APPENDIX ‘A’

GEOTECHNICAL REPORT

CITY OF WINNIPEG

2019 LOCAL STREET RENEWALS - 19-R-03 CONTRACT 3

GEOTECHNICAL REPORT

DECEMBER 06, 2019

ORIGINAL

2019 LOCAL STREET RENEWALS - 19-R-03 CONTRACT 3

GEOTECHNICAL REPORT

CITY OF WINNIPEG

ORIGINAL

PROJECT NO.: 18M-01969-00
DATE: DECEMBER 06, 2019

WSP
1600 BUFFALO PLACE
WINNIPEG (MANITOBA) R3T 6B8
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SIGNATURES

PREPARED BY

Jason Dunn, E.I.T.
Engineer-In-Training

2019-12-06

ENGINEERS
GEOSCIENTISTS
MANITOBA
Certificate of Authorization
WSP Canada Inc.
No. 5750 Date: 2019-12-06

REVIEWED BY

Dana Bredin, P.Eng.
Project Engineer

This report was prepared by WSP Canada Inc. for the account of CITY OF WINNIPEG, in accordance with the professional services agreement. The disclosure of any information contained in this report is the sole responsibility of the intended recipient. The material in it reflects WSP Canada Inc.'s best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. WSP Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This limitations statement is considered part of this report.

The original of the technology-based document sent herewith has been authenticated and will be retained by WSP for a minimum of ten years. Since the file transmitted is now out of WSP's control and its integrity can no longer be ensured, no guarantee may be given with regards to any modifications made to this document.

TABLE OF CONTENTS

TABLES

APPENDICES

1 INTRODUCTION

A geotechnical investigation was conducted by WSP Canada Inc. for the proposed 2019 Local Street Renewals – Contract 3 (Project # 19-R-03) in Winnipeg, Manitoba. The purpose of this investigation was to assess the general subsurface conditions with respect to identifying the existing pavement structure and/or the underlying soil profile.

Three (3) streets were cored and three (3) streets were cored and drilled, which includes the following:

1. **Kirkfield St** from Portage Ave to Mobey Avenue – drilled and cored;
2. **Lilac St** from Fleet Ave to Mulvey Ave – cored only;
3. **Olive St** from Ness Ave to Braintree Cres – drilled and cored;
4. **Inglewood St** from Ness Ave to Silver Ave – cored only;
5. **Wellington Ave** from Banning St to Arlington St – drilled and cored;
6. **Palliser Ave –** cored only**.**

2 SUB-SURFACE INVESTIGATION AND TESTING

The field investigation commenced on March 18, 2019 and was completed on April 9, 2019. A total of 13 testholes and 29 pavement cores were completed by Maple Leaf Drilling. The testholes were drilled to a depth of 3.05 m below the road surface using a B40 truck-mounted rig equipped with a 125 mm solid stem auger. The pavement was cored using a 150 mm diameter coring press. All testholes were backfilled with auger cuttings and bentonite after the completion of the drilling and patched with hot mix asphalt. All pavement cores were patched with hot mix asphalt. Testhole and pavement core locations are noted on the testhole logs, and within the testhole and pavement core summary tables.

The soils encountered were visually classified to the full extent of the test hole. Representative soil samples were recovered at regular intervals starting from 0.1 m below pavement structure and every 0.3 m thereafter to a maximum depth of approximately 2.4 m below grade (mbg). All of the soil samples were tested for their moisture contents and selected soil samples were submitted for grain size analysis and Atterberg limits (minimum one per street). The pavement cores were measured for their thickness and each core was photographed. Any groundwater seepage or sloughing that was encountered in any of the test holes during drilling was noted.

The photos of the pavement cores, detailed descriptions of the soil profiles for each test hole, the material test results and the testhole maps are included in Appendices, organized by street.

3 TESTHOLE SUMMARY TABLES

Table 3-1 – Kirkfield Street

TEST HOLE NO.	TESTHOLE LOCATION	PAVEMENT SURFACE		PAVEMENT STRUCTURE MATERIAL		SOIL DESCRIPTION	BOREHOLE DEPTH (m)	No. of Samples Taken
		Type	Thickness (mm)	Type	Thickness (mm)			
TH-12	UTM 14N: 5526547.4 m N, 622834.5 m E Northbound lane in front of 479 Kirkfield St, 17.6 m north of McBey Ave, 0.7 m west of east curb	Asphalt & Concrete	100 & 50	None	-	Fill, Silty Clay, Clay	3.05	8
TH-13	UTM 14N: 5526597.5 m N, 622833.1 m E Southbound lane in front of 496 Kirkfield St, 67.6 m north of McBey Ave, 4.5 m west of east curb	Asphalt	100	Granular Fill (Crushed Limestone, 20 mm)	50	Fill, Silt, Clay	3.05	8
TH-14	UTM 14N: 5526647.3 m N, 622838.7 m E Northbound lane in front of 507 Kirkfield St, 117.6 m north of McBey Ave, 1.0 m west of east curb	Asphalt	100	Granular Fill (Crushed Limestone, 20 mm)	30	Fill, Clay	3.05	8
TH-15	UTM 14N: 5526697.4 m N, 622837.3 m E Southbound lane lane in front of 520 Kirkfield St, 167.4 m north of McBey Ave, 4.4 m west of east curb	Asphalt	100	Granular Fill (Crushed Limestone, 20 mm)	80	Silty Clay, Clay	3.05	8

TH-16	UTM 14N: 5526747.3 m N, 622839.4 m E Northbound lane in front of 530 Kirkfield St, 67.2 m south of Portage Ave, 1.9 m west of east curb	Asphalt	150	Granular Fill (Crushed Limestone, 20 mm)	50	Silty Clay, Clay	3.05	8
TH-17	UTM 14N: 55267973 m N, 622841.5 m E Southbound lane east of 3216 Portage Ave, 17.2 m south of Portage Ave, 2.3 m west of east curb	Asphalt	175	Granular Fill (Crushed Limestone, 20 mm)	20	Clay, Clayey Silt, Silty Clay	3.05	8

Table 3-2 – Lilac Street

PAVEMENT CORE NO.	PAVEMENT CORE LOCATION	PAVEMENT SURFACE	
		Type	Thickness (mm)
PC-01	UTM 14N: 5525442.6 m N, 632597.4 m E Northbound lane in front of 773 Fleet Ave, 5.3 m northwest of Fleet Ave, 8.4 m southwest of east curb	Asphalt & Concrete	225 mm (50 mm asphalt, 175 mm intact concrete)
PC-02	UTM 14N: 5525458.5 m N, 632584.7 m E Southbound lane in front of 785 Fleet Ave, 24.8 m northwest of Fleet Ave, 11.7 m southwest of east curb	Asphalt & Concrete	200 mm (25 mm asphalt, 175 mm broken concrete)
PC-03	UTM 14N: 5525482.1 m N, 5525482.1 m E Southbound lane in front of 802 Mulvey Ave, 49.9 m northwest of Fleet Ave, 8.2 m southwest of east curb	Concrete	175 mm

Table 3-3 – Olive Street

TEST HOLE NO.	TESTHOLE LOCATION	PAVEMENT SURFACE		PAVEMENT STRUCTURE MATERIAL		SOIL DESCRIPTION	BOREHOLE DEPTH (m)	No. of Samples Taken
		Type	Thickness (mm)	Type	Thickness (mm)			
TH-18	UTM 14N: 5527390.9 m N, 625268.8 m E Southbound lane in front 2271 Ness Ave, 10.1 m north of Ness Ave, 3.3 m east of west curb	Asphalt & Concrete	50 & 125	None	-	Clay	3.05	8
TH-19	UTM 14N: 5527410.8 m N, 625272.5 m E Northbound lane in front of 485 Olive St, 29.7 m north of Ness Ave, 1.1 m west of east curb	Asphalt & Concrete	75 & 125	Granular Fill (Crushed Limestone, 20 mm)	30	Clay	3.05	8
TH-20	UTM 14N: 552740.9 m N, 6252702 m E Southbound lane in front of 2 Olive St, 49.2 m north of Ness Ave, 3.2 m east of west curb	Asphalt & Concrete	75 & 125	Granular Fill (Crushed Limestone, 20 mm)	30	Clay	3.05	8

Table 3-4 – Inglewood Street

PAVEMENT CORE NO.	PAVEMENT CORE LOCATION	PAVEMENT SURFACE	
		Type	Thickness (mm)
PC-04	UTM 14N: 5527310.9 m N, 627902.5 m E Northbound lane in front of 349 Inglewood St, 25.5 m north of Ness Ave, 1.0 m west of east curb.	Concrete	150 mm (broken concrete)
PC-05	UTM 14N: 5527361.0 m N, 627900.8 m E Southbound lane in front of 360 Inglewood St, 75.5 m north of Ness Ave, 4.2 m west of east curb.	Concrete	150 mm
PC-06	UTM 14N: 5527410.8 m N, 627906.2 m E Northbound lane in front of 374 Inglewood St, 125.3 m north of Ness Ave, 0.8 m west of east curb	Concrete	175 mm
PC-07	UTM 14N: 5527460.9 m N, 627904.5 m E Southbound lane in front of 384 Inglewood St, 175.5 m north of Ness Ave, 4.3 m west of east curb.	Concrete	200 mm (150 mm intact concrete, 50 mm broken concrete)
PC-08	UTM 14N: 5527510.7 m N, 627910.0 m E Northbound lane in front of 402 Inglewood St, 178.5 m south of Silver Ave, 1.1 m west of east curb.	Concrete	150 mm
PC-09	UTM 14N: 5527560.8 m N, 627908.3 m E Southbound lane in front of 414 Inglewood St, 128.8 m south of Silver Ave, 4.3 m west of east curb.	Concrete	175 mm
PC-10	UTM 14N: 5527610.7 m N, 627913.8 m E Northbound lane in front of 426 Inglewood St, 78.5 m south of Silver Ave, 0.9 m west of east curb.	Concrete	175 mm
PC-11	UTM 14N: 5527660.8 m N, 627912.0 m E Southbound lane in front of 440 Inglewood St, 28.5 m south of Silver Ave, 4.4 m west of east curb.	Concrete	180 mm

