

CITY OF WINNIPEG

2018 ALLEY RENEWALS - LOCAL IMPROVEMENTS GEOTECHNICAL REPORT

MARCH 09, 2018





2018 ALLEY RENEWALS LOCAL IMPROVEMENTS GEOTECHNICAL REPORT

CITY OF WINNIPEG

FINAL REPORT

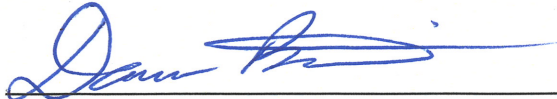
PROJECT NO.: 17M-02285-00
DATE: MARCH 09, 2018

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1 INTRODUCTION

A geotechnical investigation was conducted by WSP Canada Inc. for the proposed 2018 Alley Renewals – Local Improvements Project in Winnipeg, Manitoba. The purpose of this investigation was to assess the general subsurface conditions with respect to identifying the existing pavement structure and the underlying soil profile.

Five alleys were drilled, which includes the following alleys:

- A. Alleys bounded by Dumoulin St and Notre Dame St, Archibald St and La Fleche St
- B. North/south alley between Lawndale Ave and Ferndale Ave from Highfield St to Coniston St
- C. Alleys bounded by Tache Ave and Crawford Ave, Coniston St and Lyndale Dr
- D. Alleys bounded by Lloyd St and Gauvin St, Coniston St and Lyndale Dr
- E. Alleys bounded by Bronstone Blvd, West Ferndale Ave and St. Mary's Rd

2 SUB-SURFACE INVESTIGATION AND TESTING

The field investigation was undertaken on February 15, 2018 and was completed on February 16, 2018. A total of 15 test holes were completed by Maple Leaf Drilling. The test holes were drilled to a depth of 3.05 m below the road surface using a truck-mounted CME 55 rig equipped with a 125 mm auger, as well as a truck-mounted B-40 rig also equipped with a 125 mm auger. All test holes were backfilled with auger cuttings and bentonite after the completion of the drilling. Testhole locations are noted on the testhole logs and within the test hole summary tables.

The soils encountered were visually classified to the full extent of the test hole. Representative soil samples were recovered at regular intervals, every 0.3 m to 2.1 m as well as one sample at 3.0 m. All of the soil samples were tested for their moisture contents and selected soil samples were submitted for grain size analysis (minimum one per alley). No groundwater seepage or sloughing was encountered in the test holes during drilling.

Detailed descriptions of the soil profiles for each test hole are included on the logs in Appendix A. The material test results are included in Appendix B. The locations of the testholes are included in Appendix C.

3 TESTHOLE SUMMARY TABLES

Table 3-1 - Dumoulin/Notre Dame Alley

TEST HOLE NO.	TESTHOLE LOCATION	PAVEMENT SURFACE		SOIL DESCRIPTION	BOREHOLE DEPTH (m)	No. of Samples Taken
		Type	Thickness (mm)			
A-TH1	635851.6 m E; 5528916.6 m N CL of Alley behind 479 Dumoulin St	Granular Fill	150	Fill/Silt/Clay	3.05	8
A-TH2	635902.6 m E; 5528935.0 m N CL of Alley behind 489 Dumoulin St	Granular Fill	300	Fill/Silt/Clay	3.05	8
A-TH3	635939.6 m E; 5528947.5 m N CL of Alley behind 505 Dumoulin St	Sand Fill	300	Fill/Silt/Clay	3.05	8

Table 3-2 - Lawndale/Ferndale Alley

TEST HOLE NO.	TESTHOLE LOCATION	PAVEMENT SURFACE		SOIL DESCRIPTION	BOREHOLE DEPTH (m)	No. of Samples Taken
		Type	Thickness (mm)			
B-TH1	634503.0 m E; 5526429.1 m N CL of Alley behind 114 Lawndale Ave	Granular Fill	100	Fill/Silty Clay	3.05	8
B-TH2	634501.3 m E; 5526378.0 m N CL of Alley behind 102 Lawndale Ave	Granular Fill	100	Fill/Silty Clay	3.05	8
B-TH3	634500.2 m E; 5526303.8 m N CL of Alley behind 80 Lawndale Ave	Granular Fill	150	Fill/Silty Clay	3.05	8

Table 3-3 - Tache/Crawford Alley

TEST HOLE NO.	TESTHOLE LOCATION	PAVEMENT SURFACE		SOIL DESCRIPTION	BOREHOLE DEPTH (m)	No. of Samples Taken
		Type	Thickness (mm)			
C-TH1	634896.3 m E; 5526262.3 m N CL of Alley behind 72 Tache Ave	Sand Fill	300	Fill/Silt/Clay	3.05	8
C-TH2	634896.2 m E; 5526198.3 m N CL of Alley behind 56 Tache Ave	Sand Fill	450	Clay/Silt/Clay	3.05	8
C-TH3	634875.9 m E; 5526152.9 m N CL of Alley behind 543 Lyndale Dr	Sand Fill	300	Fill/Silt/Clay	3.05	8

Table 3-4 - Lloyd/Gauvin Alley

TEST HOLE NO.	TESTHOLE LOCATION	PAVEMENT SURFACE		SOIL DESCRIPTION	BOREHOLE DEPTH (m)	No. of Samples Taken
		Type	Thickness (mm)			
D-TH1	635169.9 m E; 5526297.4 m N CL of Alley behind 75 Lloyd St	Granular Fill	100	Fill (silty)/Clay	3.05	8
D-TH2	635230.5 m E; 5526226.4 m N CL of Alley behind 53 Lloyd St	Granular Fill	150	Fill (silty)/Clay	3.05	8
D-TH3	635300.2 m E; 5526185.1 m N CL of Alley behind 669 Lyndale Dr	Granular Fill	100	Fill (silty)/ Clay/Silt/ Clay	3.05	8

Table 3-5 - Bronstone/West Ferndale Alley

TEST HOLE NO.	TESTHOLE LOCATION	PAVEMENT SURFACE		SOIL DESCRIPTION	BOREHOLE DEPTH (m)	No. of Samples Taken
		Type	Thickness (mm)			
E-TH1	635472.1 m E; 5523309.2 m N North side of Alley behind 36 Bronstone Blvd	Granular Fill	100	Fill/Clay	3.05	8
E-TH2	635534.3 m E; 5523341.0 m N South side of Alley behind 28 Bronstone Blvd	Granular Fill Sand Fill	100 200	Clay/Silt/Clay	3.05	8
E-TH3	635626.8 m E; 5523394.1 m N CL of Alley behind 14 Bronstone Blvd	Granular Fill	150	Fill/Silt/Clay	3.05	8

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

TESTHOLE LOGS





WSP
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A-TH1

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CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Notre Dame/Dumoulin Alley

DATE STARTED 2/15/18 COMPLETED 2/15/18

GROUND ELEVATION _____ HOLE SIZE 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - CME

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin CHECKED BY Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of alley: 635851.6 m E, 5528916.6 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				GRANULAR FILL								
0.5				FILL - Clayey, grey, trace sand and f. gravel	GB 1			35				
					GB 2			49				
1.0				SILT (ML) - Tan-brown, frozen	GB 3			30				
				- 72.0% silt; 26.6% clay; 1.4% sand at 0.9 m	GB 4			26				
1.5				- Frost to 1.5 m - Clayey, soft, moist below 1.5 m	GB 5			27				
2.0				CLAY (CH) - Brown, stiff, moist, trace silt inclusions	GB 6			33				
					GB 7			42				
2.5				- Silty, trace oxidation at 2.4 m								
3.0					GB 10			45				

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite



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A-TH2

PAGE 1 OF 1

CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Notre Dame/Dumoulin Alley

DATE STARTED 2/15/18 **COMPLETED** 2/15/18

GROUND ELEVATION **HOLE SIZE** 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - CME

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin **CHECKED BY** Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of alley: 635902.6 m E, 5528935.0 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				GRANULAR FILL - Sand and gravel above 0.15 m - Sandy, silty, trace f. gravel, brown below 0.15 m	GB 1			11				
0.5				FILL - Clayey, grey, trace sand and f. gravel	GB 2			35				
				SILT (ML) - Tan-brown	GB 3			35				
1.0					GB 4			27				
				- Frost to 1.35 m - Soft, moist below 1.35 m	GB 5			24				
1.5				CLAY (CH) - Brown, stiff, moist, trace silt inclusions	GB 6			42				
2.0					GB 7			46				
2.5												
3.0					GB 10			41				

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite



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A-TH3

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CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Notre Dame/Dumoulin Alley

DATE STARTED 2/15/18 **COMPLETED** 2/15/18

GROUND ELEVATION **HOLE SIZE** 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - CME

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin **CHECKED BY** Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of alley: 635939.6 m E, 5528947.5 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									PL	MC	LL	
									20	40	60	80
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				SAND FILL - Sandy, silty, trace f. gravel, brown	GB 1			6				
0.5				FILL - Grey, clayey, silty, trace sand below 0.3 m	GB 2			45				
				SILT (ML) - Tan-brown	GB 3			27				
1.0					GB 4			26				
				- Frost to 1.35 m - Soft, moist below 1.35 m	GB 5			23				
1.5				CLAY (CH) - Brown, stiff, moist, trace silt inclusions	GB 6			35				
2.0					GB 7			38				
2.5												
3.0				- Silt pocket from 2.7 m to 3.0 m	GB 10			52				

