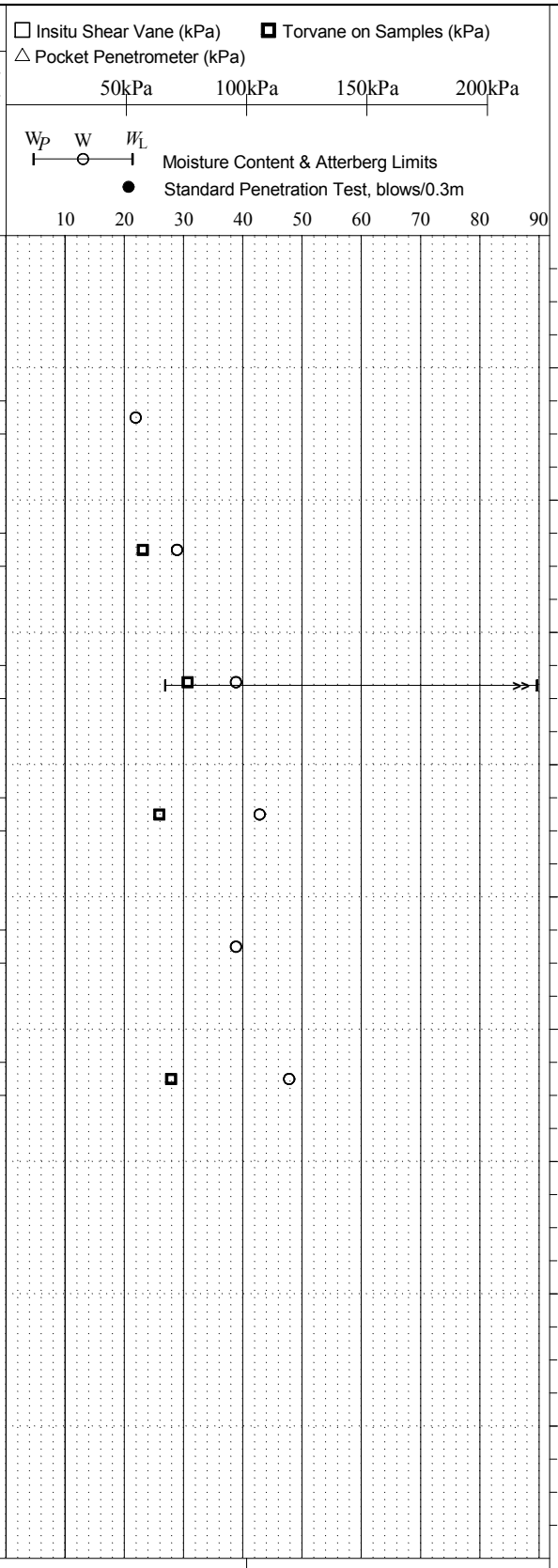
Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH02 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department — PROJECT No. 123313460
PROJECT 2018 Local Street Renewals — DATUM Geodetic — NORTHING 5530008.8
LOCATION Chambers Street (Logan Ave to Alexander Ave) — ELEVATION — EASTING 632550.4
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling — DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete			
	GW		Limestone			
	FL		FILL: stiff brown fat clay	GS		22
			- silty, trace fine sand, moist			
			stiff brown fat CLAY (CH)			
			- some silt			
			- moist	GS		29
1			- Grain Size Analysis @ 1.0 m: 0.0% Gravel, 0.4% Sand, 9.2% Silt, 90.4% Clay	GS		39
	CH			GS		43
				GS		39
2				GS		48
			• TESTHOLE LOCATION: 57 m south of Chambers Street and Logan Avenue, northbound lane, 1 m west of curb.			
			• No groundwater seepage			
			• Sloughing was observed upon completion of drilling, testhole open to 1.7 m .			
3			• Testhole terminated at depth of 2.0 m.			