Table 3-5 – Wellington Avenue

TEST HOLE NO.	TESTHOLE LOCATION	PAVEMENT SURFACE		PAVEMENT STRUCTURE MATERIAL		SOIL DESCRIPTION	BOREHOLE DEPTH (m)	No. of Samples Taken
		Type	Thickness (mm)	Type	Thickness (mm)			
TH-01	UTM 14N: 5529158.1 m N, 631346.4 m E Westbound lane in front of 887 Banning St, 25.4 m east of Banning St, 3.6 m south of north curb.	Concrete	175	None	-	Silty Clay, Silt, Clay	3.05	8
TH-02	UTM 14N: 5529151.7 m N, 631406.3 m E Eastbound lane in front of 780 Burnell St, 85.4 m east of Banning St, 8.7 m south of north curb.	Asphalt & Concrete	125 & 125	None	-	Silty Clay, Silt, Clay	3.05	8
TH-03	UTM 14N: 5529155.6 m N, 631456.4 m E Westbound lane in front of 777 Alverstone St, 73.9 m west of Arlington St, 3.7 m south of north curb.	Asphalt & Concrete	75 & 100	None	-	Silt	1.52	5
TH-04	UTM 14N: 5529148.0 m N, 631501.2 m E Eastbound lane in front of 805 Wellington Ave, 28.9 m west of Arlington St, 10.2 m south of north curb.	Asphalt & Concrete	50 & 200	None	-	Clay, Silt, Clay	3.05	8

Table 3-6 – Palliser Avenue

PAVEMENT CORE NO.	PAVEMENT CORE LOCATION	PAVEMENT SURFACE	
		Type	Thickness (mm)
PC-12	UTM 14N: 5526940.6 m N, 626012.2 m E Westbound lane in front of 187 Palliser Ave, 50.0 m west of Mt Royal Rd (north leg), 2.6 m south of north curb.	Asphalt & Concrete	270 mm (50 mm asphalt, 220 mm concrete)
PC-13	UTM 14N: 5526939.9 m N, 625912.1 m E Eastbound lane in front of 166 Palliser Ave, 149.7 m west of Mt Royal Rd (north leg), 6.6 m south of north curb.	Asphalt & Concrete	240 mm (30 mm asphalt, 210 mm concrete)
PC-14	UTM 14N: 5526912.3 m N, 625841.6 m E Southbound lane in front of 143 Palliser Ave, 248.4 m west and south of Mt Royal Rd (west leg), 2.7 m east of west curb.	Asphalt & Concrete	230 mm (30 mm asphalt, 155 mm intact concrete, 45 mm broken concrete)
PC-15	UTM 14N: 5526864.2 m N, 625897.8 m E Westbound lane in front of 134 Palliser Ave, 161.9 m west of Mt Royal Rd (south leg), 2.8 m south of north curb.	Asphalt & Concrete	240 mm (35 mm asphalt, 205 mm concrete)
PC-16	UTM 14N: 5526856.5 m N, 626007.6 m E Eastbound lane in front of 110 Palliser Ave, 52.0 m west of Mt. Royal Rd (south leg), 6.7 m south of north curb.	Asphalt & Concrete	125 mm (45 mm asphalt, 80 mm broken concrete)

4 CLOSURE

The findings and recommendations provided in this report were prepared by WSP Canada Inc. (the Consultant) in accordance with generally accepted professional engineering principles and practices. The recommendations are based on the results of field and laboratory investigations and are reflective only of the actual test hole(s) and/or excavation(s) examined. If conditions encountered during construction appear to be different than those shown by the test hole(s) and/or excavation(s) at this site, the Consultant should be notified immediately in order that the recommendations can be reviewed and modified as necessary to address actual site conditions.

This report is limited in scope to only those items that are specifically referenced in this report. There may be existing conditions that were not recorded in this report. Such conditions were not apparent to the Consultant due to the limitations imposed by the scope of work. The Consultant, therefore, accepts no liability for any costs incurred by the Client for subsequent discovery, manifestation or rectification of such conditions.

This report is intended solely for the Client named as a general indication of the visible or reported physical condition of the items addressed in the report at the time of the geotechnical investigation. The material in this report reflects the Consultant's best judgment in light of the information available to it at the time of preparation.

This report and the information and data contained herein are to be treated as confidential and may be used only by the Client and its officers and employees in relation to the specific project that it was prepared for. Any use a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. The Consultant accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The report has been written to be read in its entirety, do not use any part of this report as a separate entity.

All files, notes, source data, test results and master files are retained by the Consultant and remain the property of the Consultant.

APPENDIX

A KIRKFIELD ST

1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204–477–6650 FAX : 204–474–2864
WWW.WSPGROUP.COM

TITLE:
19–R–03 LOCAL STREETS
KIRKFIELD ST FROM
MOBEY AVE TO PORTAGE AVE

TESTHOLE LOCATIONS

SCALE: 1:1500

DATE: 2019/12/03

PROJECT NO: 18M–01969–00

REVISION: 0

DRAWING NO: B101

XREF

STAMP

WSP
1600 Buffalo Place
Winnipeg, MB R3T 6B8
Telephone: (204)-477-6650

TH-12

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contact 3 - Street Renewals
PROJECT NUMBER 18M-01969-00
PROJECT LOCATION Kirkfield between Portage/McBey
DATE STARTED 4/8/19 **COMPLETED** 4/8/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	TORVANE (kPa)	MOISTURE CONTENT (%)
	99.90	ASPHALT - 100mm thick, intact.					
	99.85	CONCRETE - 50mm thick, intact.	GB S1				21
		FILL - CLAY, some silt, trace sand - Black, frozen					
0.5			GB S2				37
	99.24	SILTY CLAY - Brown, silty, frozen	GB S3				36
1.0			GB S4				34
1.5	98.48		GB S5				37
		CLAY - Brown, frozen, some silt. - Frost penetration to 1.67 m below grade. - Moist, stiff below 1.67 m	GB S6				46
2.0			GB S7				48
2.5			GB S8				48
3.0	96.95						

▲SPT N VALUE▲
20 40 60 80
PL MC LL
20 40 60 80
PP qu (kPa) Torvane
100 200 300 400

- Testhole ended at 3.05m below grade.
- No seepage encountered.
- Sloughing encountered at 2.90m below grade.
- Test hole backfilled with bentonite and auger cuttings.

WSP
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Winnipeg, MB R3T 6B8
Telephone: (204)-477-6650

TH-13

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contact 3 - Street Renewals
PROJECT NUMBER 18M-01969-00
PROJECT LOCATION Kirkfield between Portage/McBey
DATE STARTED 4/8/19 **COMPLETED** 4/8/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	TORVANE (kPa)	MOISTURE CONTENT (%)
	99.90	ASPHALT - 100mm thick, intact.					
	99.85	GRANULAR FILL - Crushed limestone, 20 mm down	GB S1				24
0.5		FILL - CLAY, some silt, trace sand. - Black-brown, frozen.	GB S2				26
	99.39	SILT - Tan-brown, some clay. - Frost penetration to 1.52m below grade. - Moist, soft below 1.52 m	GB S3				18
1.0			GB S4				16
1.5			GB S5				23
	98.32	CLAY - Brown, moist, stiff, trace to some silt.	GB S6				47
2.0			GB S7				48
2.5			GB S8				47
3.0	96.95						

▲SPT N VALUE▲
20 40 60 80
PL MC LL
20 40 60 80
PP qu (kPa) Torvane
100 200 300 400

- Testhole ended at 3.05m below grade.
- No seepage encountered.
- Sloughing encountered at 2.90m below grade.
- Test hole backfilled with bentonite and auger cuttings.

WSP
1600 Buffalo Place
Winnipeg, MB R3T 6B8
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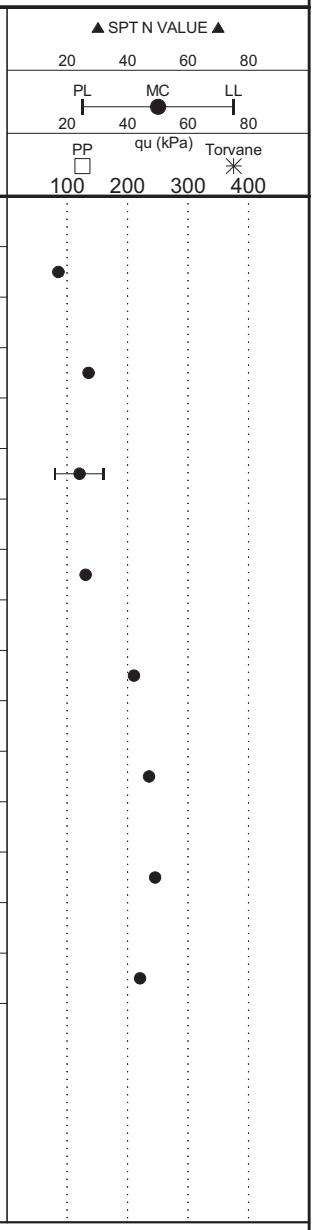
TH-14

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contact 3 - Street Renewals
PROJECT NUMBER 18M-01969-00
PROJECT LOCATION Kirkfield between Portage/McBey
DATE STARTED 4/8/19 **COMPLETED** 4/8/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	TORVANE (kPa)	MOISTURE CONTENT (%)
	99.90	ASPHALT - 100mm thick, some cracking.					
	99.87	GRANULAR FILL - Crushed limestone, 20 mm down	GB S1				17
		FILL - SILTY CLAY with some sand, brown, frozen.					
0.5			GB S2				27
		- 23.6% Sand, 49.7% silt, 26.7% clay at 0.9 m	GB S3				24
1.0			GB S4				26
	98.78	CLAY - Brown, frozen, some silt. - Frost penetration to 1.52m below grade.					
1.5		- Moist, stiff below 1.52m	GB S5				42
			GB S6				47
2.0			GB S7				49
			GB S8				44
2.5							
3.0	96.95						



- Testhole ended at 3.05m below grade.
- No seepage encountered.
- No sloughing encountered.
- Test hole backfilled with bentonite and auger cuttings.

