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# APPENDIX 'A' GEOTECHNICAL REPORT

**GEOTECHNICAL STREET TESTING PROGRAM WINGHAM AVE. / BAYFIELD AVE. ALLEY** POPLARWOOD AVE. / BERRYDALE AVE. ALLEY **FERNWOOD AVE. / LENNOX AVE. ALLEY** STRANMILLIS AVE. / IMPERIAL AVE. ALLEY KITSON ST. / HANBURY ST. ALLEY **WINNIPEG, MANITOBA** 

Prepared for:

**City of Winnipeg Public Works Department** 

Project No: 151 13889 00

May 24, 2016



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Appendix A – Wingham Ave. /Bayfield Ave. Alley

Appendix B – Poplarwood Ave. /Berrydale Ave. Alley
Appendix C – Fernwood Ave. /Lennox Ave. Alley
Appendix D – Stranmillis Ave. /Imperial Ave. Alley

Appendix E - Kitson St. /Hanbury St. Alley

### 1.0 SUMMARY

A geotechnical investigation was conducted for the proposed back lane upgrade projects 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 (Wingham Ave. /Bayfield Ave. Alley from Clayton Drive to St. Anne's Road, Poplarwood Ave. /Berrydale Ave. Alley from St. David Road to St. Mary's Road, Fernwood Ave. /Lennox Ave. Alley from St. Andrew Road to St. Anne's Road, Stranmillis Ave. /Imperial Ave. Alley from St. Anne's Road to Rue Des Meurons and Kitson St. /Hanbury St. Alley from Tache Ave. to Kenny St.) were drilled to at least 2.13m depth in conjunction with City of Winnipeg (COW) geotechnical investigation guideline.

The subsurface conditions under the investigated alleys are summarized in Appendix A to E consisting of a Table, Site Plan and Testhole Logs. Note that no photographs were taken since there is no asphalt or concrete layer on these alleys

# 2.0 INTRODUCTION

### 2.1 SCOPE OF WORK/ BACKGROUND

WSP Inc. was retained to undertake a soils investigation for a proposed alley reconstruction and upgrade in Winnipeg, Manitoba. The purpose of this work was to establish the soil and groundwater conditions at the sites, of which the pavement structure is identified and soil stratigraphy is profiled using the City of Winnipeg (COW) geotechnical investigation guideline. Authorization to proceed with the work was provided by City of Winnipeg.

# 2.2 PROPOSED ALLEY RECONSTRUCTION AND UPGRADES

The proposed alleys are from Wingham Ave. /Bayfield Ave. Alley (Clayton Drive to St. Anne's Road), Poplarwood Ave. /Berrydale Ave. Alley (St. David Road to St. Mary's Road), Fernwood Ave. /Lennox Ave. Alley (St. Andrew Road to St. Anne's Road), Stranmillis Ave. /Imperial Ave. Alley (St. Anne's Road to Rue Des Meurons) and Kitson St. /Hanbury St. Alley (Tache Ave. to Kenny St.).

# 3.0 FIELD METHODOLOGY

The subsoils encountered were visually classified to the full extent in the testhole and representative soil samples were recovered at regular depth intervals (every 300mm down to 2.13m). For confirmation, all of the soil samples are tested for moisture contents and selected soil samples (minimum one per street) between the depth of 0.3m and 0.9m were either submitted for Atterberg Limit test or Particle Size Analysis test (PSA). Since there is no asphalt and concrete cores present on the back alleys, no photographs were taken during our investigation. Any groundwater seepage and sloughing encountered in the testholes were noted.

# 4.0 FIELD TESTING

The field investigation was undertaken between April 19 and April 20, 2016. A total of 16 testholes (TH45 to TH61) were drilled down to 2.13m depth using a truck-mounted CME rig equipped with 125mm auger. All testholes were backfilled with auger cuttings/bentonite and capped with cold mix asphalt after completion of drilling. The testhole locations and ground elevations were surveyed using a GPS and are shown on the site plan, attached with the Testhole Logs for every alleys.