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

Sample Type: GS - Grab Sample; SS - Split Spoon; RC - Rock Core; ST - Shelby Tube; PT - Piston Tube; VT - Shear Vane Test

Piezometer Backfill Type: Bentonite; Drill Cuttings; Sand; Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

TH03 TESTHOLE RECORD

CLIENT City of Winnipeg, Public Works Department PROJECT No. 123313460
PROJECT 2018 Local Street Renewals DATUM Geodetic NORTHING 5529978
LOCATION Chambers Street (Logan Ave to Alexander Ave) ELEVATION EASTING 632537
DRILLING DATE November 20, 2017 DRILLING CO. Maple Leaf Drilling DRILLING METHOD 125 mm SSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES TYPE	SAMPLES NUMBER	MOISTURE CONTENT (%)
0	AS		Asphalt			
	CO		Concrete			
	GW		Limestone			
	FL		FILL: stiff dark grey fat clay - silty, trace organics, moist	GS		26
	ML		SILT: light brown - some clay, trace oxidation, trace fine sand - moist	GS		20
			- Grain Size Analysis @ 0.7 m: 0.0% Gravel, 4.7% Sand, 80.2% Silt, 15.1% Clay			
1				GS		22
				GS		20
	CH		stiff grey fat CLAY (CH) - some silt - moist	GS		23
				GS		38
2			• TESTHOLE LOCATION: 90 m south of Chambers Street and Logan Avenue, northbound lane, 1 m west of curb. • No groundwater seepage • Sloughing was observed upon completion of drilling, testhole open to 1.2 m . • Testhole terminated at depth of 2.0 m.			
3						

□ Insitu Shear Vane (kPa) ■ Torvane on 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

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Lee Boughton
Reviewed by: German Leal

Stantec

Atterberg Limits
ASTM D4318
Method A- Multi-Point

Client: Stantec Consulting Ltd.
Project Name: 2018 Street Renewals Chambers

Project No: 123313460
Date Received: November 20, 2017
Date Tested: November 24, 2017
Tested By: Nestor Abarca

LABORATORY
199 Henlow Bay

Winnipeg, Manitoba
Canada R3Y 1G4
Tel: (204) 488-6999

Sample : TH02, 3.5'

LIQUID LIMIT

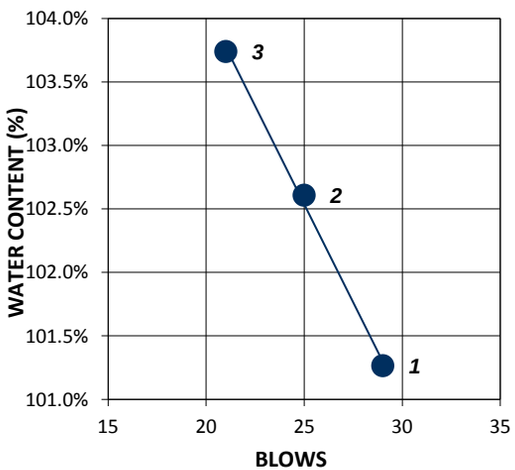
Trial	1	2	3
No. of Blows	29	25	21
Tare No.	145	154	215
Wt. Sa. (wet+tare)(g)	37	40	39
Wt. Sa. (dry+tare)(g)	28	29	29
Wt. Tare (g)	18	19	19
Wt. Dry Soil (g)	9.5	10.0	9.6
Wt. Water (g)	9.6	10.2	10.0
Water Content (%)	101.3%	102.6%	103.7%