WSP
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TH-15

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contact 3 - Street Renewals
PROJECT NUMBER 18M-01969-00
PROJECT LOCATION Kirkfield between Portage/McBey
DATE STARTED 4/8/19 **COMPLETED** 4/8/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	MOISTURE CONTENT (%)
	99.90	ASPHALT - 100mm thick, intact.		
	99.82	GRANULAR FILL - Crushed limestone, 20 mm down	GB S1	27
0.5		SILTY CLAY - Brown, frozen, silty. - Frost penetration to 1.52 m below grade. - Moist, stiff below 1.52 m.	GB S2	29
			GB S3	32
1.0			GB S4	41
1.5			GB S5	41
			GB S6	51
	98.17	CLAY - Mottled grey-brown, moist, stiff, some silt.	GB S7	54
2.0			GB S8	48
2.5				
3.0	96.95			

POCKET PEN. (kPa) | TORVANE (kPa)

▲SPT N VALUE▲
20 40 60 80
PL MC LL
20 40 60 80
PP □ qu (kPa) Torvane ✳
100 200 300 400

- Testhole ended at 3.05m below grade.
- No seepage encountered.
- No sloughing encountered.
- Test hole backfilled with bentonite and auger cuttings.

WSP
1600 Buffalo Place
Winnipeg, MB R3T 6B8
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TH-16

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contact 3 - Street Renewals
PROJECT NUMBER 18M-01969-00
PROJECT LOCATION Kirkfield between Portage/McBey
DATE STARTED 4/8/19 **COMPLETED** 4/8/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	MOISTURE CONTENT (%)
	99.85	ASPHALT - 150mm thick, intact.		
	99.80	GRANULAR FILL - Crushed limestone, 20 mm down	GB S1	37
0.5		SILTY CLAY - Brown, frozen, silty. - Frost penetration to 1.52 m below grade. - Moist, stiff below 1.52 m.	GB S2	35
			GB S3	36
1.0			GB S4	38
1.5			GB S5	41
			GB S6	47
	98.17	CLAY - Mottled grey-brown, moist, stiff, some silt		
2.0			GB S7	46
			GB S8	48
2.5				
3.0	96.95			

▲SPT N VALUE▲
20 40 60 80
PL MC LL
20 40 60 80
PP qu (kPa) Torvane
100 200 300 400

- Testhole ended at 3.05m below grade.
- No seepage encountered.
- No sloughing encountered.
- Test hole backfilled with bentonite and auger cuttings.

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TH-17

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contact 3 - Street Renewals
PROJECT NUMBER 18M-01969-00
PROJECT LOCATION Kirkfield between Portage/McBey
DATE STARTED 4/8/19 **COMPLETED** 4/8/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	TORVANE (kPa)	MOISTURE CONTENT (%)
	99.82	ASPHALT - 175mm thick, intact.					
	99.80	GRANULAR FILL - Crushed limestone, 20 mm down	GB S1				36
0.5		CLAY - Grey, frozen, trace silt.	GB S2				35
			GB S3				29
1.0			GB S4				20
	98.80						
		CLAYEY SILT - Grey, clayey, frozen - Frost penetration to 1.52m below grade.	GB S5				29
1.5	98.50						
		SILTY CLAY - Brown, moist, stiff, some silt. - Silty from 1.67 m to 1.97 m, light-grey, moist, soft.	GB S6				40
2.0			GB S7				48
			GB S8				49
2.5							
3.0	96.95						

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
PP □ qu (kPa) Torvane ✳
100 200 300 400

- Testhole ended at 3.05m below grade.
- No seepage encountered.
- Sloughing encountered at 2.74m below grade.
- Test hole backfilled with bentonite and auger cuttings.

H. MANALO CONSULTING LTD.
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hmanalo@mts.net

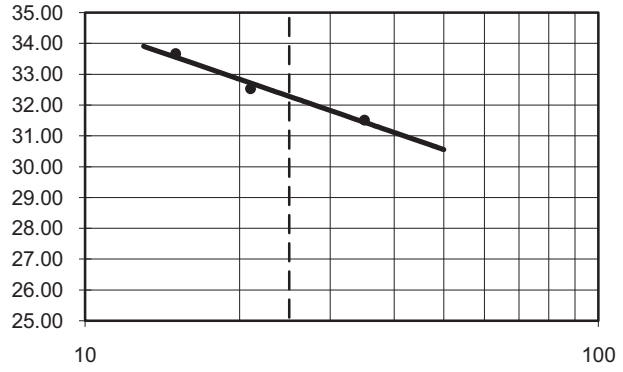
ATTERBERG LIMITS

CLIENT: WSP Canada Group Limited
1600 Buffalo Place
Winnipeg, MB R3T 6B8
ATTENTION: Dana Bredin
PROJECT: 18M-01969-00 Phase 802-1

PROJECT NO.: 103-1906
TEST NO.: 3
LAB NO.: HM 48-3

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	11.59	14.69	12.35		
Dry Soil + Dish:	9.86	12.14	10.31		
Moisture:	1.73	2.55	2.04		
Dish:	4.37	4.3	4.25		
Dry Soil:	5.49	7.84	6.06		
% Moisture:	31.51	32.53	33.66		
No. of Blows:	35	21	15		
Liquid Limits:	32.82	31.85	31.65		**32**



Material Identification:

T.H. No. **TH 14 , S3**

Depth: **3'**

Liquid Limit, %: **32**
Plastic Limit, %: **16**
Plasticity Index: **16**
(LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	5.59	6.46	5.71		
Dry Soil + Dish:	5.39	6.15	5.51		
Moisture:	0.2	0.31	0.2		
Dish:	4.2	4.22	4.27		
Dry Soil:	1.19	1.93	1.24		
% Moisture:	16.81	16.06	16.13		
Average:					**16**

Test Method : *ASTM: D4318, D2216*
HMCL Tech: *Navi*
Date Tested: *23-Apr-19*

Reviewed by: Hermie Manalo

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1402 Notre Dame Avenue, Winnipeg, MB R3E 3G5
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Email: hmanalo@mts.net

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP Canada Group Limited	TEST NO:	19- 001	PROJECT NO:	103-1906
PROJECT:	18M-01969-00 - Phase 802-1	DATE SAMPLED:	8-Apr-2019	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	18-Apr-2019	TESTED BY:	Viet Linh
TEST LOCATION:	Phase 802-1				

Description	TH-11	TH-11	TH-11		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	121.70	123.90	127.40		
Wt Dry Sample + Tare	85.30	86.00	92.20		
Wt Water	36.40	37.90	35.20		
Wt Tare	4.20	4.20	4.20		
Wt Dry Sample	81.10	81.80	88.00		
Moisture Content (%)	**44.9**	**46.3**	**40.0**		

Description	TH-12	TH-12	TH-12	TH-12	TH-12
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	154.90	126.70	128.20	124.60	124.10
Wt Dry Sample + Tare	128.40	93.90	95.30	93.90	92.00
Wt Water	26.50	32.80	32.90	30.70	32.10
Wt Tare	4.10	4.20	4.10	4.20	4.20
Wt Dry Sample	124.30	89.70	91.20	89.70	87.80
Moisture Content (%)	**21.3**	**36.6**	**36.1**	**34.2**	**36.6**

Description	TH-12	TH-12	TH-12		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	124.40	122.60	125.10		
Wt Dry Sample + Tare	86.90	84.20	86.00		
Wt Water	37.50	38.40	39.10		
Wt Tare	4.50	4.20	4.10		
Wt Dry Sample	82.40	80.00	81.90		
Moisture Content (%)	**45.5**	**48.0**	**47.7**		

Description	TH-13	TH-13	TH-13	TH-13	TH-13
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	206.50	154.80	222.80	209.50	182.90
Wt Dry Sample + Tare	174.80	131.70	195.40	186.20	156.60
Wt Water	31.70	23.10	27.40	23.30	26.30
Wt Tare	41.10	41.00	41.20	40.90	41.10
Wt Dry Sample	133.70	90.70	154.20	145.30	115.50
Moisture Content (%)	**23.7**	**25.5**	**17.8**	**16.0**	**22.8**

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MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP Canada Group Limited	TEST NO:	19- 001	PROJECT NO:	103-1906
PROJECT:	18M-01969-00 - Phase 802-1	DATE SAMPLED:	8-Apr-2019	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	18-Apr-2019	TESTED BY:	Viet Linh
TEST LOCATION:	Phase 802-1				

Description	TH-13	TH-13	TH-13		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	164.20	165.30	162.60		
Wt Dry Sample + Tare	125.00	125.00	123.70		
Wt Water	39.20	40.30	39.00		
Wt Tare	40.90	41.10	40.90		
Wt Dry Sample	84.10	83.90	82.80		
Moisture Content (%)	**46.6**	**48.0**	**47.1**		