Detailed descriptions of the soil profiles in each testhole are shown on the attached logs

# 5.0 TEST RESULTS

The subsurface conditions under the investigated streets are summarized using a Table, Site Plan and Testhole Logs. The test results which include a Table, Site Plan and Testhole Logs for each alley are arranged using Appendices A to E.

# 6.0 CLOSURE

The findings and recommendations provided in this report were prepared by WSP 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 testhole(s) and/or excavation(s) examined. If conditions encountered during construction appear to be different than those shown by the testhole(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.

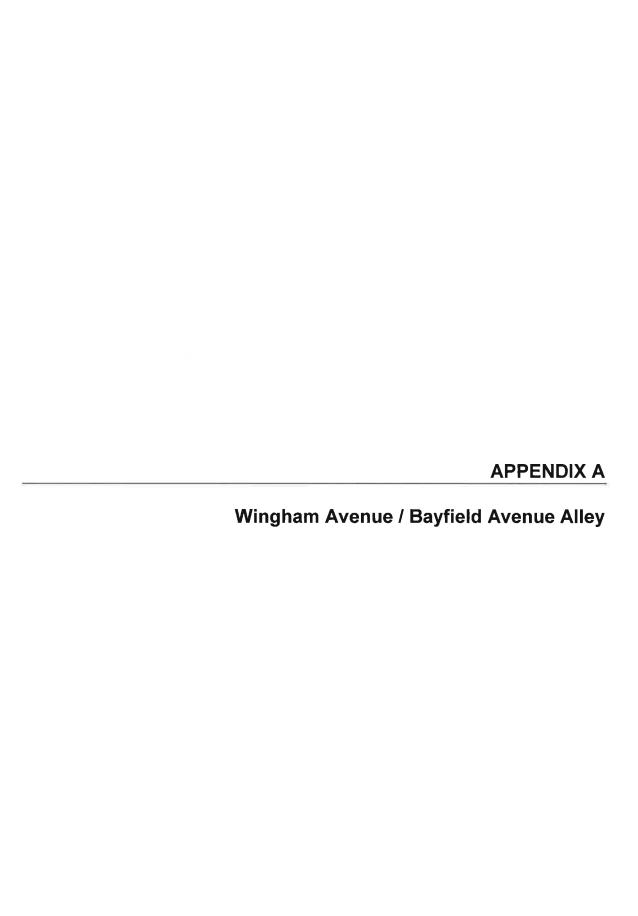
Prepared by: Silvestre S. Urbano Jr., P.Eng.

Reviewed by: Scott Minty, P.Eng.