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite



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B-TH1

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CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Lawndale/Ferndale Alley

DATE STARTED 2/16/18 **COMPLETED** 2/16/18

GROUND ELEVATION _____ **HOLE SIZE** 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin **CHECKED BY** Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of alley: 634503.0 m E, 5526429.1 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				GRANULAR FILL								
				FILL								
				- Clayey, grey, trace sand and f. gravel above 0.3 m	GB 1			29				
				- Clay mixed with some silt, brown below 0.3 m								
0.5					GB 2			28				
				SILTY CLAY								
				- Brown, clay stratified with silt seams	GB 3			27				
1.0					GB 4			30				
				- 49.5% silt; 48.7% clay; 1.8% sand at 1.2 m								
1.5				- Frost to 1.35 m	GB 5			30				
				- Stiff to firm, moist, frequent silt inclusions below 1.35 m								
2.0					GB 6			30				
					GB 7			29				
2.5												
3.0					GB 10			30				

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite



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CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Lawndale/Ferndale Alley

DATE STARTED 2/16/18 **COMPLETED** 2/16/18

GROUND ELEVATION **HOLE SIZE** 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin **CHECKED BY** Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of alley: 634501.3 m E, 5526378.0 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				GRANULAR FILL								
				FILL								
				- Clayey, grey-black, trace sand and f. gravel	GB 1			30				
0.5					GB 2			31				
				SILTY CLAY	GB 3			28				
1.0				- Brown, clay stratified with silt seams	GB 4			28				
					GB 5			28				
1.5				- Frost to 1.35 m								
				- Firm to stiff, moist, frequent silt inclusions below 1.35 m	GB 6			27				
2.0					GB 7			28				
2.5												
3.0					GB 10			29				

- Testhole open to bottom after completion
- Backfilled with auger cutting and bentonite



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B-TH3

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CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Lawndale/Ferndale Alley

DATE STARTED 2/16/18 **COMPLETED** 2/16/18

GROUND ELEVATION **HOLE SIZE** 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin **CHECKED BY** Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of alley: 634500.2 m E, 5526303.8 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				GRANULAR FILL								
0.5				FILL - Clayey, grey-brown, trace of sand	GB 1			31				
					GB 2			32				
1.0				SILTY CLAY - Brown, clay stratified with silt seams	GB 3			29				
					GB 4			30				
1.5				- Frost to 1.35 m - Firm to stiff, moist, frequent silt inclusions below 1.35 m	GB 5			31				
					GB 6			31				
2.0					GB 7			31				
2.5												
3.0					GB 10			30				

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite



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C-TH1

PAGE 1 OF 1

CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Tache/Crawford Lane

DATE STARTED 2/16/18 COMPLETED 2/16/18

GROUND ELEVATION _____ HOLE SIZE 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin CHECKED BY Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of alley: 634896.3 m E, 5526262.3 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				SAND FILL - Sandy, silty, trace f. gravel, brown	GB 1			17				
0.5				FILL - Clayey, mixed with silt, grey	GB 2			29				
				SILTY CLAY - Clay stratified with silt, brown	GB 3			32				
1.0					GB 4			34				
				SILT (ML) - Tan-brown, some clay	GB 5			28				
1.5				- Frost to 1.5 m - Soft, moist below 1.5 m								
					GB 6			24				
2.0												
				CLAY (CH) - Brown, stiff, moist	GB 7			33				
2.5												
3.0					GB 10			46				

- Testhole open to 2.1 m after completion
- Backfilled with auger cuttings and bentonite



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C-TH2

PAGE 1 OF 1

CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Tache/Crawford Lane

DATE STARTED 2/16/18 COMPLETED 2/16/18

GROUND ELEVATION HOLE SIZE 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin CHECKED BY Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of alley: 634896.2 m E, 5526198.3 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲ PL MC LL 20 40 60 80 20 40 60 80 Su (kPa) Field Vane PP 100 200 300 400
0.5				SAND FILL - Sandy, silty, trace f. gravel, brown	GB 1			7	
					GB 2			17	
1.0				CLAY (CH) - Grey, fissured	GB 3			37	
					GB 4			43	
1.5				SILT (ML) - Tan-brown, some clay	GB 5			25	
				- Frost to 1.5 m - Soft, moist below 1.5 m					
2.0				CLAY (CH) - Brown, stiff, moist, trace silt inclusions	GB 6			29	
					GB 7			35	
2.5									
3.0					GB 10			47	

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite



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C-TH3

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CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Tache/Crawford Lane

DATE STARTED 2/16/18 **COMPLETED** 2/16/18

GROUND ELEVATION **HOLE SIZE** 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin **CHECKED BY** Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of alley: 634875.9 m E, 5526152.9 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				SAND FILL - Sandy, silty, trace f. gravel, brown	GB 1			8				
0.5				FILL - Clayey, trace sand and f. gravel, grey - Clay mixed with silt below 0.6 m	GB 2			33				
1.0				- 50.2% silt; 48.6% clay, 1.2% sand at 0.9 m	GB 3			31				
1.5				SILT (ML) - Tan-brown, clayey	GB 4			23				
				- Frost 1.5 m - Firm to soft, moist	GB 5			21				
2.0				CLAY (CH) - Brown, stiff, moist, trace silt inclusions	GB 6			31				
					GB 7			35				
2.5												
3.0				- Silty, trace oxidation at 2.9 m	GB 10			46				

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite

GENERAL BH PLOTS - WSP ALLEY RENEWALS LI TACHE/GPJ GINT STD CANADA.GDT 3/12/18



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D-TH1

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CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Lloyd/Gaudin Alley

DATE STARTED 2/16/18 **COMPLETED** 2/16/18

GROUND ELEVATION **HOLE SIZE** 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin **CHECKED BY** Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of Alley: 635169.9 m E, 5526297.4 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				GRANULAR FILL								
				FILL								
				- Silty, sandy, trace f. gravel, brown-black	GB 1			13				
0.5					GB 2			23				
				CLAY (CH)								
				- Grey, fissured	GB 3			34				
1.0					GB 4			34				
					GB 5			35				
1.5				- Frost 1.5 m								
				- Stiff, moist, trace silt inclusions below 1.5 m	GB 6			32				
2.0					GB 7			31				
2.5				- Mottled grey and brown below 2.4 m								
3.0				- Silty, brown below 2.7 m	GB 10			28				

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite



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CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Lloyd/Gaudin Alley

DATE STARTED 2/16/18 **COMPLETED** 2/16/18

GROUND ELEVATION **HOLE SIZE** 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin **CHECKED BY** Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of Alley: 635230.5 m E, 5526226.4 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				GRANULAR FILL								
				FILL	GB 1			14				
				- Silty, sandy, trace f. gravel, brown								
0.5				- 62.8% silt, 28.6% sand, 8.6% clay at 0.6 m	GB 2			29				
				CLAY (CH)								
				- Grey, fissured	GB 3			35				
1.0					GB 4			35				
					GB 5			36				
1.5				- Frost to 1.5 m								
				- Stiff, moist, trace silt inclusions below 1.5 m	GB 6			33				
2.0					GB 7			35				
				- Brown below 2.4 m								
2.5												
				- Silty from 2.7 m to 3.05 m	GB 10			25				
3.0												

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite



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PAGE 1 OF 1

CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Lloyd/Gaudin Alley

DATE STARTED 2/16/18 **COMPLETED** 2/16/18

GROUND ELEVATION **HOLE SIZE** 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin **CHECKED BY** Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of Alley: 635300.2 m E, 5526185.1 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				GRANULAR FILL								
				FILL								
				- Silty, sandy, trace f. gravel, brown-black	GB 1			26				
				- Clayey, grey-black below 0.3 m								
0.5					GB 2			33				
				CLAY (CH)								
				- Grey, fissured	GB 3			33				
1.0					GB 4			33				
				- Frost to 1.5 m	GB 5			33				
1.5												
				SILT (ML)								
				- Tan-brown, soft, moist, trace f. gravel								
				CLAY (CH)	GB 6			38				
2.0				- Mottled grey and brown, stiff, moist								
					GB 7			39				
2.5												
				- Silty, brown, trace oxidation below 2.55 m								
3.0					GB 10			41				

- Testhole open to 2.7 m after completion
- Backfilled with auger cuttings and bentonite



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E-TH1

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CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Bronstone/West Ferndale Alley

DATE STARTED 2/16/18 COMPLETED 2/16/18

GROUND ELEVATION _____ HOLE SIZE 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin CHECKED BY Silvestre Urbano

AT END OF DRILLING ---

NOTES N. side of alley: 635472.1 m E, 5523309.2 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									20	40	60	80
									PL	MC	LL	
									20	40	60	80
									PP	Su (kPa)	Field Vane	
									100	200	300	400
				GRANULAR FILL								
				FILL								
				- Clayey, trace sand and f. gravel, grey-black	GB 1			36				
0.5					GB 2			37				
				CLAY (CH)	GB 3			35				
1.0				- Grey, fissured	GB 4			35				
				- Frost to 1.35 m	GB 5			36				
1.5				- Stiff, moist below 1.35 m								
				- Silt seam at 1.8 m	GB 6			42				
2.0				- Brown, trace silt inclusions below 1.8 m	GB 7			43				
2.5												
3.0					GB 10			46				