Description	TH-14	TH-14	TH-14	TH-14	TH-14
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	242.10	184.40	303.90	161.40	159.30
Wt Dry Sample + Tare	213.30	153.70	248.20	136.80	124.30
Wt Water	28.80	30.70	55.70	24.60	35.00
Wt Tare	40.90	41.40	14.60	40.60	40.90
Wt Dry Sample	172.40	112.30	233.60	96.20	83.40
Moisture Content (%)	**16.7**	**27.3**	**23.8**	**25.6**	**42.0**

Description	TH-14	TH-14	TH-14		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	162.30	164.70	167.50		
Wt Dry Sample + Tare	123.90	124.00	129.10		
Wt Water	38.40	40.70	38.40		
Wt Tare	41.40	40.60	41.10		
Wt Dry Sample	82.50	83.40	88.00		
Moisture Content (%)	**46.5**	**48.8**	**43.6**		

Description	TH-15	TH-15	TH-15	TH-15	TH-15
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	201.40	160.70	163.20	144.60	165.50
Wt Dry Sample + Tare	167.60	133.60	133.70	111.30	129.60
Wt Water	33.80	27.10	29.50	33.30	35.90
Wt Tare	40.70	41.30	41.20	29.10	41.40
Wt Dry Sample	126.90	92.30	92.50	82.20	88.20
Moisture Content (%)	**26.6**	**29.4**	**31.9**	**40.5**	**40.7**

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MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP Canada Group Limited	TEST NO:	19- 001	PROJECT NO:	103-1906
PROJECT:	18M-01969-00 - Phase 802-1	DATE SAMPLED:	8-Apr-2019	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	18-Apr-2019	TESTED BY:	Viet Linh
TEST LOCATION:	Phase 802-1				

Description	TH-15	TH-15	TH-15		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	165.70	166.00	164.30		
Wt Dry Sample + Tare	123.80	122.20	124.40		
Wt Water	41.90	43.80	39.90		
Wt Tare	41.10	41.10	40.70		
Wt Dry Sample	82.70	81.10	83.70		
Moisture Content (%)	**50.7**	**54.0**	**47.7**		

Description	TH-16	TH-16	TH-16	TH-16	TH-16
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	164.80	152.10	164.20	162.30	155.10
Wt Dry Sample + Tare	131.80	120.40	131.80	129.30	121.90
Wt Water	33.00	31.70	32.40	33.00	33.20
Wt Tare	41.50	29.50	41.10	41.40	40.70
Wt Dry Sample	90.30	90.90	90.70	87.90	81.20
Moisture Content (%)	**36.5**	**34.9**	**35.7**	**37.5**	**40.9**

Description	TH-16	TH-16	TH-16		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	132.70	127.20	124.50		
Wt Dry Sample + Tare	91.80	88.50	85.50		
Wt Water	40.90	38.70	39.00		
Wt Tare	4.30	4.20	4.60		
Wt Dry Sample	87.50	84.30	80.90		
Moisture Content (%)	**46.7**	**45.9**	**48.2**		

Description	TH-17	TH-17	TH-17	TH-17	TH-17
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	122.40	122.10	124.30	122.70	123.40
Wt Dry Sample + Tare	91.20	91.60	97.60	103.10	96.50
Wt Water	31.20	30.50	26.70	19.60	26.90
Wt Tare	4.50	4.30	4.50	4.20	4.20
Wt Dry Sample	86.70	87.30	93.10	98.90	92.30
Moisture Content (%)	**36.0**	**34.9**	**28.7**	**19.8**	**29.1**

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MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP Canada Group Limited	TEST NO:	19- 001	PROJECT NO:	103-1906
PROJECT:	18M-01969-00 - Phase 802-1	DATE SAMPLED:	8-Apr-2019	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	18-Apr-2019	TESTED BY:	Viet Linh
TEST LOCATION:	Phase 802-1				

Description	TH-17	TH-17	TH-17		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	124.70	127.70	122.30		
Wt Dry Sample + Tare	90.60	88.00	83.80		
Wt Water	34.10	39.70	38.50		
Wt Tare	4.20	4.40	4.60		
Wt Dry Sample	86.40	83.60	79.20		
Moisture Content (%)	**39.5**	**47.5**	**48.6**		

Description	TH-18	TH-18	TH-18	TH-18	TH-18
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	124.30	122.70	121.20	126.70	124.10
Wt Dry Sample + Tare	89.20	92.10	90.60	92.70	89.40
Wt Water	35.10	30.60	30.60	34.00	34.70
Wt Tare	4.20	4.30	4.30	4.30	4.40
Wt Dry Sample	85.00	87.80	86.30	88.40	85.00
Moisture Content (%)	**41.3**	**34.9**	**35.5**	**38.5**	**40.8**

Description	TH-18	TH-18	TH-18		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	122.70	126.40	122.10		
Wt Dry Sample + Tare	90.40	89.40	87.10		
Wt Water	32.30	37.00	35.00		
Wt Tare	4.10	4.20	4.20		
Wt Dry Sample	86.30	85.20	82.90		
Moisture Content (%)	**37.4**	**43.4**	**42.2**		

Description	TH-19	TH-19	TH-19	TH-19	TH-19
Sample	S1	S2	S3	S5	S4
Wt Wet Sample + Tare	151.10	232.20	293.30	127.20	121.40
Wt Dry Sample + Tare	108.50	177.40	221.90	93.00	89.40
Wt Water	42.60	54.80	71.40	34.20	32.00
Wt Tare	4.20	14.30	15.40	4.10	4.20
Wt Dry Sample	104.30	163.10	206.50	88.90	85.20
Moisture Content (%)	**40.8**	**33.6**	**34.6**	**38.5**	**37.6**

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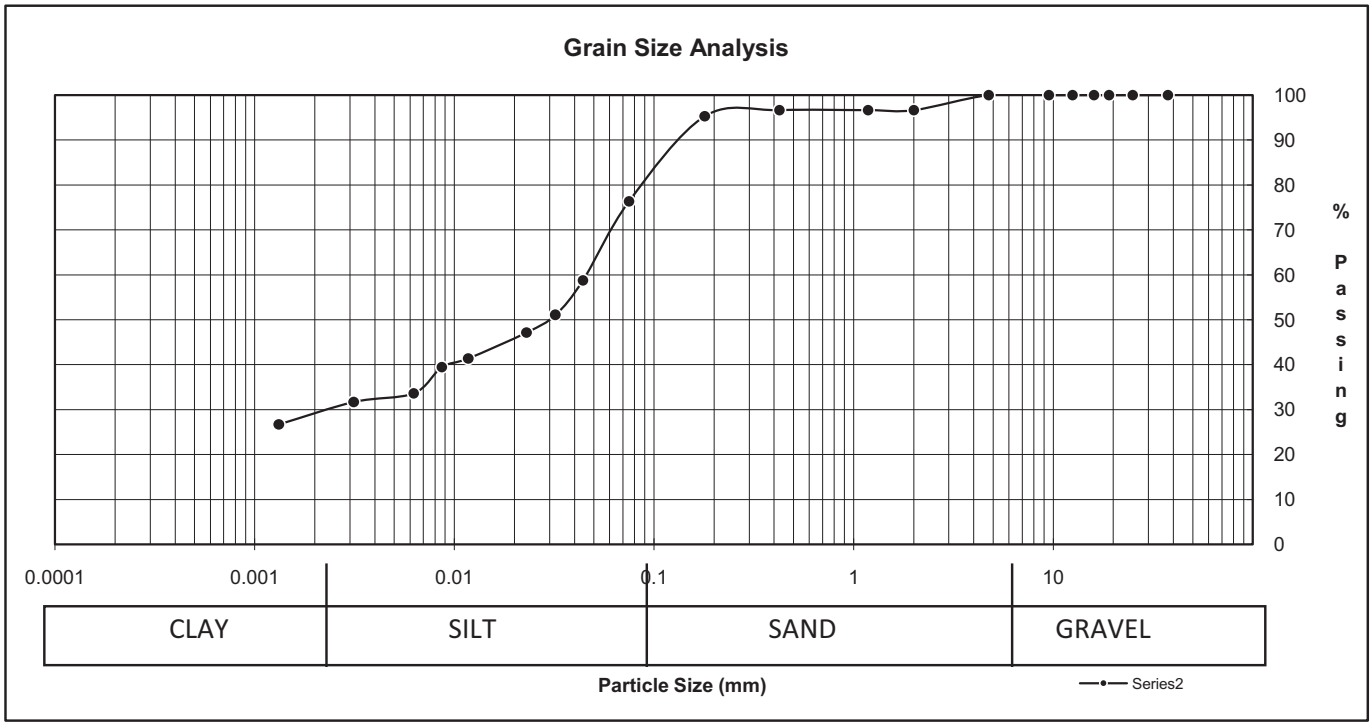
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	WSP	PROJECT NO.	103-1906
	1600 Buffalo Place	Test No:	3
	Winnipeg, MB R3T 6B8	Lab No:	HM 48-3P
ATTENTION:	Dana Bredin		
PROJECT:	18M-01969-00 Phase 802-1		

Date Sampled:	17-Apr-19	Date Received:	17-Apr-19
Sampled By:	Client	Date Tested:	18-Apr-19

Material Identification
B.H./T.H. No. **TH 14, S3**
Sample No. **HM 48-3P**
Sample Source Various City Street
Specific Gravity of Material: 2.65

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0441	58.8
9.50	100.0	0.0321	51.0
4.75	100.0	0.0231	47.2
2.00	96.7	0.0118	41.4
1.18	96.7	0.0087	39.4
0.425	96.7	0.0062	33.6
0.180	95.3	0.0031	31.7
0.075	76.4	0.0013	26.7