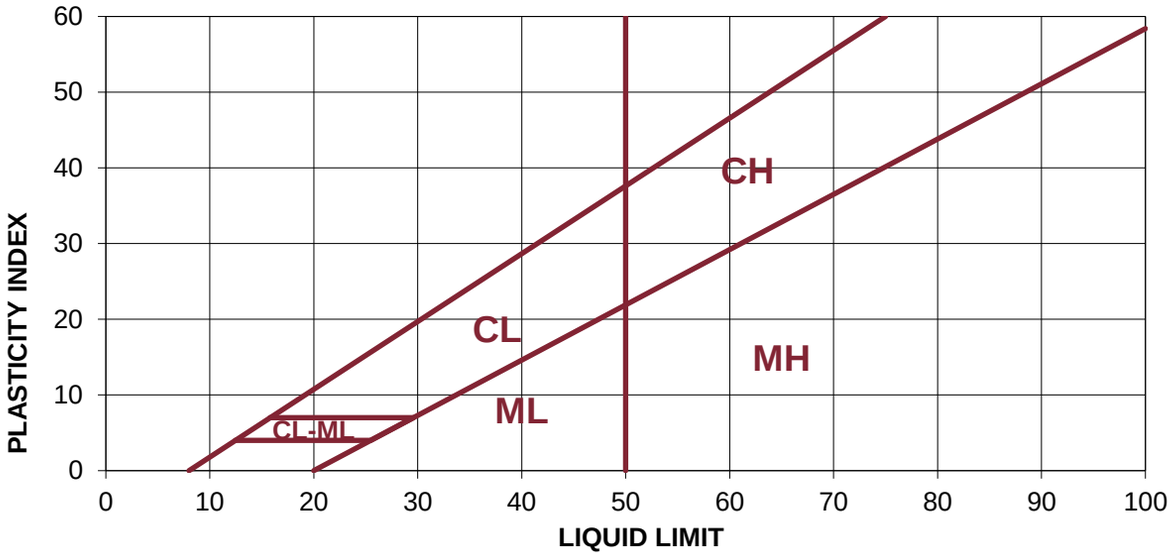
PLASTIC LIMIT

Trial	1	2
Tare No.	195	216
Wt. Sa. (wet+tare)(g)	29.78	29.74
Wt. Sa. (dry+tare)(g)	27.66	27.61
Wt. Tare (g)	19.96	19.81
Wt. Dry Soil (g)	7.7	7.8
Wt. Water (g)	2.1	2.1
Water Content (%)	27.5%	27.3%

RESULTS

LL	**103**
PL	**27**
PI	**76**
Natural MC (%)	
38.9%	





CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Reviewed By: Lee Boughton

Atterberg Limits
ASTM D4318
Method A- Multi-Point

Client: Stantec Consulting Ltd.
Project Name: 2018 Street Renewals Chambers

Project No: 123313460
Date Received: November 20, 2017
Date Tested: November 24, 2017
Tested By: Nestor Abarca

LABORATORY
199 Henlow Bay

Winnipeg, Manitoba
Canada R3Y 1G4
Tel: (204) 488-6999

Sample : TH03, 2.5'

LIQUID LIMIT

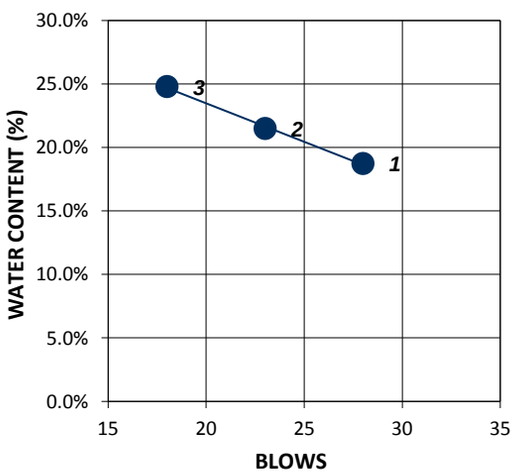
Trial	1	2	3
No. of Blows	28	23	18
Tare No.	153	164	229
Wt. Sa. (wet+tare)(g)	43	46	45
Wt. Sa. (dry+tare)(g)	40	41	40
Wt. Tare (g)	20	21	20
Wt. Dry Soil (g)	20.2	20.5	20.4
Wt. Water (g)	3.8	4.4	5.1
Water Content (%)	18.7%	21.5%	24.8%