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite

CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Bronstone/West Ferndale Alley

DATE STARTED 2/16/18 **COMPLETED** 2/16/18

GROUND ELEVATION _____ **HOLE SIZE** 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin **CHECKED BY** Silvestre Urbano

AT END OF DRILLING _____

NOTES S. side of alley: 635534.3 m E, 5523341.0 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲			
									PL 20 40 60 80 MC LL Su (kPa) Field Vane			
									PP 100 200 300 400 *			
				GRANULAR FILL								
				SAND FILL - Sandy, silty, trace f. gravel, brown	Hand GB 1			9	●			
0.5				CLAY (CH) - Grey, fissured	Hand GB 2			30		●		
1.0					Hand GB 3			43			●	
1.5				SILT (ML) - Tan-brown, frozen - Clayey above 1.2 m	Hand GB 4			27		●		
				- Frost to 1.5 m	Hand GB 5			18	●			
2.0				CLAY (CH) - Grey, stiff, moist	Hand GB 6			42			●	
2.5				- Silt seam, trace oxidation at 2.25 m - Brown, trace silt inclusions below 2.25 m	Hand GB 7			43			●	
3.0					Hand GB 10			49			●	

- Testhole open to bottom after completion
- Backfilled with auger cutting and bentonite



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E-TH3

PAGE 1 OF 1

CLIENT City of Winnipeg

PROJECT NAME 2018 Alley Renewals - Local Improvements

PROJECT NUMBER 17M-02285-00

PROJECT LOCATION Bronstone/West Ferndale Alley

DATE STARTED 2/16/18 COMPLETED 2/16/18

GROUND ELEVATION HOLE SIZE 125 mm

DRILLING CONTRACTOR Maple Leaf Drilling

GROUND WATER LEVELS:

DRILLING METHOD Solid Stem Auger - B40 Truck Rig

AT TIME OF DRILLING ---

LOGGED BY Dana Bredin CHECKED BY Silvestre Urbano

AT END OF DRILLING ---

NOTES CL of alley: 635626.8 m E, 5523394.1 m N

AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEV. (m)	WATER LEVEL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	▲ SPT N VALUE ▲ 20 40 60 80 PL MC LL 20 40 60 80 PP Su (kPa) Field Vane 100 200 300 400
				GRANULAR FILL					
0.5				FILL - Clayey, trace sand and f. gravel, grey-black	GB 1			31	
					GB 2			30	
1.0				SILT (ML) - Tan-brown - 83.2 % silt; 15.6 % clay; 1.2% sand at 0.9 m	GB 3			28	
					GB 4			22	
1.5				- Frost to 1.35 m - Soft, moist below 1.35 m - Clayey below 1.5 m	GB 5			21	
2.0				CLAY (CH) - Brown, stiff, moist	GB 6			30	
					GB 7			39	
2.5									
3.0					GB 10			49	

- Testhole open to bottom after completion
- Backfilled with auger cuttings and bentonite

APPENDIX

B

MATERIAL TESTING RESULTS

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

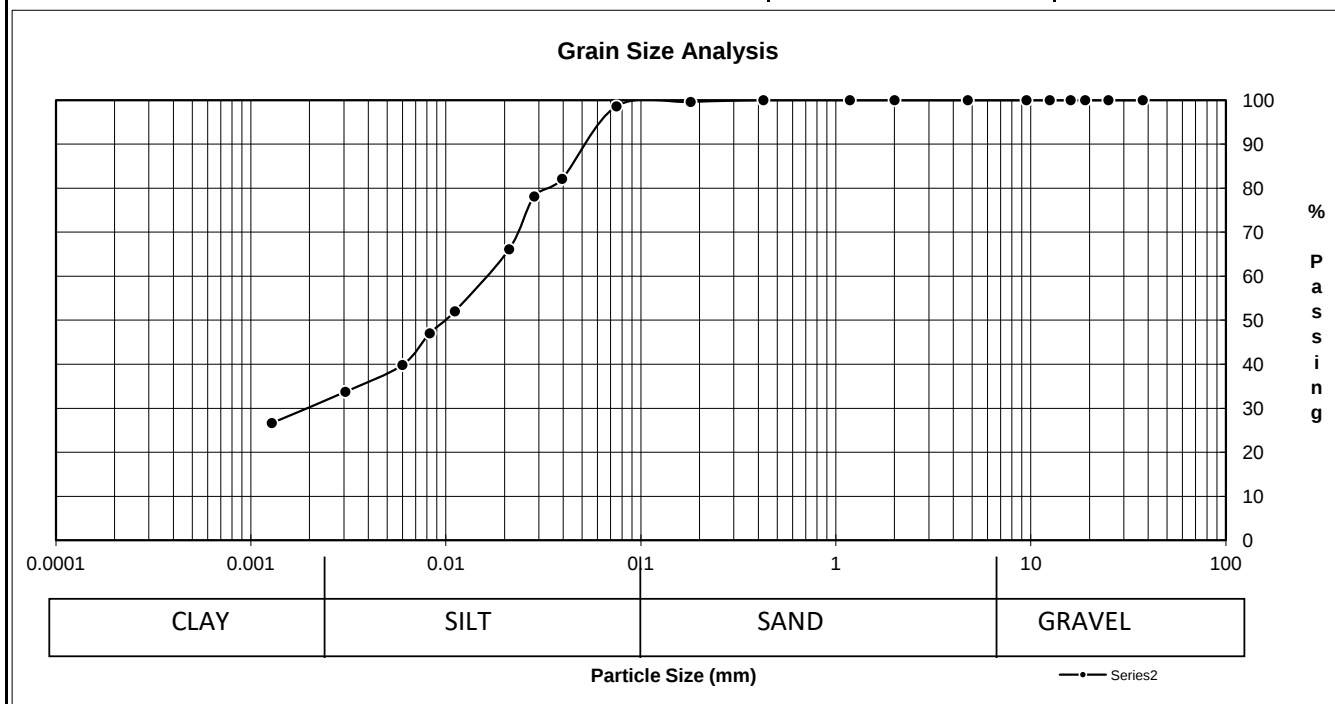
CLIENT: WSP Canada Group Limited
Suite 111-93 Lombard Avenue
Winnipeg, MB R3B 3B1

ATTENTION: Dana Bredin

PROJECT: 17M-02283-00
Dumoulin

PROJECT NO. 103-1804

Date Sampled:	20-Feb-18	Date Received:	20-Feb-18	Sieve Analysis		Hydrometer Analysis	
Sampled By:	Client	Date Tested:	26-Feb-18	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH 1 @3' Sample No. 8 Sample Source Specific Gravity of Material: 2.65				50.00	100.0		
				37.50	100.0		
				25.00	100.0		
				19.00	100.0		
				16.00	100.0		
				12.50	100.0	0.0394	82.1
				9.50	100.0	0.0284	78.1
				4.75	100.0	0.0211	66.1
				2.00	100.0	0.0111	52.0
				1.18	100.0	0.0083	47.0
				0.425	100.0	0.0060	39.8
				0.180	99.6	0.0031	33.7
				0.075	98.6	0.0013	26.6



SOIL DESCRIPTION	% Composition			
SILTY CLAY LOAM	1.4	Gravel	D10	0.00128
	72.0	Sand	D30	0.01112
	26.6	Silt	D60	0.01112
		Clay	Cu	#DIV/0!
			Cc	#DIV/0!