Certificate of Authorization

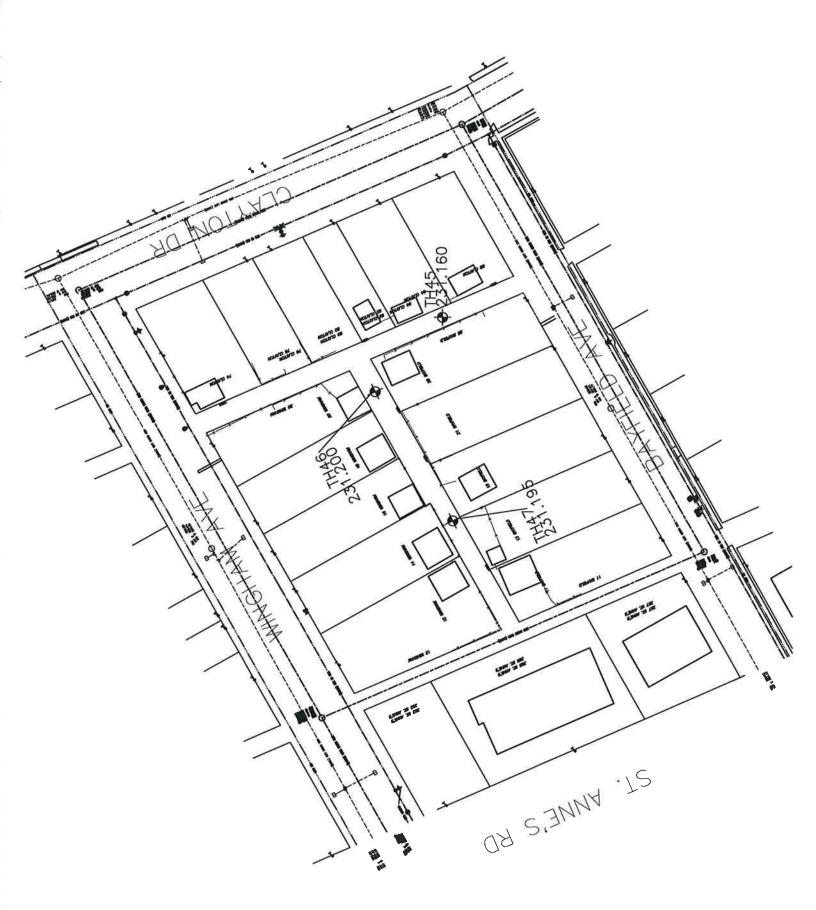
WSP Canada Inc.

No. 5750



Wingham Avenue / Bayfield Avenue Alley Clayton Drive to St. Anne's Road

			8 6	0
	Plasticity Index	*****	ı	1
Atterberg Limits	Liquid Limit Plastic Limit	1	1	14/
	Liquid Limit	1	Ĭ	1
	Clay (%)	î	39	1
Particle Size Analysis	Silt (%)	I	25	t
Particle Siz	Sand (%)	1	4	1
	Gravel (%)	ī	ì	I
Moisture Content (%)		1	144.1	\ <b>I</b> }
Sample Depth (m)		1	9.0	1
Soll Description		Clay Fill, mixed	Clay Fill, mixed	Clay Fill, mixed
Structure rial	Thickness (mm)	975	300	009
Pavement Structu Material	Туре	Clay Fill	Clay Fill	Clay Fill
Pavement Surface	Thickness (mm)	92	450	300
Раvет	Type	Granular Fill	Granular Fill	Granular Fill
Testhole Location		See site plan	See site plan	See site plan
Testhole ID		TH45	ТН46	TH47



Client: City of Winnipeg

**TH45** 

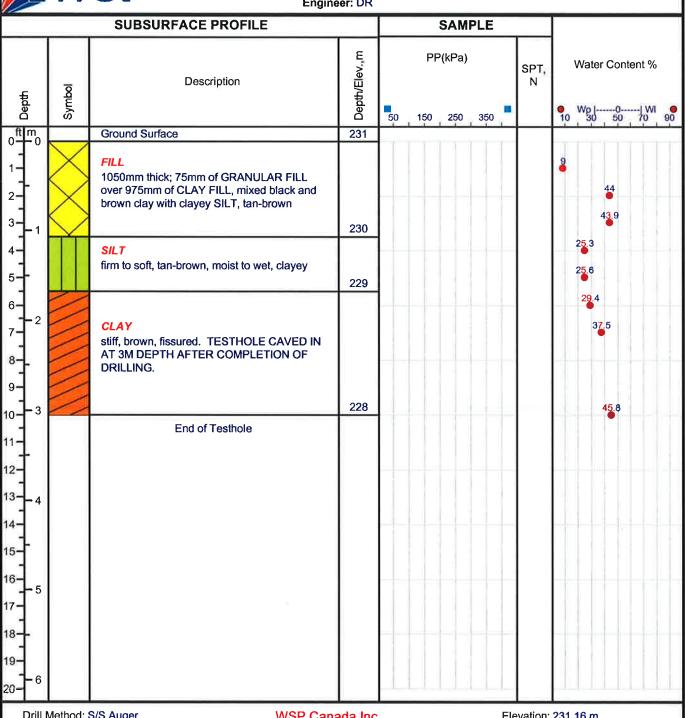
Project: Back Alley Renewal, 2016

Location: Between Wingham Ave. and Bayfield Ave.