SOIL DESCRIPTION	% Composition		D10	
		Gravel	D30	0.00250
	23.6	Sand	D60	0.04405
	49.7	Silt	Cu	
	26.7	Clay	Cc	

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: Navi

Reviewed by: Hermie Manalo

Figure 1 – TH-12 Kirkfield Street

Figure 2 – TH-13 Kirkfield Street

Figure 3 – TH-14 Kirkfield Street

Figure 4 – TH-15 Kirkfield Street

Figure 5 – TH-16 Kirkfield Street

Figure 6 – TH-17 Kirkfield Street

APPENDIX

B LILAC ST

wsp
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

TITLE:
19-R-03 LOCAL STREETS
LILAC ST FROM
FLEET AVE TO MULVEY AVE

CORING LOCATIONS

SCALE: 1:500

DATE: 2019/12/03

PROJECT NO: 18M-01969-00

REVISION: 0

DRAWING NO: B102

XREF

STAMP

Figure 1 – PC-01 Lilac Street

Figure 2 – PC-02 Lilac Stre

Figure 3 – PC-03 Lilac Street

APPENDIX

C OLIVE ST

wsp
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

TITLE:
19–R–03 LOCAL STREETS
OLIVE ST FROM
NESS AVE TO BRAINTREE CRES

TESTHOLE LOCATIONS

SCALE: 1:500

DATE: 2019/12/03

PROJECT NO: 18M–01969–00

REVISION: 0

DRAWING NO: B103

XREF

STAMP

WSP
1600 Buffalo Place
Winnipeg, MB R3T 6B8
Telephone: (204)-477-6650

TH-18

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contract 3 - Street Renewals
PROJECT NUMBER 18M-01969
PROJECT LOCATION Olive between Ness/Braintree
DATE STARTED 4/9/19 **COMPLETED** 4/9/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	TORVANE (kPa)	MOISTURE CONTENT (%)
	99.95	ASPHALT - 50mm thick, rubble.					
	99.82	CONCRETE - 125mm thick, intact.	GB S1				41
0.5		CLAY - Black, frozen, some silt and sand. - Below 0.76m, brown, frozen, some silt, trace sand. - Frost penetration to 1.68m below grade. - Moist, stiff below 1.68m - Trace hydrocarbons below 2.29m.	GB S2				35
			GB S3				36
1.0			GB S4				39
			GB S5				41
1.5			GB S6				38
			GB S7				43
2.0			GB S8				42
2.5							
3.0	96.95						

▲SPT N VALUE▲
20 40 60 80
PL MC LL
20 40 60 80
PP qu (kPa) Torvane
100 200 300 400

- Testhole ended at 3.05m below grade.
- Seepage at 2.90m below grade.
- No sloughing.
- Test hole backfilled with bentonite and auger cuttings.

WSP
1600 Buffalo Place
Winnipeg, MB R3T 6B8
Telephone: (204)-477-6650

TH-19

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contract 3 - Street Renewals
PROJECT NUMBER 18M-01969
PROJECT LOCATION Olive between Ness/Braintree
DATE STARTED 4/9/19 **COMPLETED** 4/9/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	MOISTURE CONTENT (%)
	99.92	ASPHALT - 75mm thick, intact.		
	99.80 99.77	CONCRETE - 125mm thick, intact.	GB S1	41
		GRANULAR FILL - Crushed limestone, 20 mm down.		
0.5		CLAY - Black, frozen, some silt and sand.	GB S2	34
		- 25.0% sand, 21.9% silt, 53.2% clay at 0.61m		
		- Brown, some silt, trace sand and fine gravel below 0.76m - Frost penetration to 1.68m below grade.	GB S3	35
1.0		- Moist, stiff below 1.68m.		
		- Firm to soft below 2.44m.	GB S4	39
			GB S5	38
1.5				
			GB S6	43
2.0			GB S7	43
			GB S8	42
2.5				
3.0	96.95			

BLOW COUNTS (N VALUE)
POCKET PEN. (kPa)
TORVANE (kPa)

▲SPT N VALUE▲
20 40 60 80
PL MC LL
20 40 60 80
PP qu (kPa) Torvane
100 200 300 400

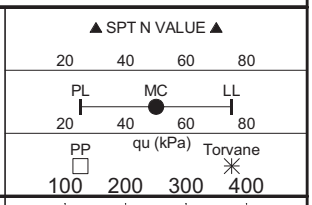
- Testhole ended at 3.05m below grade.
- No seepage.
- No sloughing.
- Test hole backfilled with bentonite and auger cuttings.

WSP
1600 Buffalo Place
Winnipeg, MB R3T 6B8
Telephone: (204)-477-6650

TH-20

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contract 3 - Street Renewals
PROJECT NUMBER 18M-01969
PROJECT LOCATION Olive between Ness/Braintree
DATE STARTED 4/9/19 **COMPLETED** 4/9/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	TORVANE (kPa)	MOISTURE CONTENT (%)
		99.95		ASPHALT - 50mm thick, intact.					
		99.90		CONCRETE - 50mm thick, partially intact.	GB S1				42
0.5				CLAY - Grey-black, moist to wet, stiff, some silt and sand. - Brown, frozen, trace silt, trace sand and fine gravel below 0.61. - Frost penetration to 1.52m below grade. - Moist, stiff below 1.52m.	GB S2				38
					GB S3				41
1.0					GB S4				40
1.5					GB S5				39
					GB S6				41
2.0					GB S7				48
					GB S8				43
2.5									
3.0		96.95		- Testhole ended at 3.05m below grade. - No seepage. - No sloughing. - Test hole backfilled with bentonite and auger cuttings.					



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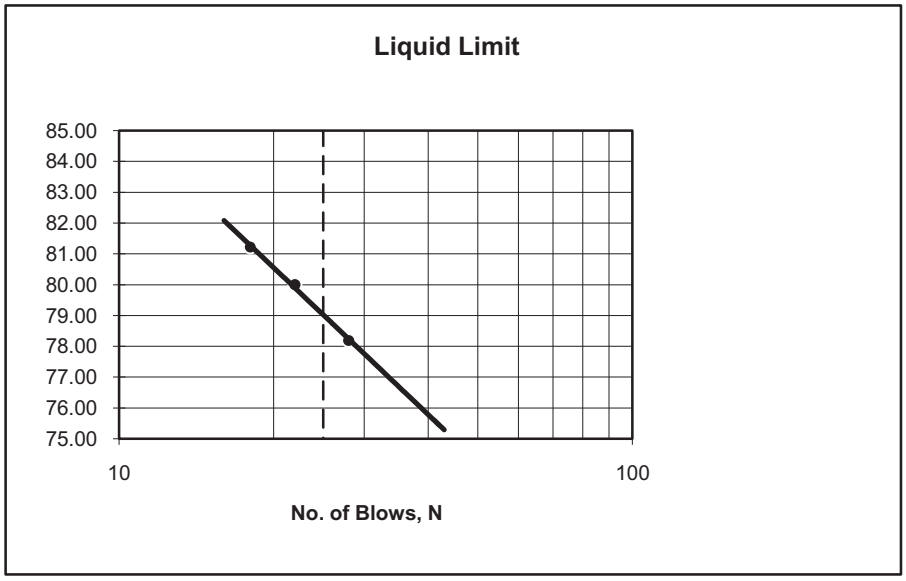
ATTERBERG LIMITS

CLIENT: WSP Canada Group Limited
1600 Buffalo Place
Winnipeg, MB R3T 6B8
ATTENTION: Dana Bredin
PROJECT: 18M-01969-00 Phase 802-1

PROJECT NO.: 103-1906
TEST NO.: 4
LAB NO.: HM 48-4

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	14.19	12.97	10.76		
Dry Soil + Dish:	9.96	9.17	7.82		
Moisture:	4.23	3.8	2.94		
Dish:	4.55	4.42	4.2		
Dry Soil:	5.41	4.75	3.62		
% Moisture:	78.19	80.00	81.22		
No. of Blows:	28	22	18		
Liquid Limits:	79.27	78.77	78.05		**79**



Material Identification:

T.H. No. **TH 19, S2**

Depth: **2'**

Liquid Limit, %: **79**
Plastic Limit, %: **34**
Plasticity Index: **45**
(LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	6.04	6.2	6.3		
Dry Soil + Dish:	5.58	5.68	5.78		
Moisture:	0.46	0.52	0.52		
Dish:	4.19	4.19	4.22		
Dry Soil:	1.39	1.49	1.56		
% Moisture:	33.09	34.90	33.33		
Average:					**34**

Test Method : *ASTM: D4318, D2216*
HMCL Tech: *Navi*
Date Tested: *23-Apr-19*

Reviewed by: Hermie Manalo

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Email: hmanalo@mts.net

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP Canada Group Limited	TEST NO:	19- 001	PROJECT NO:	103-1906
PROJECT:	18M-01969-00 - Phase 802-1	DATE SAMPLED:	8-Apr-2019	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	18-Apr-2019	TESTED BY:	Viet Linh
TEST LOCATION:	Phase 802-1				

Description	TH-19	TH-19	TH-19		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	124.60	121.20	126.20		
Wt Dry Sample + Tare	88.40	85.90	90.00		
Wt Water	36.20	35.30	36.20		
Wt Tare	4.20	4.10	4.20		
Wt Dry Sample	84.20	81.80	85.80		
Moisture Content (%)	**43.0**	**43.2**	**42.2**		