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: GM



Reviewed by: Hermie Manalo

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

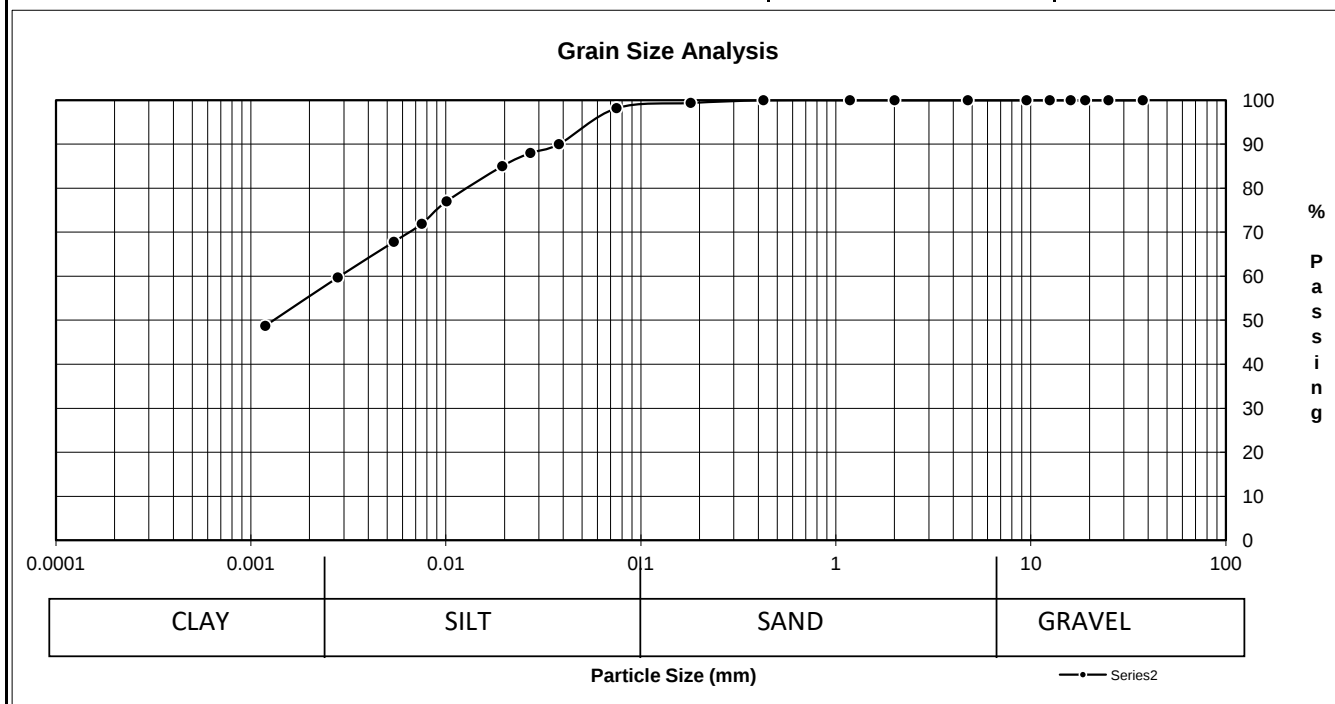
CLIENT: WSP Canada Group Limited
Suite 111-93 Lombard Avenue
Winnipeg, MB R3B 3B1

ATTENTION: Dana Bredin

PROJECT: 17M-02283-00
Lawndale

PROJECT NO. 103-1804

Date Sampled:	20-Feb-18	Date Received:	20-Feb-18	Sieve Analysis		Hydrometer Analysis	
Sampled By:	Client	Date Tested:	26-Feb-18	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH 1 @4' Sample No. 9 Sample Source Specific Gravity of Material: 2.65				50.00	100.0		
				37.50	100.0		
				25.00	100.0		
				19.00	100.0		
				16.00	100.0		
				12.50	100.0	0.0380	90.0
				9.50	100.0	0.0271	88.0
				4.75	100.0	0.0195	85.0
				2.00	100.0	0.0101	77.0
				1.18	100.0	0.0075	71.9
				0.425	100.0	0.0054	67.8
				0.180	99.4	0.0028	59.7
				0.075	98.2	0.0012	48.7



SOIL DESCRIPTION	% Composition		D10	
			D30	
SILTY CLAY	1.8	Gravel	D60	0.00279
	49.5	Sand	Cu	#DIV/0!
	48.7	Clay	Cc	#DIV/0!

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: GM



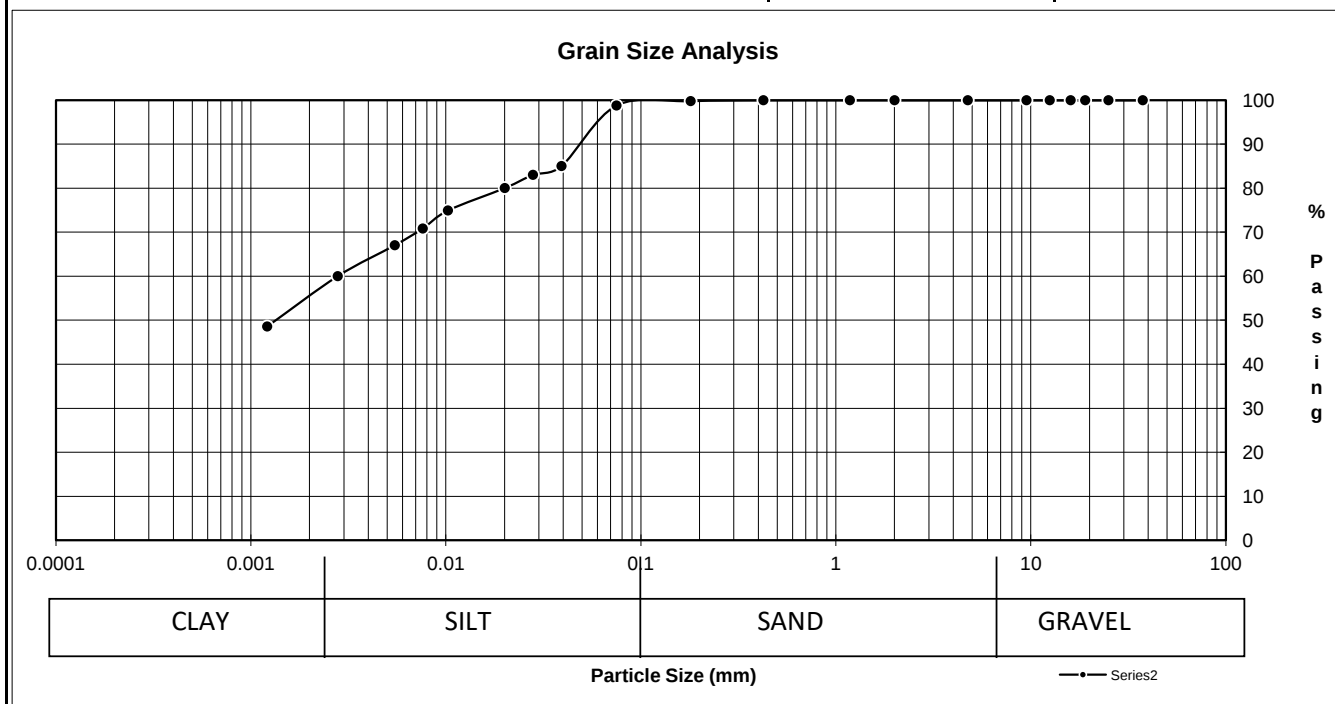
Reviewed by: Hermie Manalo

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: WSP Canada Group Limited
Suite 111-93 Lombard Avenue
Winnipeg, MB R3B 3B1
ATTENTION: Dana Bredin
PROJECT: 17M-02283-00
Tache

PROJECT NO. 103-1804

Date Sampled:	20-Feb-18	Date Received:	20-Feb-18	Sieve Analysis		Hydrometer Analysis	
Sampled By:	Client	Date Tested:	26-Feb-18	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH 3 @3' Sample No. 10 Sample Source Specific Gravity of Material: 2.65				50.00	100.0		
				37.50	100.0		
				25.00	100.0		
				19.00	100.0		
				16.00	100.0		
				12.50	100.0	0.0392	85.0
				9.50	100.0	0.0280	83.0
				4.75	100.0	0.0200	80.0
				2.00	100.0	0.0102	74.9
				1.18	100.0	0.0076	70.8
				0.425	100.0	0.0055	67.0
				0.180	99.8	0.0028	60.0
				0.075	98.8	0.0012	48.6



SOIL DESCRIPTION	% Composition			
			D10	
SILTY CLAY	1.2	Gravel	D30	
	50.2	Sand	D60	0.00279
	48.6	Silt	Cu	#DIV/0!
		Clay	Cc	#DIV/0!

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: GM



Reviewed by: Hermie Manalo

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

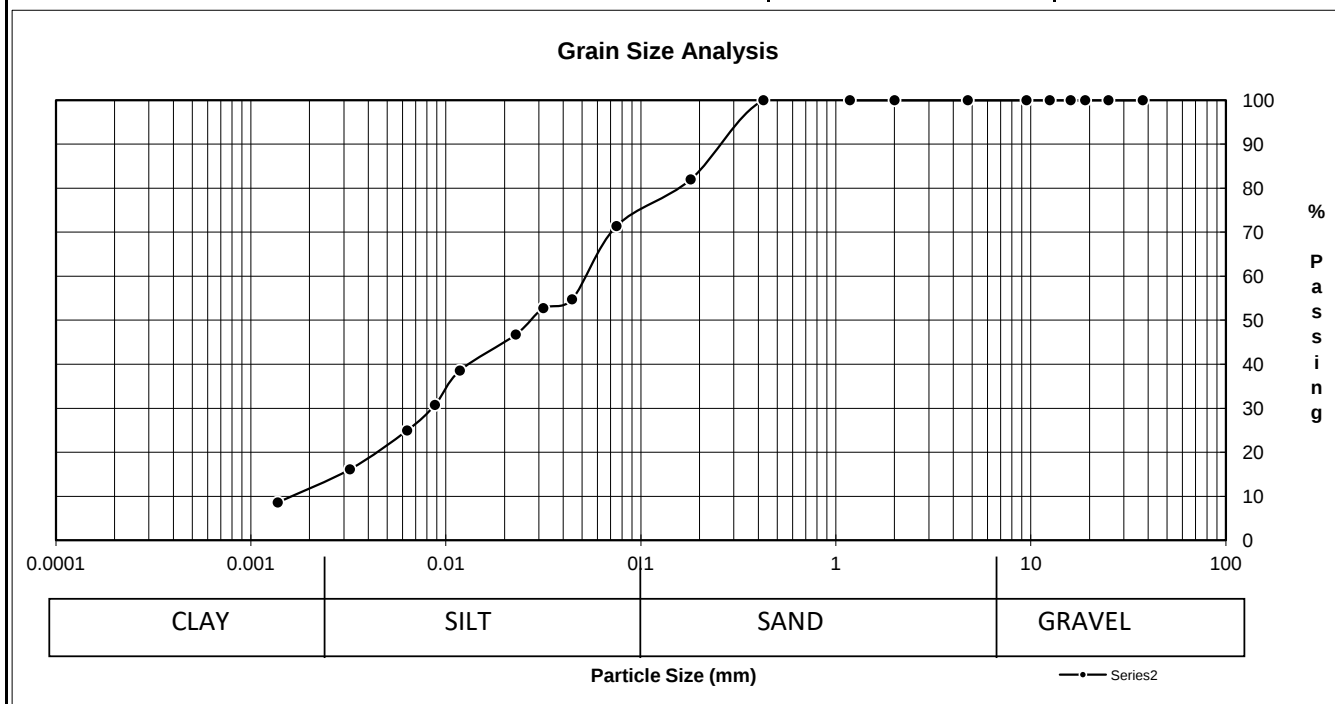
CLIENT: WSP Canada Group Limited
Suite 111-93 Lombard Avenue
Winnipeg, MB R3B 3B1