**Enclosure:** 

Engineer: DR



Drill Method: S/S Auger

Drill Date: 04/19/16

Hole Size: 125mm

WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB. R3T 6B8

Elevation: 231.16 m

Checked by: SSU

Client: City of Winnipeg

**TH46** 

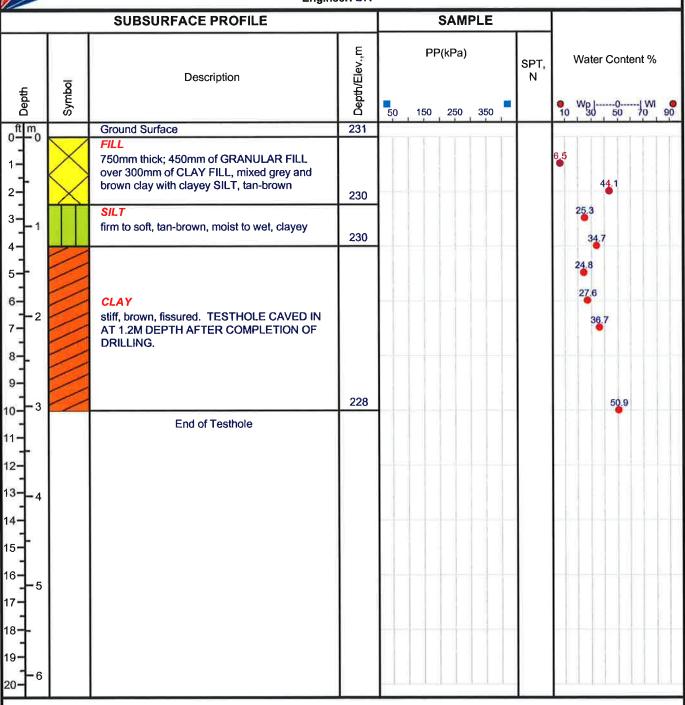
Project: Back Alley Renewal, 2016

Location: Between Wingham Ave. and Bayfield Ave.



Enclosure:

**Engineer: DR** 



Drill Method: S/S Auger

Drill Date: 04/19/16

Hole Size: 125mm

WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB. R3T 6B8 Elevation: 231.20 m

Checked by: SSU

Client: City of Winnipeg

**TH47** 

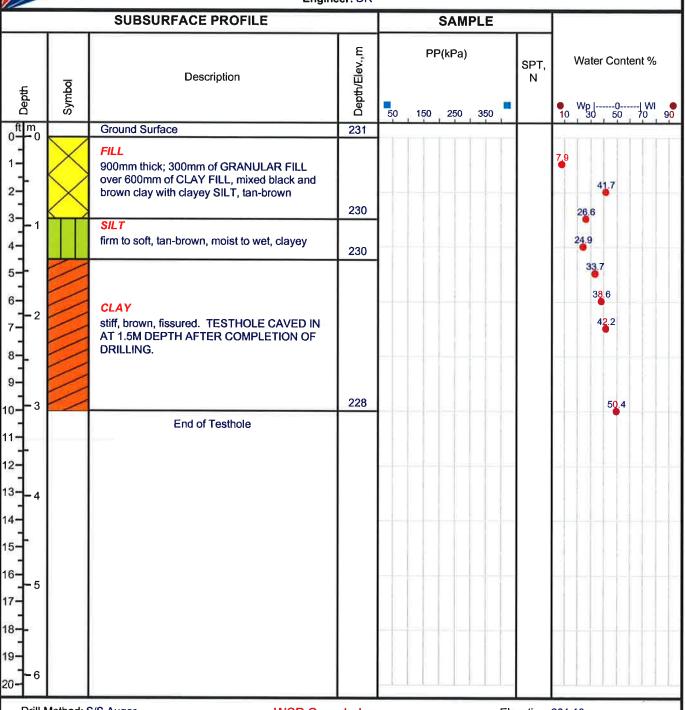
Project: Back Alley Renewal, 2016

Location: Between Wingham Ave. and Bayfield Ave.