Description	TH-20	TH-20	TH-20	TH-20	TH-20
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	127.30	125.10	127.20	122.00	122.30
Wt Dry Sample + Tare	91.20	91.50	91.70	88.10	89.30
Wt Water	36.10	33.60	35.50	33.90	33.00
Wt Tare	4.30	4.10	4.20	4.20	4.40
Wt Dry Sample	86.90	87.40	87.50	83.90	84.90
Moisture Content (%)	**41.5**	**38.4**	**40.6**	**40.4**	**38.9**

Description	TH-20	TH-20	TH-20		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	124.60	125.30	122.70		
Wt Dry Sample + Tare	90.00	86.00	87.10		
Wt Water	34.60	39.30	35.60		
Wt Tare	4.20	4.30	4.20		
Wt Dry Sample	85.80	81.70	82.90		
Moisture Content (%)	**40.3**	**48.1**	**42.9**		

MTR/Disptach No: MTR 1005-1

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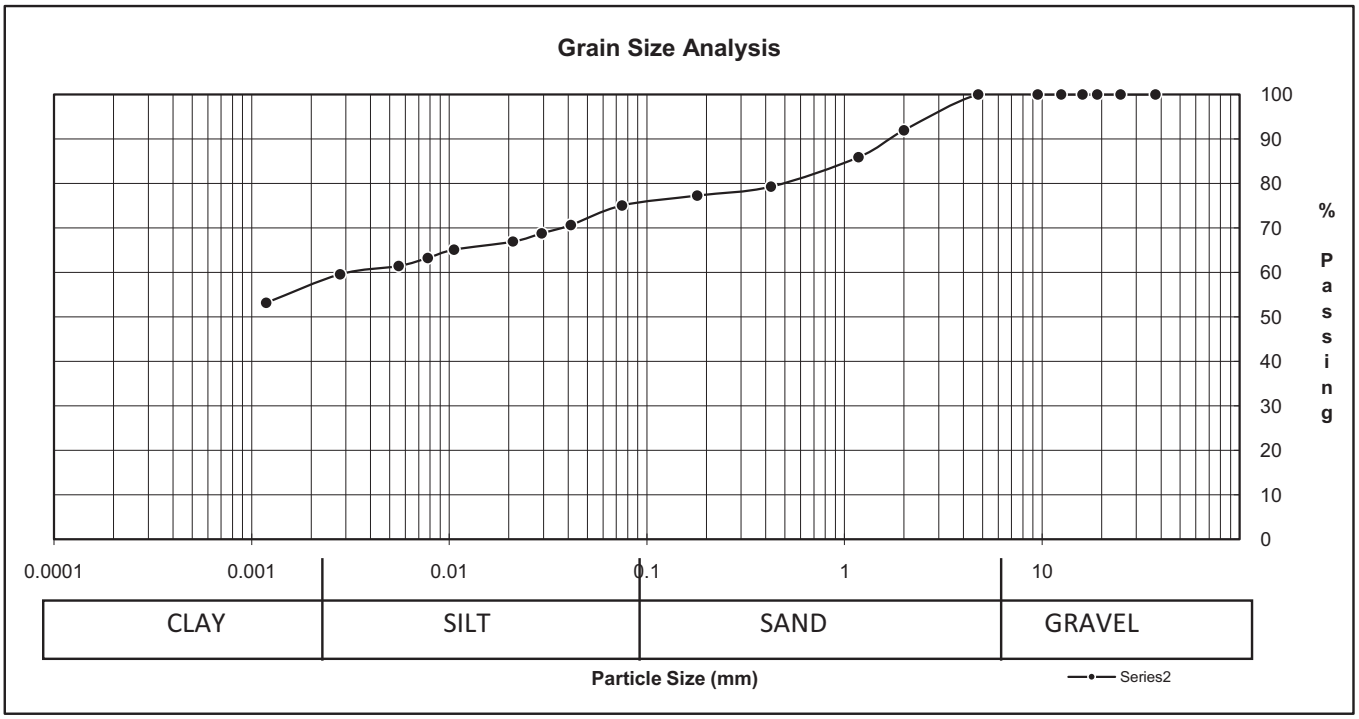
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	WSP	PROJECT NO.	103-1906
	1600 Buffalo Place	Test No:	4
	Winnipeg, MB R3T 6B8	Lab No:	HM 48-4P
ATTENTION:	Dana Bredin		
PROJECT:	18M-01969-00 Phase 802-1		

Date Sampled:	17-Apr-19	Date Received:	17-Apr-19
Sampled By:	Client	Date Tested:	18-Apr-19

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0413	70.6
9.50	100.0	0.0294	68.8
4.75	100.0	0.0210	66.9
2.00	91.9	0.0106	65.1
1.18	85.9	0.0078	63.3
0.425	79.3	0.0056	61.4
0.180	77.2	0.0028	59.6
0.075	75.0	0.0012	53.2

Material Identification
B.H./T.H. No. **TH 19, S2**
Sample No. **HM 48-4P**
Sample Source Various City Street
Specific Gravity of Material: 2.65



SOIL DESCRIPTION	% Composition		D10
		Gravel	D30
	25.0	Sand	D60
	21.9	Silt	Cu
	53.2	Clay	Cc

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: Navi

Reviewed by: Hermie Manalo

Figure 1 – TH-18 Olive Street

Figure 2 – TH-18A Olive Street

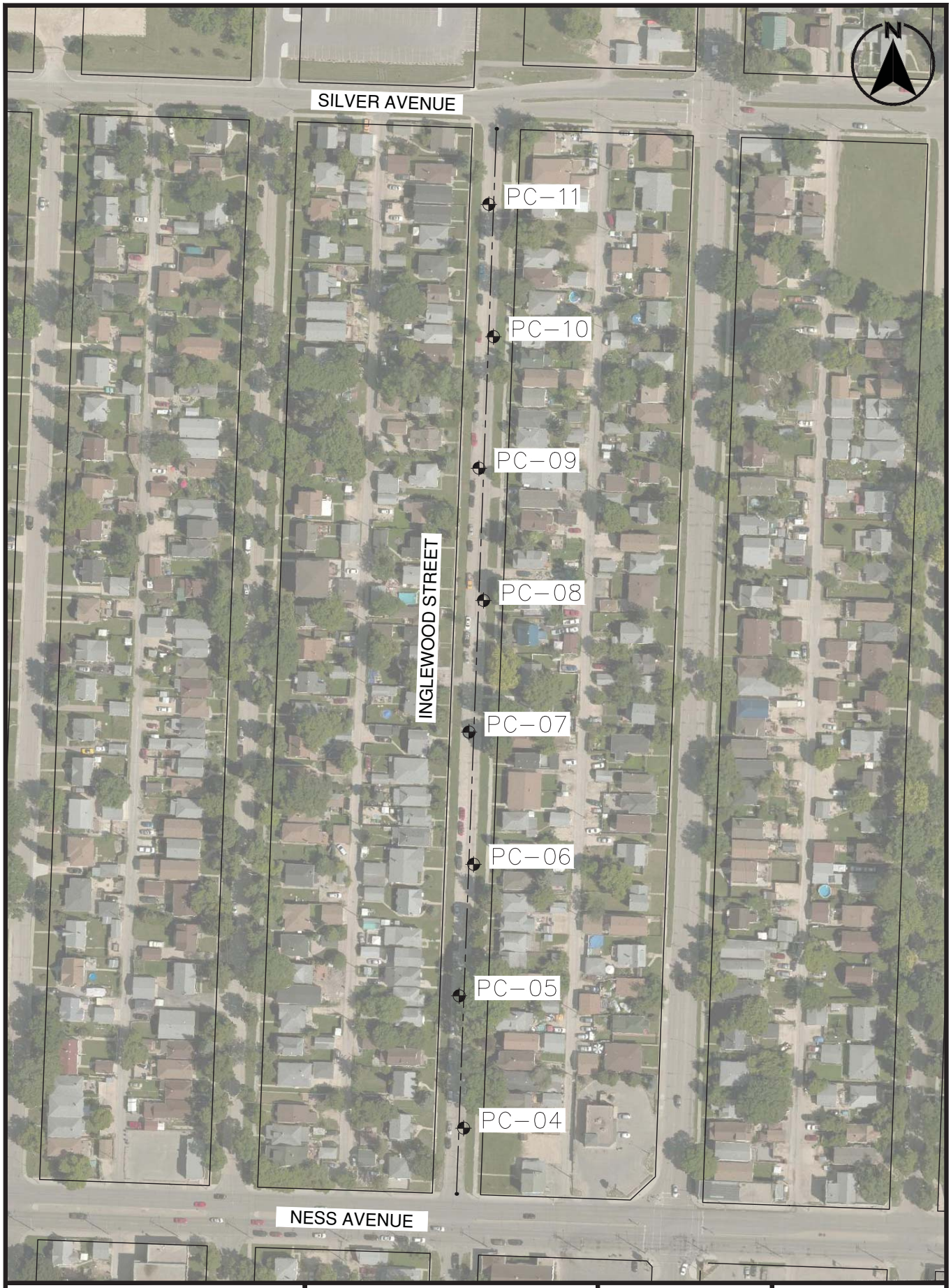
Figure 3 – TH-19 Olive Street

Figure 4 – TH-20 Olive Street

Figure 5 – TH-20A Olive Street

APPENDIX

D INGLEWOOD ST



wsp
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204–477–6650 FAX : 204–474–2864
WWW.WSPGROUP.COM