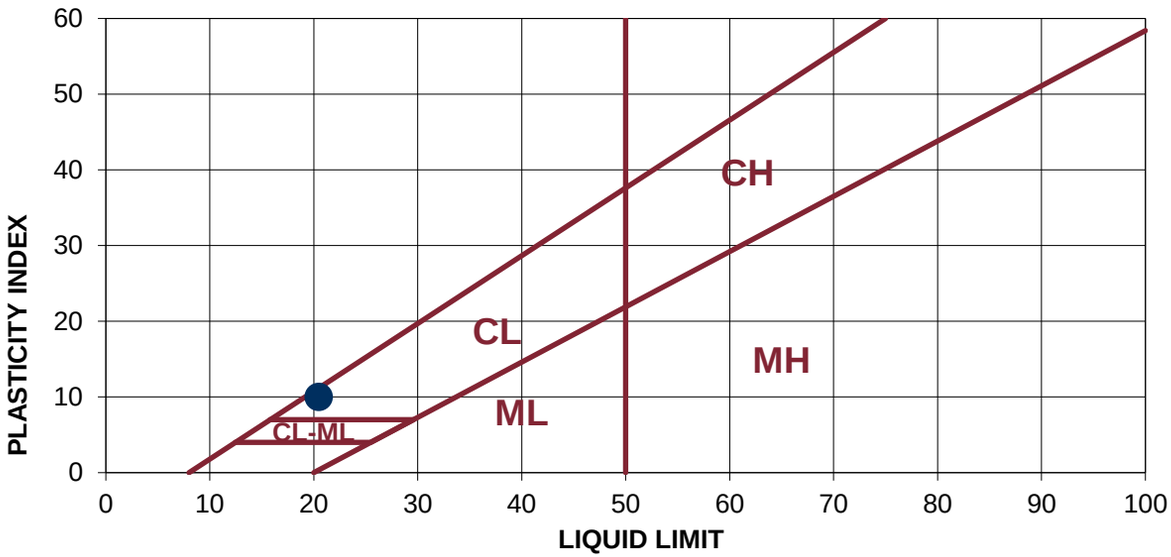
PLASTIC LIMIT

Trial	1	2
Tare No.	264	314
Wt. Sa. (wet+tare)(g)	35.52	32.85
Wt. Sa. (dry+tare)(g)	34.11	31.75
Wt. Tare (g)	20.00	20.75
Wt. Dry Soil (g)	14.1	11.0
Wt. Water (g)	1.4	1.1
Water Content (%)	10.0%	10.0%

RESULTS

LL	**20**
PL	**10**
PI	**10**
Natural MC (%)	
19.8%	





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Reviewed By: Lee Boughton

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

PARTICLE SIZE ANALYSIS
ASTM D422

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, Manitoba
R3B 2B9

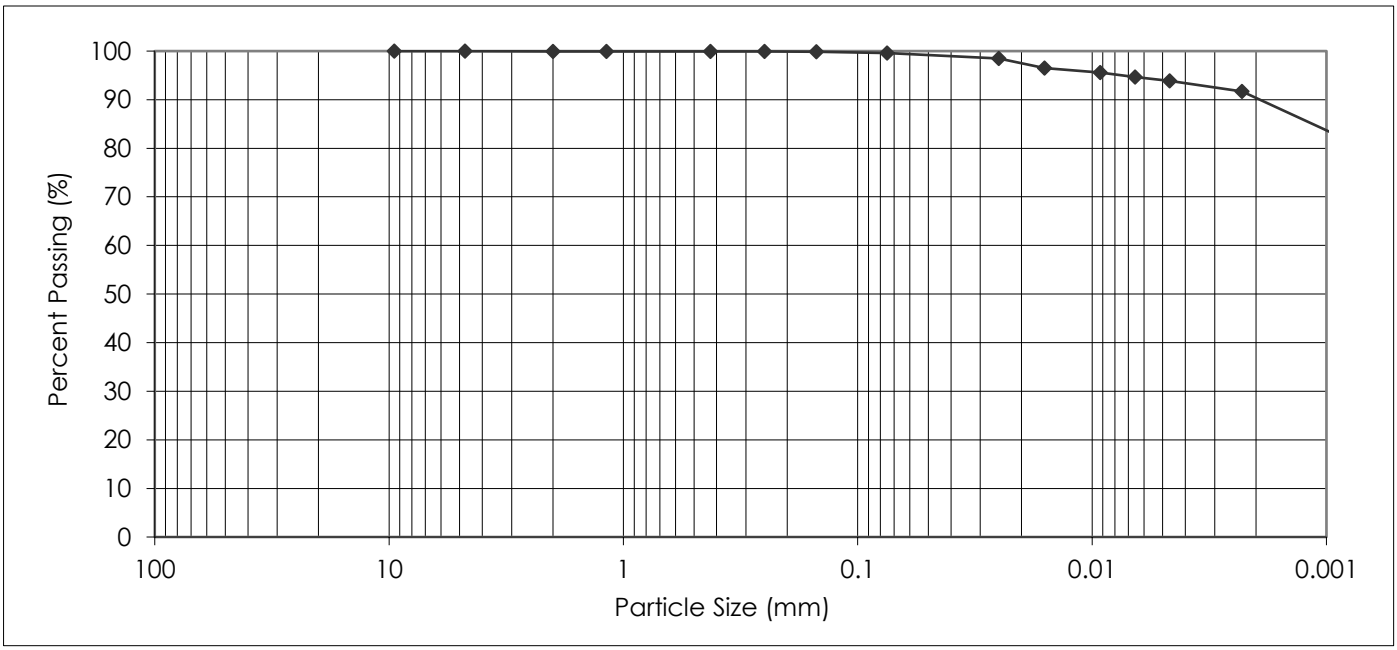
PROJECT: 2018 Street Renewals Chambers

Attention: Lee Boughton

PROJECT NO.: 123313460

SAMPLED BY: Lee Boughton
SAMPLE ID: TH02, 3.5'