**Enclosure:** 

Engineer: DR



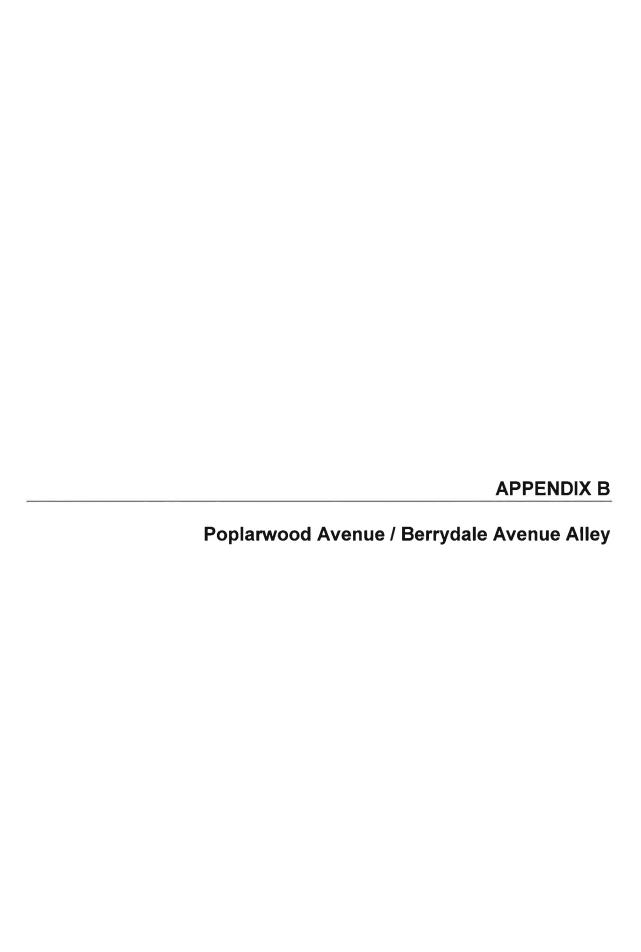
Drill Method: S/S Auger

Drill Date: 04/19/16

Hole Size: 125mm

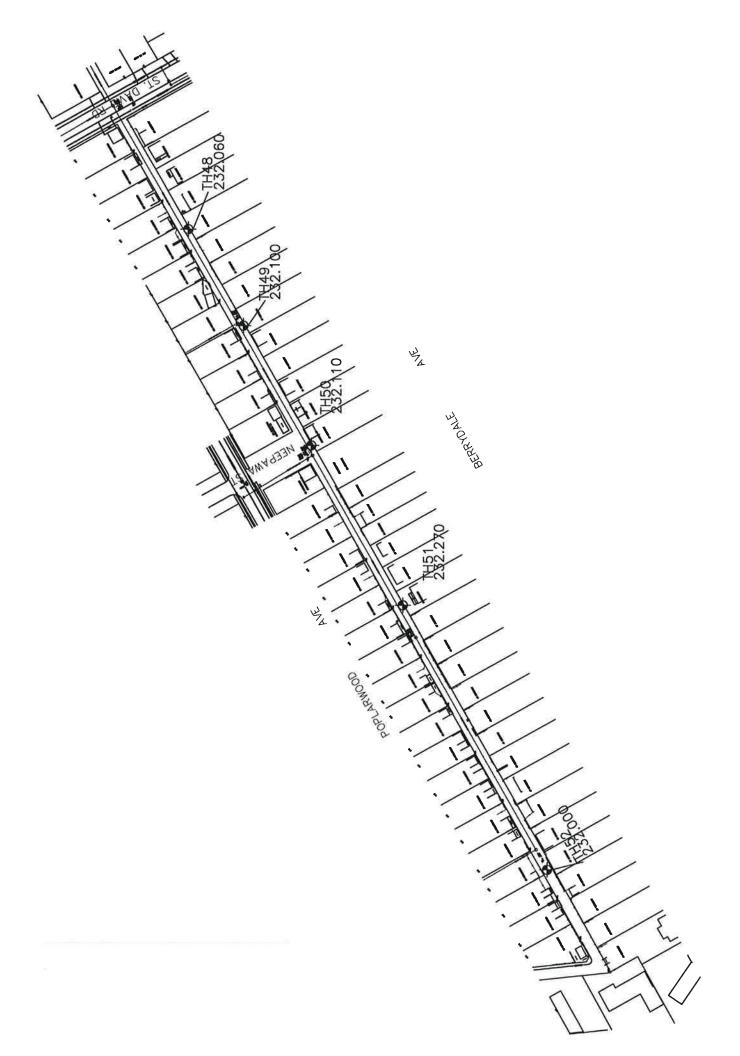
WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB. R3T 6B8 Elevation: 231.19 m