ATTENTION: Dana Bredin

PROJECT: 17M-02283-00
Lloyd

PROJECT NO. 103-1804

Date Sampled:	20-Feb-18	Date Received:	20-Feb-18	Sieve Analysis		Hydrometer Analysis	
Sampled By:	Client	Date Tested:	26-Feb-18	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH 2 @2' Sample No. 11 Sample Source Specific Gravity of Material: 2.65			50.00	100.0			
			37.50	100.0			
			25.00	100.0			
			19.00	100.0			
			16.00	100.0			
			12.50	100.0		0.0444	54.8
			9.50	100.0		0.0316	52.8
			4.75	100.0		0.0228	46.8
			2.00	100.0		0.0118	38.6
			1.18	100.0		0.0088	30.8
			0.425	100.0		0.0063	24.9
			0.180	82.0		0.0032	16.1
			0.075	71.4		0.0014	8.6



SOIL DESCRIPTION	% Composition		D10	0.00137
	28.6	Gravel	D30	0.00878
SILT LOAM	62.8	Sand	D60	0.04437
	8.6	Silt	Cu	32.39
		Clay	Cc	1.27

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: GM



Reviewed by: Hermie Manalo

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: WSP Canada Group Limited
Suite 111-93 Lombard Avenue
Winnipeg, MB R3B 3B1

ATTENTION: Dana Bredin

PROJECT: 17M-02283-00
Bronstone

PROJECT NO. 103-1804

Date Sampled: 20-Feb-18 Date Received: 20-Feb-18
Sampled By: Client Date Tested: 26-Feb-18

Sieve Analysis
Sieve (mm) % Passing

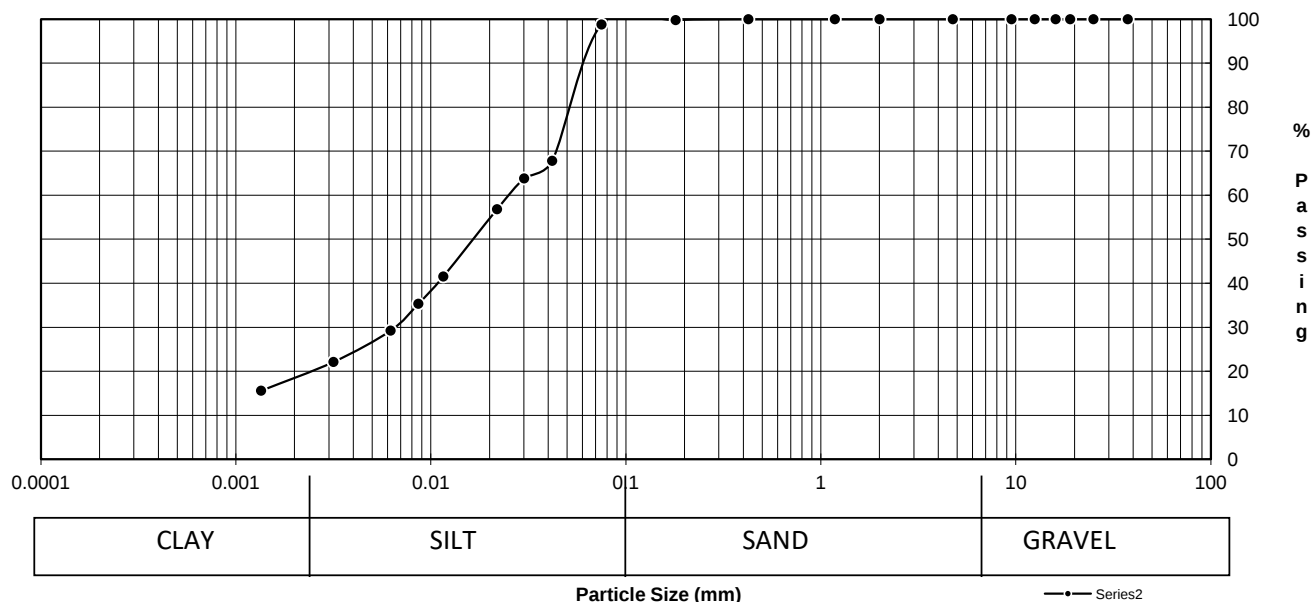
Hydrometer Analysis
Diameter % Finer

Material Identification

B.H./T.H. No. **TH 3 @3'**
Sample No. **12**
Sample Source
Specific Gravity of Material: 2.65

50.00	100.0		
37.50	100.0		
25.00	100.0		
19.00	100.0		
16.00	100.0		
12.50	100.0	0.0419	67.8
9.50	100.0	0.0301	63.8
4.75	100.0	0.0218	56.8
2.00	100.0	0.0116	41.5
1.18	100.0	0.0086	35.3
0.425	100.0	0.0062	29.2
0.180	99.8	0.0032	22.1
0.075	98.8	0.0013	15.6

Grain Size Analysis



SOIL DESCRIPTION	% Composition		D10	
SILT LOAM	1.2	Gravel	D30	0.00621
	83.2	Sand	D60	0.02184
	15.6	Silt	Cu	#DIV/0!
		Clay	Cc	#DIV/0!

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: GM



Reviewed by: Hermie Manalo

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP	TEST NO:	18- 002	PROJECT NO:	103-1805
PROJECT:	17M-00285-00	DATE SAMPLED:	20-Feb-2018	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	23-Feb-2018	TESTED BY:	Greg Manalo
TEST LOCATION:	Dumoulin				
Description	TH1	TH1	TH1	TH1	TH1
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	151.00	173.40	460.50	170.40	160.30
Wt Dry Sample + Tare	113.10	117.90	356.60	136.30	127.30
Wt Water	37.90	55.50	103.90	34.10	33.00
Wt Tare	4.10	4.10	4.30	4.10	4.20
Wt Dry Sample	109.00	113.80	352.30	132.20	123.10
Moisture Content (%)	34.8	48.8	29.5	25.8	26.8
Description	TH1	TH1	TH1		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	148.60	173.70	162.70		
Wt Dry Sample + Tare	112.80	123.20	113.20		
Wt Water	35.80	50.50	49.50		
Wt Tare	4.10	4.20	4.10		
Wt Dry Sample	108.70	119.00	109.10		
Moisture Content (%)	32.9	42.4	45.4		
Description	TH2	TH2	TH2	TH2	TH2
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	153.90	148.70	169.10	140.30	163.10
Wt Dry Sample + Tare	139.60	111.50	126.10	111.20	131.70
Wt Water	14.30	37.20	43.00	29.10	31.40
Wt Tare	4.40	4.10	4.30	4.30	4.40
Wt Dry Sample	135.20	107.40	121.80	106.90	127.30
Moisture Content (%)	10.6	34.6	35.3	27.2	24.7
Description	TH2	TH2	TH2		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	163.50	161.60	142.00		
Wt Dry Sample + Tare	116.60	112.20	102.00		
Wt Water	46.90	49.40	40.00		
Wt Tare	4.40	4.50	4.40		
Wt Dry Sample	112.20	107.70	97.60		
Moisture Content (%)	41.8	45.9	41.0		