DATE RECEIVED: November 20, 2017
TESTED BY: Tabea Kleineberg, M.Sc., GIT



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	99.9
0.075 mm	99.6
0.005 mm	94.0
0.002 mm	90.4
0.001 mm	83.7

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.0	0.1	0.3	9.2	90.4	83.7

REPORT DATE: November 27, 2017

REVIEWED BY: Lee Boughton

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

PARTICLE SIZE ANALYSIS
ASTM D422

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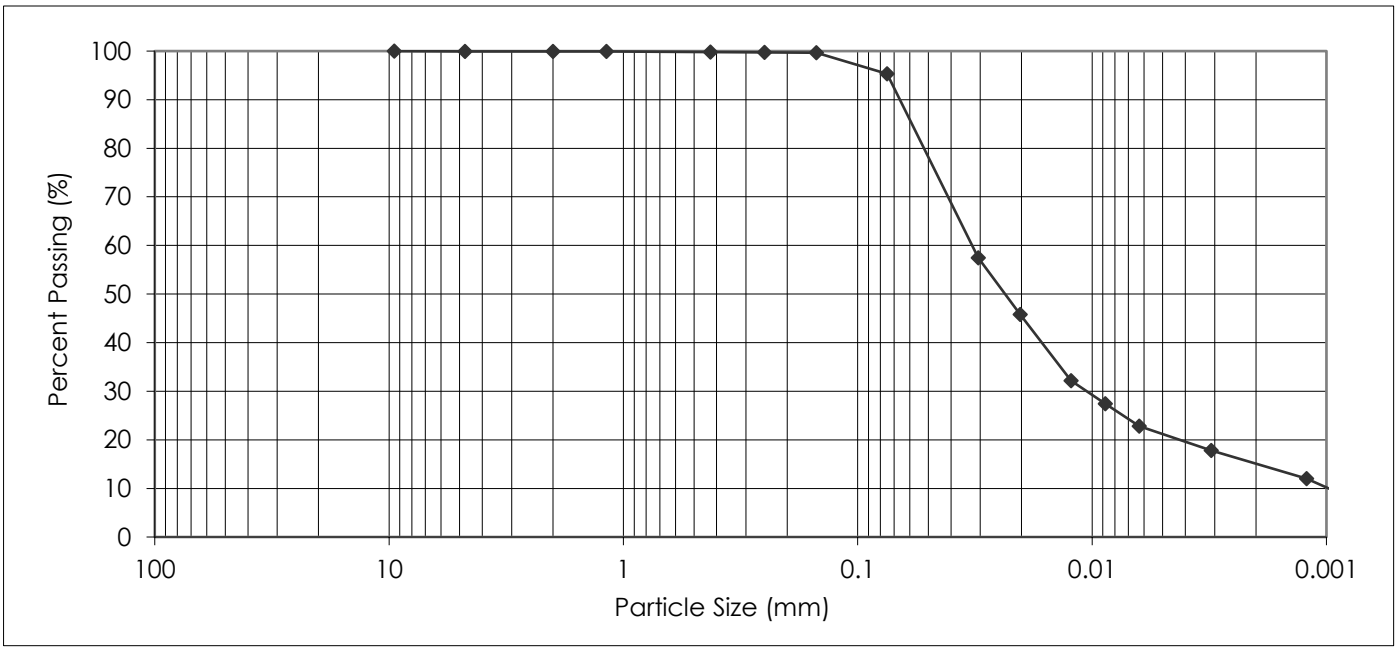

PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	100.0
2.00 mm	99.9

PARTICLE SIZE	PERCENT PASSING
1.18 mm	99.9
0.425 mm	99.8
0.250 mm	99.8
0.150 mm	99.7
0.075 mm	95.3
0.005 mm	21.2
0.002 mm	15.1
0.001 mm	10.2

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.1	0.1	4.5	80.2	15.1	10.2

REPORT DATE: November 27, 2017

REVIEWED BY: Lee Boughton