Checked by: SSU



Poplarwood Avenue / Berrydale Avenue Alley St. David Road to St. Mary's Road

_							
Atterbert Limits	Plasticity Index	1	Ţ	j	ï	Ĭ.	
	Plastic Limit	Ü	1	\(\frac{1}{160}\)	ī	Ĭ.	
	Liquid Limit	Ï,	1	( <b></b> )	Ĭ	Li.	
	Clay (%)	i)	39	VIII:	i	Ü	
Particle Size Analysis	Silt (%)	F	48	4	ı	1	
Particle Si	Sand (%)	Į.	10	3	*	E	
)))	Gravel (%)	ľ	ю	-	1	Ţ.	
Moisture	Content (%)	ľ)	23.4		ı		
Sample Depth (m)		ı	9.0	-	I	I)	
Soil	Description	Clay Fill, mixed	Clay Fill, mixed	Clay Fill, mixed	Clay Fill, mixed	Clay Fill, mixed	
ucture Material	Thickness (mm)	1050	1350	750	006	1050	
Pavement Structure Material	Туре	Clay Fill, mixed	Clay Fill , mixed	Clay Fill . mixed	Clay Fill , mixed	Clay Fill , mixed	
urface	Type Thickness (mm)	150	450	009	450	150	
Pavement St	Туре	Granular Fill	Granular Fill	Granular Fill	Granular Fill	Granular Fill	
Testhole Location		See site plan	See site plan	See site plan	See site plan	See site plan	
Testhole ID		TH48	ТН49	TH50	TH51	TH52	