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP	TEST NO:	18- 002	PROJECT NO:	103-1805
PROJECT:	17M-00285-00	DATE SAMPLED:	20-Feb-2018	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	23-Feb-2018	TESTED BY:	Greg Manalo
TEST LOCATION:	Dumoulin				
Description	TH3	TH3	TH3	TH3	TH3
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	113.90	137.90	149.50	155.40	188.20
Wt Dry Sample + Tare	107.40	96.40	118.90	124.00	154.30
Wt Water	6.50	41.50	30.60	31.40	33.90
Wt Tare	4.20	4.20	4.20	4.10	4.20
Wt Dry Sample	103.20	92.20	114.70	119.90	150.10
Moisture Content (%)	6.3	45.0	26.7	26.2	22.6
Description	TH3	TH3	TH3		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	168.80	134.30	155.50		
Wt Dry Sample + Tare	126.10	98.50	104.10		
Wt Water	42.70	35.80	51.40		
Wt Tare	4.10	4.20	4.20		
Wt Dry Sample	122.00	94.30	99.90		
Moisture Content (%)	35.0	38.0	51.5		
Description					
Depth (ft)					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					
Description					
Depth (ft)					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP	TEST NO:	18- 001	PROJECT NO:	103-1805
PROJECT:	17M-00285-00	DATE SAMPLED:	20-Feb-2018	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	23-Feb-2018	TESTED BY:	Greg Manalo
TEST LOCATION:	Lawndale				
Description	TH1	TH1	TH1	TH1	TH1
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	156.40	151.50	148.70	273.60	150.60
Wt Dry Sample + Tare	122.30	119.60	118.00	211.50	116.60
Wt Water	34.10	31.90	30.70	62.10	34.00
Wt Tare	4.20	4.20	4.10	4.10	4.10
Wt Dry Sample	118.10	115.40	113.90	207.40	112.50
Moisture Content (%)	28.9	27.6	27.0	29.9	30.2
Description	TH1	TH1	TH1		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	161.30	166.50	171.90		
Wt Dry Sample + Tare	125.50	130.20	133.40		
Wt Water	35.80	36.30	38.50		
Wt Tare	4.10	4.10	4.20		
Wt Dry Sample	121.40	126.10	129.20		
Moisture Content (%)	29.5	28.8	29.8		
Description	TH2	TH2	TH2	TH2	TH2
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	149.30	158.10	177.60	188.60	168.10
Wt Dry Sample + Tare	115.70	121.40	139.70	148.20	132.50
Wt Water	33.60	36.70	37.90	40.40	35.60
Wt Tare	4.20	4.00	4.00	4.20	4.20
Wt Dry Sample	111.50	117.40	135.70	144.00	128.30
Moisture Content (%)	30.1	31.3	27.9	28.1	27.7
Description	TH2	TH2	TH2		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	172.90	150.80	155.50		
Wt Dry Sample + Tare	137.30	118.70	121.50		
Wt Water	35.60	32.10	34.00		
Wt Tare	4.10	4.10	4.20		
Wt Dry Sample	133.20	114.60	117.30		
Moisture Content (%)	26.7	28.0	29.0		

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT: WSP	TEST NO: 18- 001	PROJECT NO: 103-1805
PROJECT: 17M-00285-00	DATE SAMPLED: 20-Feb-2018	SAMPLED BY: Client
PROJECT CONTACT: Dana Bredin	DATE TESTED: 23-Feb-2018	TESTED BY: Greg Manalo
TEST LOCATION: Lawndale		

Description	TH3	TH3	TH3	TH3	TH3
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	157.30	157.10	144.20	154.00	152.40
Wt Dry Sample + Tare	120.80	120.40	112.60	119.70	117.40
Wt Water	36.50	36.70	31.60	34.30	35.00
Wt Tare	4.10	4.10	4.10	4.10	4.10
Wt Dry Sample	116.70	116.30	108.50	115.60	113.30
Moisture Content (%)	31.3	31.6	29.1	29.7	30.9

Description	TH3	TH3	TH3		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	189.70	188.10	169.30		
Wt Dry Sample + Tare	145.80	145.00	131.10		
Wt Water	43.90	43.10	38.20		
Wt Tare	4.20	4.30	4.20		
Wt Dry Sample	141.60	140.70	126.90		
Moisture Content (%)	31.0	30.6	30.1		

Description					
Depth (ft)					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					

Description					
Depth (ft)					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP	TEST NO:	18- 005	PROJECT NO:	103-1805
PROJECT:	17M-00285-00	DATE SAMPLED:	20-Feb-2018	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	23-Feb-2018	TESTED BY:	Irvin Araquil
TEST LOCATION:	Tache				
Description	TH1	TH1	TH1	TH1	TH1
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	154.90	150.70	177.60	153.90	162.20
Wt Dry Sample + Tare	133.30	118.10	135.40	116.10	127.60
Wt Water	21.60	32.60	42.20	37.80	34.60
Wt Tare	4.20	4.20	4.20	4.20	4.20
Wt Dry Sample	129.10	113.90	131.20	111.90	123.40
Moisture Content (%)	16.7	28.6	32.2	33.8	28.0
Description	TH1	TH1	TH1		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	154.60	172.10	166.00		
Wt Dry Sample + Tare	125.40	130.80	114.90		
Wt Water	29.20	41.30	51.10		
Wt Tare	4.20	4.20	4.20		
Wt Dry Sample	121.20	126.60	110.70		
Moisture Content (%)	24.1	32.6	46.2		
Description	TH2	TH2	TH2	TH2	TH2
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	159.50	155.10	151.70	151.30	158.80
Wt Dry Sample + Tare	149.80	133.60	112.00	107.20	127.60
Wt Water	9.70	21.50	39.70	44.10	31.20
Wt Tare	4.20	4.20	4.20	4.20	4.20
Wt Dry Sample	145.60	129.40	107.80	103.00	123.40
Moisture Content (%)	6.7	16.6	36.8	42.8	25.3
Description	TH2	TH2	TH2		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	156.70	163.50	161.30		
Wt Dry Sample + Tare	122.40	122.00	111.30		
Wt Water	34.30	41.50	50.00		
Wt Tare	4.20	4.20	4.20		
Wt Dry Sample	118.20	117.80	107.10		
Moisture Content (%)	29.0	35.2	46.7		

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP	TEST NO:	18- 005	PROJECT NO:	103-1805
PROJECT:	17M-00285-00	DATE SAMPLED:	20-Feb-2018	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	23-Feb-2018	TESTED BY:	Irvin Araquil
TEST LOCATION:	Tache				
Description	TH3	TH3	TH3	TH3	TH3
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	154.40	159.80	322.40	153.40	169.10
Wt Dry Sample + Tare	143.20	121.40	247.80	125.50	140.50
Wt Water	11.20	38.40	74.60	27.90	28.60
Wt Tare	4.20	4.20	4.20	4.20	4.20
Wt Dry Sample	139.00	117.20	243.60	121.30	136.30
Moisture Content (%)	8.1	32.8	30.6	23.0	21.0
Description	TH3	TH3	TH3		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	151.80	157.50	150.60		
Wt Dry Sample + Tare	117.10	118.10	104.60		
Wt Water	34.70	39.40	46.00		
Wt Tare	4.20	4.20	4.20		
Wt Dry Sample	112.90	113.90	100.40		
Moisture Content (%)	30.7	34.6	45.8		
Description					
Depth (ft)					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					
Description					
Depth (ft)					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP	TEST NO:	18- 004	PROJECT NO:	103-1805
PROJECT:	17M-00285-00	DATE SAMPLED:	20-Feb-2018	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	23-Feb-2018	TESTED BY:	Irvin Araquil
TEST LOCATION:	Lloyd				
Description	TH1	TH1	TH1	TH1	TH1
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	173.60	173.60	156.20	153.70	156.30
Wt Dry Sample + Tare	154.40	141.50	117.80	115.70	116.60
Wt Water	19.20	32.10	38.40	38.00	39.70
Wt Tare	4.20	4.20	4.20	4.20	4.20
Wt Dry Sample	150.20	137.30	113.60	111.50	112.40
Moisture Content (%)	12.8	23.4	33.8	34.1	35.3
Description	TH1	TH1	TH1		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	150.10	157.50	161.40		
Wt Dry Sample + Tare	114.90	120.90	127.40		
Wt Water	35.20	36.60	34.00		
Wt Tare	4.20	4.20	4.20		
Wt Dry Sample	110.70	116.70	123.20		
Moisture Content (%)	31.8	31.4	27.6		
Description	TH2	TH2	TH2	TH2	TH2
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	172.30	270.10	157.30	166.20	154.10
Wt Dry Sample + Tare	151.10	211.10	117.90	124.00	114.60
Wt Water	21.20	59.00	39.40	42.20	39.50
Wt Tare	4.20	4.20	4.20	4.20	4.20
Wt Dry Sample	146.90	206.90	113.70	119.80	110.40
Moisture Content (%)	14.4	28.5	34.7	35.2	35.8
Description	TH2	TH2	TH2		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	177.20	152.10	167.60		
Wt Dry Sample + Tare	134.80	114.20	134.80		
Wt Water	42.40	37.90	32.80		
Wt Tare	4.20	4.20	4.20		
Wt Dry Sample	130.60	110.00	130.60		
Moisture Content (%)	32.5	34.5	25.1		