TITLE:
19–R–03 LOCAL STREETS
INGLEWOOD ST FROM
NESS AVE TO SILVER AVE

CORING LOCATIONS

SCALE: 1:2000

DATE: 2019/12/03

PROJECT NO: 18M–01969–00

REVISION: 0

DRAWING NO: B104

XREF

STAMP

Figure 1 – PC-04 Inglewood Street

Figure 2 – PC-05 Inglewood Street

Figure 3 – PC-06 Inglewood Street

Figure 4 – PC-07 Inglewood Street

Figure 5 – PC-08 Inglewood Street

Figure 6 – PC-09 Inglewood Street

Figure 7 – PC-10 Inglewood Street

Figure 8 – PC-11 Inglewood Street

APPENDIX

E WELLINGTON AVE

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WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

TITLE:
19-R-03 LOCAL STREETS
WELLINGTON AVE FROM
BANNING ST TO ARLINGTON ST

TESTHOLE LOCATIONS

SCALE:
1:1250

DATE:
2019/12/03

PROJECT NO:
18M-01969-00

REVISION:
0

DRAWING NO:
B105

XREF

STAMP

WSP
1600 Buffalo Place
Winnipeg, MB R3T 6B8
Telephone: (204)-477-6650

TH-01

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contract 3 - Street Renewals
PROJECT NUMBER 18M-01969-00
PROJECT LOCATION Wellington between Banning/Arlington
DATE STARTED 4/10/19 **COMPLETED** 4/10/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	MOISTURE CONTENT (%)
	99.82	CONCRETE - 175mm thick, partially intact		
	99.54	SILTY CLAY - Brown, frozen, silty, trace sand	GB S1	27
0.5		SILT - Tan-brown, frozen, some clay. - Frost penetration to 1.52m below grade. - Wet, soft, below 1.52 m	GB S2	28
			GB S3	22
1.0			GB S4	21
1.5			GB S5	21
			GB S6	24
	98.17	CLAY - Brown, moist, stiff, trace silt.	GB S7	39
2.0			GB S8	51
2.5				
3.0	96.95			

BLOW COUNTS (N VALUE)
POCKET PEN. (kPa)
TORVANE (kPa)

▲SPT N VALUE▲
20 40 60 80
PL MC LL
20 40 60 80
PP qu (kPa) Torvane
100 200 300 400

- Testhole ended at 3.05m below grade.
- Seepage at 1.83m below grade.
- No sloughing.
- Test hole backfilled with bentonite and auger cuttings.

WSP
1600 Buffalo Place
Winnipeg, MB R3T 6B8
Telephone: (204)-477-6650

TH-02

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contract 3 - Street Renewals
PROJECT NUMBER 18M-01969-00
PROJECT LOCATION Wellington between Banning/Arlington
DATE STARTED 4/10/19 **COMPLETED** 4/10/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	TORVANE (kPa)	MOISTURE CONTENT (%)
	99.87	ASPHALT - 125mm thick, intact.					
	99.75	CONCRETE - 125mm thick, intact					
		SILTY CLAY - Brown, frozen, silty, trace sand.	GB S1				41
0.5	99.54	- 10.2% sand, 43.7% silt, 46.1% clay at 0.3 m	GB S2				29
		SILT - Tan-brown, frozen, some clay. - Frost penetration to 1.52m below grade.	GB S3				33
1.0			GB S4				21
1.5	98.48		GB S5				22
		CLAY - Brown, moist, stiff, trace silt.	GB S6				40
2.0			GB S7				52
2.5			GB S8				55
3.0	96.95						

▲SPT N VALUE▲
20 40 60 80
PL MC LL
20 40 60 80
PP qu (kPa) Torvane
100 200 300 400

- Testhole ended at 3.05m below grade.
- No seepage.
- No sloughing.
- Test hole backfilled with bentonite and auger cuttings.

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TH-03

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contract 3 - Street Renewals
PROJECT NUMBER 18M-01969-00
PROJECT LOCATION Wellington between Banning/Arlington
DATE STARTED 4/10/19 **COMPLETED** 4/10/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	TORVANE (kPa)	MOISTURE CONTENT (%)
		99.92		ASPHALT - 75mm thick, intact.					
		99.82		CONCRETE - 100mm thick, intact	GB S1				33
0.5				SILT - Tan-brown, frozen, some clay. - Frost penetration to 1.37m below grade. - Dry below 1.37 m	GB S2				37
					GB S3				30
1.0					GB S4				24
1.5		98.48			GB S5				26
				- Testhole ended at 1.52m below grade due to proximity to utilities. - No seepage encountered. - Sloughing encountered at 1.37m below grade. - Test hole backfilled with bentonite and auger cuttings.	GB S6				
2.0					GB S7				
					GB S8				
2.5									
3.0									

▲SPT N VALUE▲
20 40 60 80
PL MC LL
20 40 60 80
PP qu (kPa) Torvane
100 200 300 400

WSP
1600 Buffalo Place
Winnipeg, MB R3T 6B8
Telephone: (204)-477-6650

TH-04

CLIENT City of Winnipeg
PROJECT NAME 19-R-03 - Contract 3 - Street Renewals
PROJECT NUMBER 18M-01969-00
PROJECT LOCATION Wellington between Banning/Arlington
DATE STARTED 4/10/19 **COMPLETED** 4/10/19
GROUND ELEVATION 100 m **HOLE SIZE** 125mm
DRILLING CONTRACTOR Maple Leaf Drilling
GROUND WATER LEVELS:
DRILLING METHOD Solid Stem Auger - B40 Truck Rig
AT TIME OF DRILLING ---
LOGGED BY Jason Dunn **CHECKED BY** Dana Bredin
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEV. (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	MOISTURE CONTENT (%)
	99.95	ASPHALT - 50mm thick, intact.		
	99.75	CONCRETE - 200mm thick, intact		
	99.54	CLAY - Brown, frozen, some silt.	GB S1	31
0.5		SILT - Tan-brown, frozen, some clay. - Frost penetration to 1.52m below grade. - Dry below 1.52 m	GB S2	23
			GB S3	22
1.0			GB S4	29
			GB S5	23
1.5			GB S6	35
	98.17	CLAY - Brown, moist, stiff, some silt.		
2.0			GB S7	50
			GB S8	55
2.5				
3.0	96.95			

BLOW COUNTS (N VALUE)
POCKET PEN. (kPa)
TORVANE (kPa)

▲SPT N VALUE▲
20 40 60 80
PL MC LL
20 40 60 80
PP □ qu (kPa) Torvane ✳
100 200 300 400

- Testhole ended at 3.05m below grade.
- No seepage.
- No sloughing.
- Test hole backfilled with bentonite and auger cuttings.

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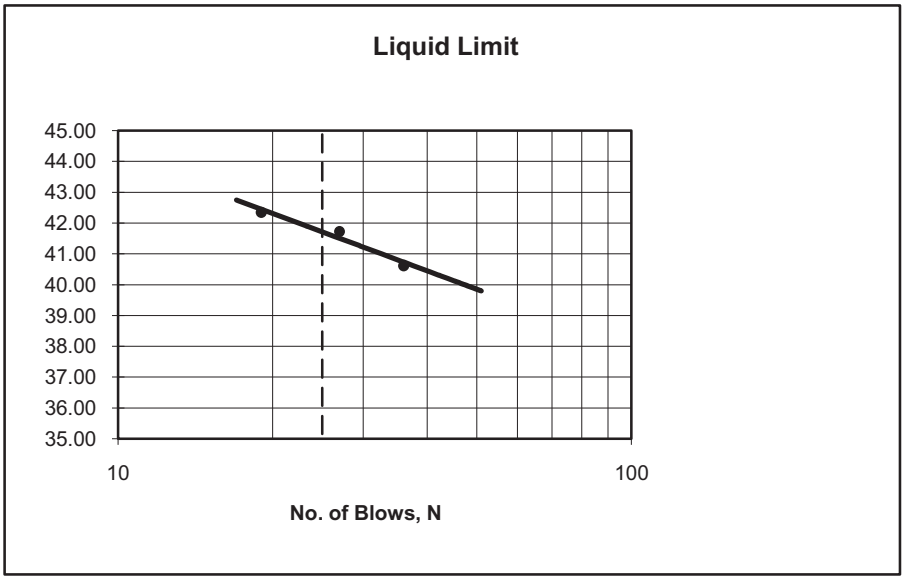
ATTERBERG LIMITS

CLIENT: WSP Canada Group Limited
1600 Buffalo Place
Winnipeg, MB R3T 6B8
ATTENTION: Dana Bredin
PROJECT: 18M-01969-00 Phase 802-1

PROJECT NO.: 103-1906
TEST NO.: 5
LAB NO.: HM 48-5

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	12.99	13.27	10.87		
Dry Soil + Dish:	10.46	10.65	9.21		
Moisture:	2.53	2.62	1.66		
Dish:	4.23	4.37	5.29		
Dry Soil:	6.23	6.28	3.92		
% Moisture:	40.61	41.72	42.35		
No. of Blows:	36	27	19		
Liquid Limits:	42.44	42.11	40.96		**42**



Material Identification:

T.H. No. **TH 02-02, S1**

Depth: **1'**

Liquid Limit, %: **42**
Plastic Limit, %: **23**
Plasticity Index: **19**
(LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	6.58	6.06	6.33		
Dry Soil + Dish:	6.18	5.85	6		
Moisture:	0.4	0.21	0.33		
Dish:	4.4	4.83	4.66		
Dry Soil:	1.78	1.02	1.34		
% Moisture:	22.47	20.59	24.63		
Average:					**23**

Test Method : *ASTM: D4318, D2216*
HMCL Tech: *Navi*
Date Tested: *23-Apr-19*

Reviewed by: Hermie Manalo

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MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP Canada Group Limited	TEST NO:	19- 002	PROJECT NO:	103-1906
PROJECT:	18M-01969-00 - Phase 802-1	DATE SAMPLED:	8-Apr-2019	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	19-Apr-2019	TESTED BY:	Viet Linh
TEST LOCATION:	Phase 802-1				