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP	TEST NO:	18- 004	PROJECT NO:	103-1805
PROJECT:	17M-00285-00	DATE SAMPLED:	20-Feb-2018	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	23-Feb-2018	TESTED BY:	Irvin Araquil
TEST LOCATION:	Lloyd				
Description	TH3	TH3	TH3	TH3	TH3
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	152.10	158.80	152.00	155.90	160.30
Wt Dry Sample + Tare	121.60	120.80	115.70	118.30	121.60
Wt Water	30.50	38.00	36.30	37.60	38.70
Wt Tare	4.20	4.20	4.20	4.20	4.20
Wt Dry Sample	117.40	116.60	111.50	114.10	117.40
Moisture Content (%)	26.0	32.6	32.6	33.0	33.0
Description	TH3	TH3	TH3		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	150.90	175.30	156.70		
Wt Dry Sample + Tare	110.50	127.00	112.40		
Wt Water	40.40	48.30	44.30		
Wt Tare	4.20	4.20	4.20		
Wt Dry Sample	106.30	122.80	108.20		
Moisture Content (%)	38.0	39.3	40.9		
Description					
Depth (ft)					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					
Description					
Depth (ft)					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP	TEST NO:	18- 003	PROJECT NO:	103-1805
PROJECT:	17M-00285-00	DATE SAMPLED:	20-Mar-2018	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	23-Feb-2018	TESTED BY:	Irvin Araquil
TEST LOCATION:	Bronstone				
Description	TH1	TH1	TH1	TH1	TH1
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	157.20	155.00	156.40	160.80	157.90
Wt Dry Sample + Tare	117.10	114.70	117.00	120.20	117.20
Wt Water	40.10	40.30	39.40	40.60	40.70
Wt Tare	4.20	4.20	4.20	4.10	4.20
Wt Dry Sample	112.90	110.50	112.80	116.10	113.00
Moisture Content (%)	35.5	36.5	34.9	35.0	36.0
Description	TH1	TH1	TH1		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	170.10	155.60	159.10		
Wt Dry Sample + Tare	121.40	110.20	110.40		
Wt Water	48.70	45.40	48.70		
Wt Tare	4.10	4.20	4.20		
Wt Dry Sample	117.30	106.00	106.20		
Moisture Content (%)	41.5	42.8	45.9		
Description	TH2	TH2	TH2	TH2	TH2
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	160.50	155.50	167.60	167.60	164.20
Wt Dry Sample + Tare	147.90	120.40	118.50	132.90	139.80
Wt Water	12.60	35.10	49.10	34.70	24.40
Wt Tare	4.20	4.10	4.10	4.20	4.10
Wt Dry Sample	143.70	116.30	114.40	128.70	135.70
Moisture Content (%)	8.8	30.2	42.9	27.0	18.0
Description	TH2	TH2	TH2		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	166.90	157.90	165.10		
Wt Dry Sample + Tare	119.10	111.40	112.30		
Wt Water	47.80	46.50	52.80		
Wt Tare	4.20	4.20	4.20		
Wt Dry Sample	114.90	107.20	108.10		
Moisture Content (%)	41.6	43.4	48.8		

MOISTURE CONTENT OF SOIL (ASTM D2216)

CLIENT:	WSP	TEST NO:	18- 003	PROJECT NO:	103-1805
PROJECT:	17M-00285-00	DATE SAMPLED:	20-Mar-2018	SAMPLED BY:	Client
PROJECT CONTACT:	Dana Bredin	DATE TESTED:	23-Feb-2018	TESTED BY:	Irvin Araquil
TEST LOCATION:	Bronstone				
Description	TH3	TH3	TH3	TH3	TH3
Depth (ft)	1	2	3	4	5
Wt Wet Sample + Tare	165.10	158.30	283.80	164.10	157.80
Wt Dry Sample + Tare	126.90	123.00	222.80	134.90	131.70
Wt Water	38.20	35.30	61.00	29.20	26.10
Wt Tare	4.10	4.20	4.10	4.20	4.20
Wt Dry Sample	122.80	118.80	218.70	130.70	127.50
Moisture Content (%)	31.1	29.7	27.9	22.3	20.5
Description	TH3	TH3	TH3		
Depth (ft)	6	7	10		
Wt Wet Sample + Tare	150.00	164.80	167.00		
Wt Dry Sample + Tare	116.50	120.00	113.40		
Wt Water	33.50	44.80	53.60		
Wt Tare	4.20	4.20	4.10		
Wt Dry Sample	112.30	115.80	109.30		
Moisture Content (%)	29.8	38.7	49.0		
Description					
Depth (ft)					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					
Description					
Depth (ft)					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					

APPENDIX

C

TESTHOLE LOCATIONS



SCALE:	REVISION:
1:1000	
DATE:	DRAWING NO:
2018/03/09	GT-A
PROJECT NO:	
17M-02285-00	

TITLE:

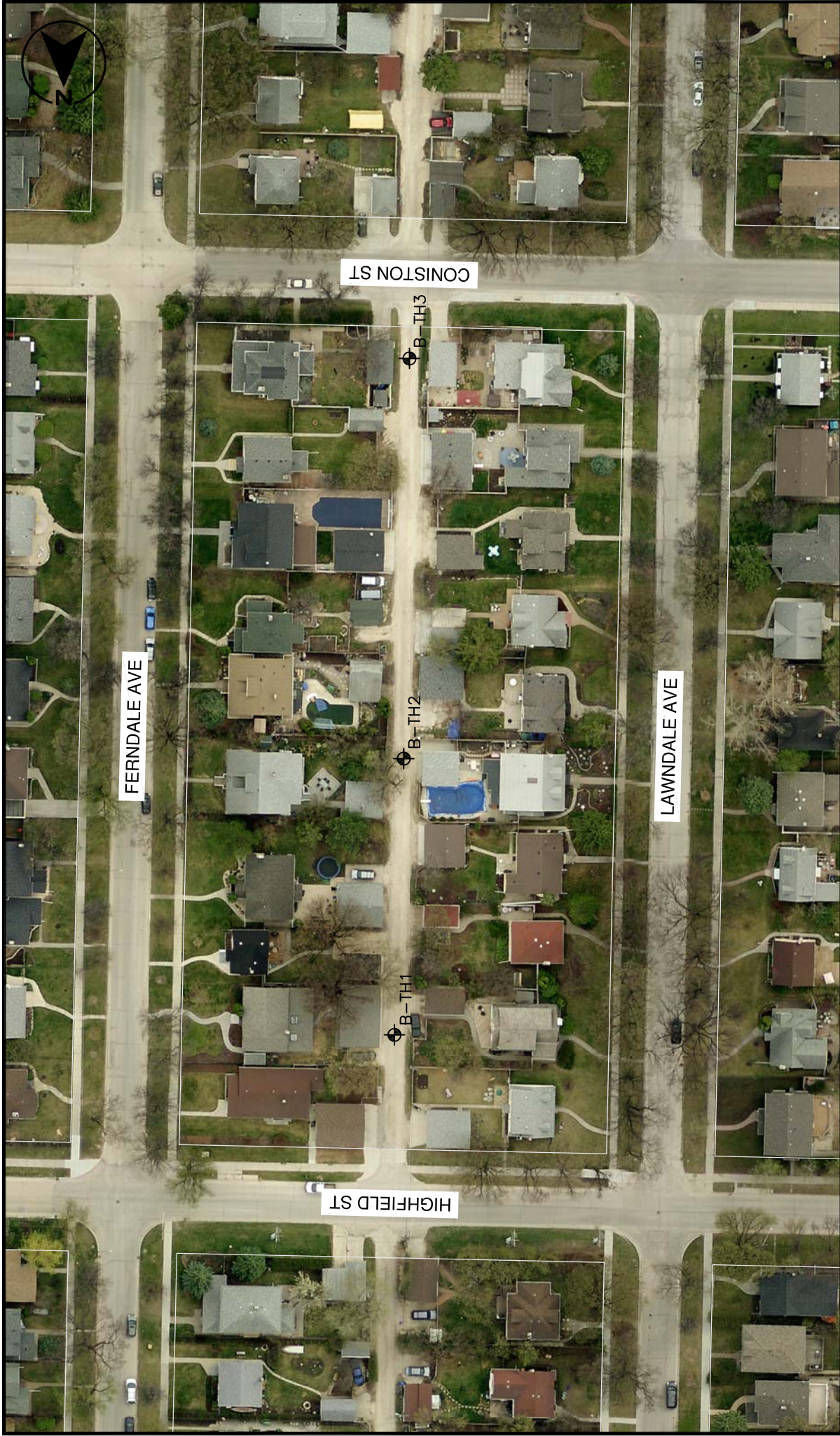
2018 ALLEY RENEWALS – LOCAL IMPROVEMENTS
DUMOULIN/NOTRE DAME/ARCHIBALD/LA FLECHE ALLEY
TESTHOLE LOCATIONS