Description	TH-01-02	TH-01-02	TH-01-02	TH-01-02	TH-01-02
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	126.70	123.20	124.10	126.60	123.20
Wt Dry Sample + Tare	100.80	97.10	102.30	105.00	102.50
Wt Water	25.90	26.10	21.80	21.60	20.70
Wt Tare	4.20	4.40	4.00	4.20	4.10
Wt Dry Sample	96.60	92.70	98.30	100.80	98.40
Moisture Content (%)	**26.8**	**28.2**	**22.2**	**21.4**	**21.0**

Description	TH-01-02	TH-01-02	TH-01-02		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	126.70	126.00	121.50		
Wt Dry Sample + Tare	103.00	92.10	81.80		
Wt Water	23.70	33.90	39.70		
Wt Tare	4.30	4.20	4.40		
Wt Dry Sample	98.70	87.90	77.40		
Moisture Content (%)	**24.0**	**38.6**	**51.3**		

Description	TH-02-02	TH-02-02	TH-02-02	TH-02-02	TH-02-02
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	462.40	123.50	122.30	127.70	126.20
Wt Dry Sample + Tare	331.20	97.00	93.20	106.60	104.40
Wt Water	131.20	26.50	29.10	21.10	21.80
Wt Tare	14.00	4.20	4.10	4.20	4.20
Wt Dry Sample	317.20	92.80	89.10	102.40	100.20
Moisture Content (%)	**41.4**	**28.6**	**32.7**	**20.6**	**21.8**

Description	TH-02-02	TH-02-02	TH-02-02		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	124.00	122.00	122.00		
Wt Dry Sample + Tare	89.70	81.90	80.10		
Wt Water	34.30	40.10	41.90		
Wt Tare	4.30	4.50	4.30		
Wt Dry Sample	85.40	77.40	75.80		
Moisture Content (%)	**40.2**	**51.8**	**55.3**		

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MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP Canada Group Limited	TEST NO:	19- 002	PROJECT NO:	103-1906
PROJECT:	18M-01969-00 - Phase 802-1	DATE SAMPLED:	8-Apr-2019	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	19-Apr-2019	TESTED BY:	Viet Linh
TEST LOCATION:	Phase 802-1				

Description	TH-03-02	TH-03-02	TH-03-02	TH-03-02	TH-03-02
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	123.10	124.00	124.60	126.90	123.70
Wt Dry Sample + Tare	93.70	91.90	97.10	103.50	99.40
Wt Water	29.40	32.10	27.50	23.40	24.30
Wt Tare	4.30	4.20	4.40	4.20	4.40
Wt Dry Sample	89.40	87.70	92.70	99.30	95.00
Moisture Content (%)	**32.9**	**36.6**	**29.7**	**23.6**	**25.6**

Description	TH-04-02	TH-04-02	TH-04-02	TH-04-02	TH-04-02
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	126.40	122.50	122.80	123.50	124.60
Wt Dry Sample + Tare	97.60	100.10	101.30	96.50	101.80
Wt Water	28.80	22.40	21.50	27.00	22.80
Wt Tare	4.20	4.30	4.20	4.30	4.20
Wt Dry Sample	93.40	95.80	97.10	92.20	97.60
Moisture Content (%)	**30.8**	**23.4**	**22.1**	**29.3**	**23.4**

Description	TH-04-02	TH-04-02	TH-04-02		
Sample	S6	S7	S8		
Wt Wet Sample + Tare	123.20	123.30	127.00		
Wt Dry Sample + Tare	92.20	83.60	83.60		
Wt Water	31.00	39.70	43.40		
Wt Tare	4.10	4.20	4.20		
Wt Dry Sample	88.10	79.40	79.40		
Moisture Content (%)	**35.2**	**50.0**	**54.7**		

Description	TH-05-02	TH-05-02	TH-05-02	TH-05-02	TH-05-02
Sample	S1	S2	S3	S4	S5
Wt Wet Sample + Tare	127.40	123.30	124.70	123.20	123.50
Wt Dry Sample + Tare	97.00	103.80	99.60	96.80	92.20
Wt Water	30.40	19.50	25.10	26.40	31.30
Wt Tare	4.10	4.10	4.20	4.40	4.20
Wt Dry Sample	92.90	99.70	95.40	92.40	88.00
Moisture Content (%)	**32.7**	**19.6**	**26.3**	**28.6**	**35.6**

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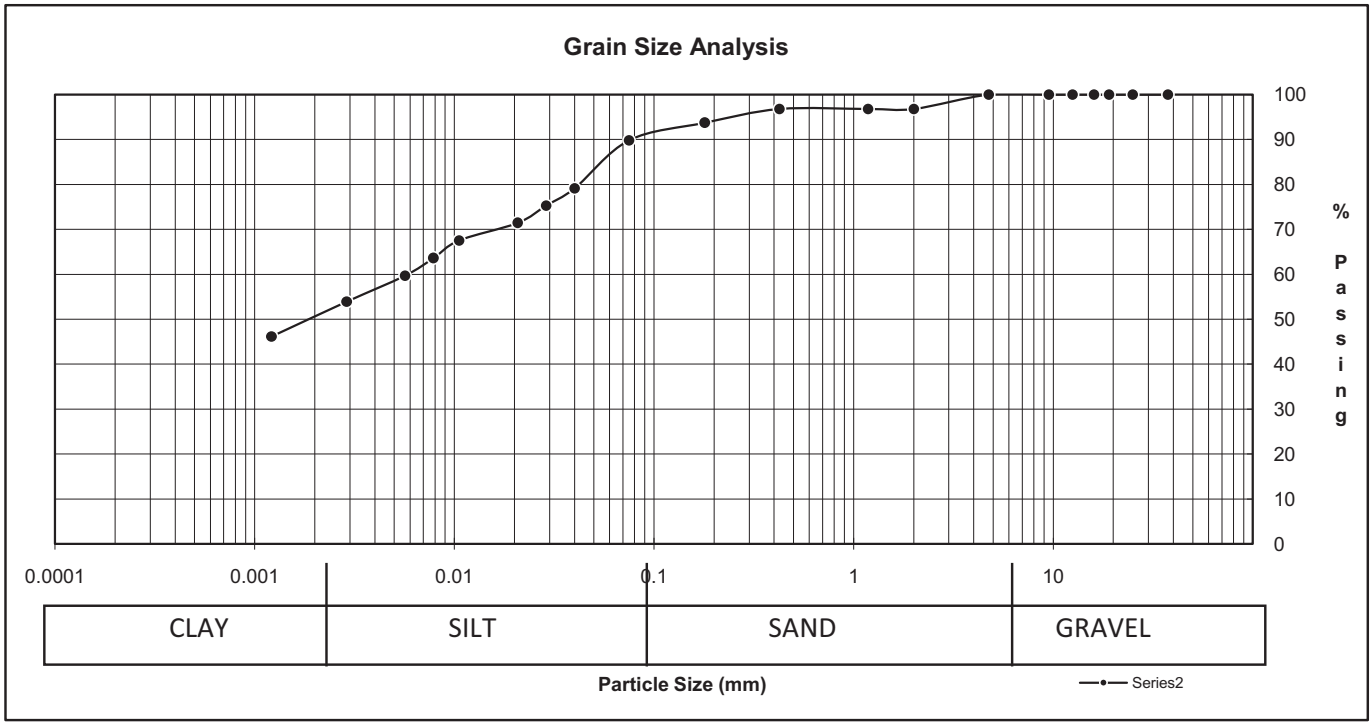
PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT:	WSP	PROJECT NO.	103-1906
	1600 Buffalo Place	Test No:	5
	Winnipeg, MB R3T 6B8	Lab No:	HM 48-5P
ATTENTION:	Dana Bredin		
PROJECT:	18M-01969-00 Phase 802-1		

Date Sampled:	17-Apr-19	Date Received:	17-Apr-19
Sampled By:	Client	Date Tested:	18-Apr-19

Material Identification	
B.H./T.H. No.	**TH 02-02, S1**
Sample No.	**HM 48-5P**
Sample Source	Various City Street
Specific Gravity of Material:	2.65

Sieve Analysis		Hydrometer Analysis	
Sieve (mm)	% Passing	Diameter	% Finer
50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0400	79.2
9.50	100.0	0.0288	75.3
4.75	100.0	0.0207	71.4
2.00	96.8	0.0105	67.5
1.18	96.8	0.0079	63.6
0.425	96.8	0.0057	59.7
0.180	93.7	0.0029	53.9
0.075	89.8	0.0012	46.1



SOIL DESCRIPTION	% Composition			
		Gravel	D10	
	10.2	Sand	D30	
	43.7	Silt	D60	0.00560
	46.1	Clay	Cu	
			Cc	

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: Navi

Reviewed by: Hermie Manalo

Figure 1 – TH-01 Wellington Avenue

Figure 2 – TH-02 Wellington Avenue

Figure 3 – TH-03 Wellington Avenue

Figure 4 – TH-03A Wellington Avenue

Figure 5 – TH-04 Wellington Avenue

APPENDIX

F PALLISER AVE

wsp
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

TITLE:
19–R–03 LOCAL STREETS
PALLISER AVE FROM
MT ROYAL RD

CORING LOCATIONS

SCALE:
1:1250

DATE:
2019/12/03

PROJECT NO:
18M–01969–00

REVISION:
0

DRAWING NO:
B106

XREF

STAMP

Figure 1 – PC-12 Palliser Avenue

Figure 2 – PC-13 Palliser Avenue

Figure 3 – PC-14 Palliser Avenue

Figure 4 – PC-15 Palliser Avenue

Figure 5 – PC-16 Palliser Avenue