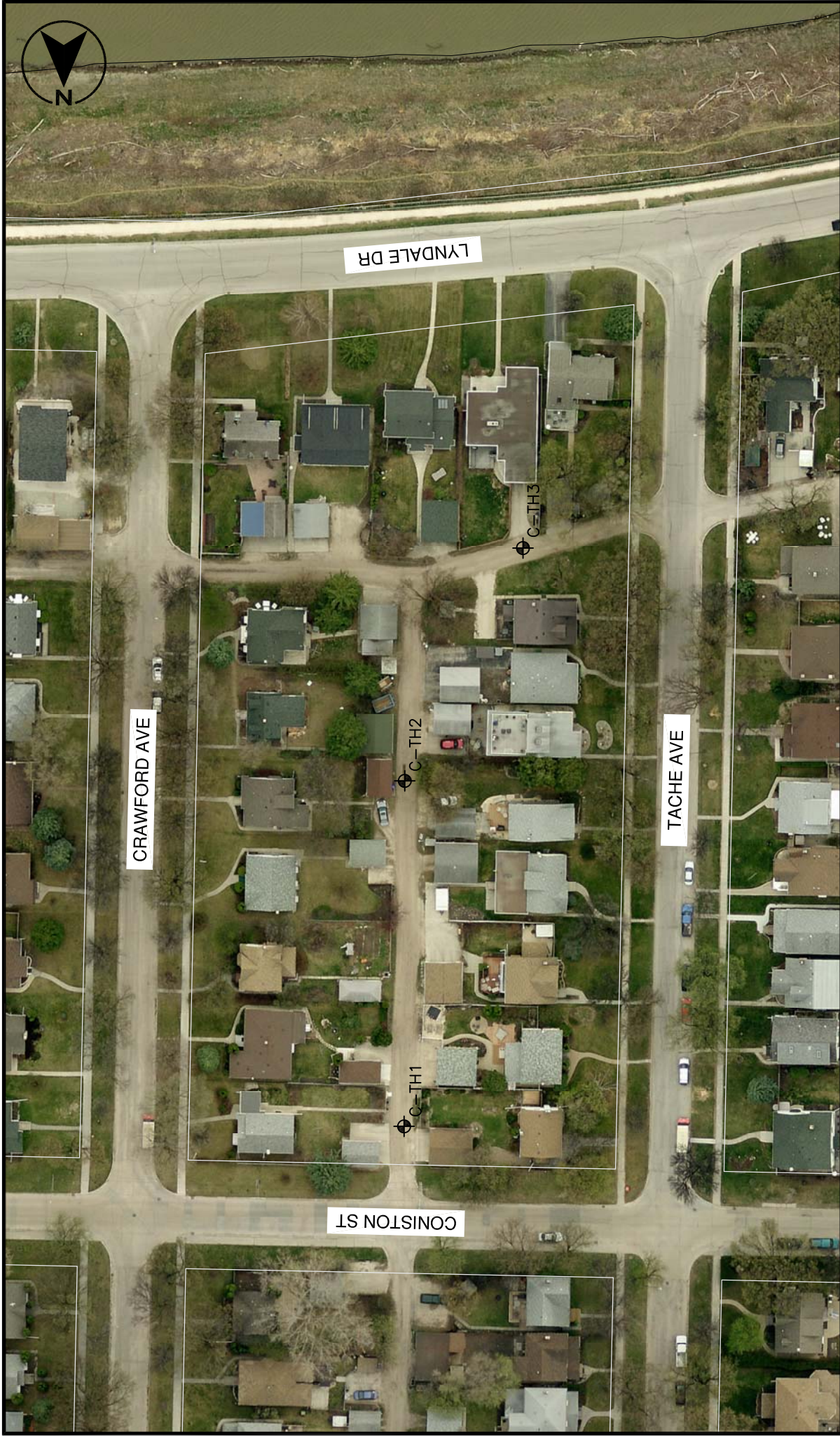
1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.WSPGROUP.COM

STAMP

XREF



 1600 BUFFALO PLACE WINNIPEG, MANITOBA CANADA R3T 6B8 PHONE: 204-477-6650 FAX : 204-474-2864 WWW.WSPGROUP.COM	TITLE: 2018 ALLEY RENEWALS – LOCAL IMPROVEMENTS LAWNDAL/FERNDAL/HIGHFIELD/CONISTON ALLEY TESTHOLE LOCATIONS	REVISION: SCALE: 1:1000 DATE: 2018/03/09 PROJECT NO: 17M-02285-00	DRAWING NO: GT-B
	STAMP		



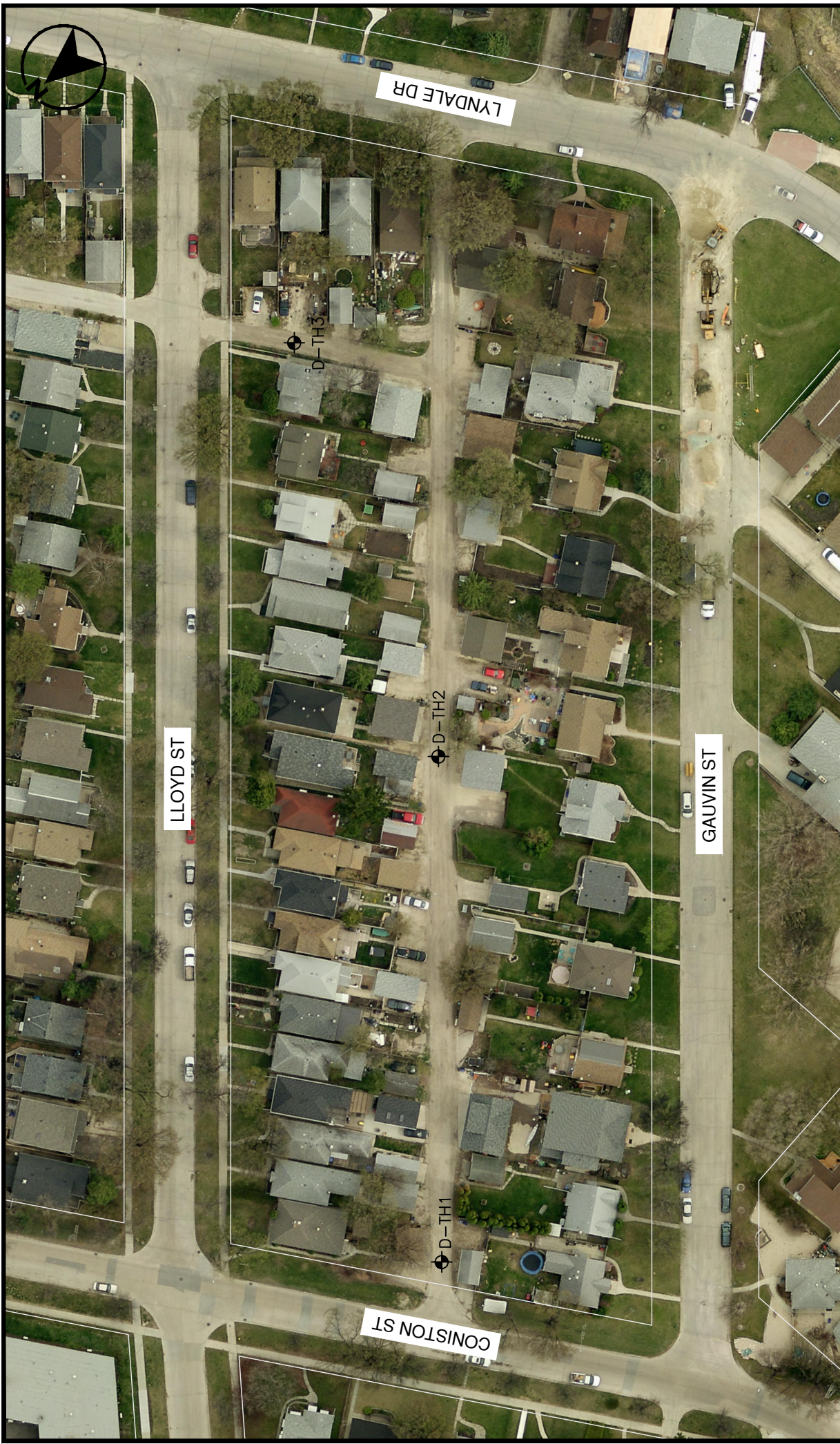
SCALE:	REVISION:
1:1000	
DATE:	
2018/03/09	
PROJECT NO:	
17M-02285-00	

TITLE:	2018 ALLEY RENEWALS – LOCAL IMPROVEMENTS TACHE/CRAWFORD/CONISTON/LYNDAL ALLEY TESTHOLE LOCATIONS
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1600 BUFFALO PLACE
WINNIPEG, MANITOBA
CANADA R3T 6B8
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 1600 BUFFALO PLACE WINNEPEG, MANITOBA CANADA R3T 6B8 PHONE: 204-477-6650 FAX : 204-474-2864 WWW.WSPGROUP.COM	TITLE:	2018 ALLEY RENEWALS – LOCAL IMPROVEMENTS LLOYD/GAUVIN/CONISTON/LYNDALE ALLEY TESTHOLE LOCATIONS		
	SCALE:	1:1000	REVISION:	
	DATE:	2018/03/09	DRAWING NO:	GT-D
	PROJECT NO:	17M-02285-00		



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CANADA R3T 6B8
PHONE: 204-477-6650 FAX : 204-474-2864
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TITLE:

2018 ALLEY RENEWALS – LOCAL IMPROVEMENTS
BRONSTONE/WEST FERDALE/ST. MARY’S ALLEY
TESTHOLE LOCATIONS

SCALE:

1:1000

DATE:

2018/03/09

PROJECT NO:

17M-02285-00

REVISION:

DRAWING NO:

GT-E