Client: City of Winnipeg

**TH48** 

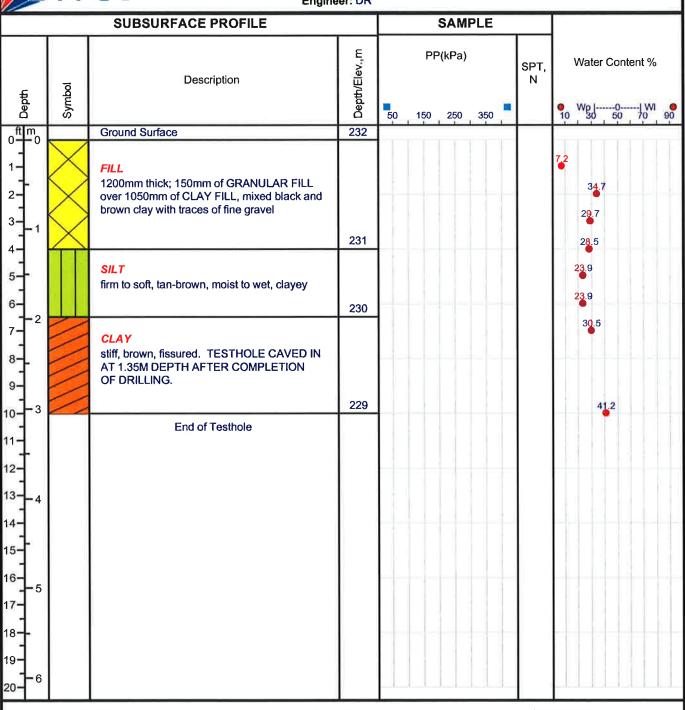
Project: Back Alley Renewal, 2016

Location: Between Poplarwood and Berrydale Ave.



**Enclosure:** 

Engineer: DR



Drill Method: S/S Auger

Drill Date: 04/19/16

Hole Size: 125mm

WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB. **R3T 6B8** 

Elevation: 232.06 m

Checked by: SSU

Client: City of Winnipeg

**TH49** 

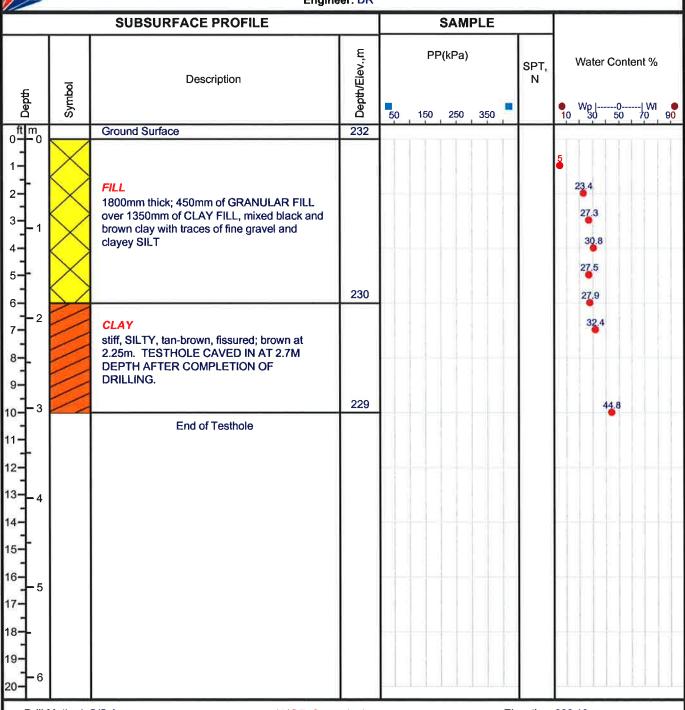
Project: Back Alley Renewal, 2016

Location: Between Poplarwood and Berrydale Ave.



Enclosure:

Engineer: DR



Drill Method: S/S Auger

Drill Date: 04/19/16

Hole Size: 125mm

WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB. R3T 6B8 Elevation: 232.10 m

Checked by: SSU

Project No: 151-13889-00 **TH50** Client: City of Winnipeg Project: Back Alley Renewal, 2016 Location: Between Poplarwood and Berrydale Ave. **Enclosure:** Engineer: DR SUBSURFACE PROFILE SAMPLE Depth/Elev.,m PP(kPa) Water Content % SPT, Description Ν Symbol Depth Wp |-----0-----| WI 30 50 70 50 150 250 350 232 **Ground Surface** FILL 1350mm thick; 600mm of GRANULAR FILL 20.7 over 750mm of CLAY FILL, mixed black and brown clay with traces of fine gravel and clayey SILT 29.2 231 CLAY 231 25.7 stiff, brown, fissured 23.8 2 SILT 23.5 soft tan-brown, clayey 229 CLAY stiff, SILTY, tan-brown, fissured; brown at 229 3 2.25m. TESTHOLE CAVED IN AT 2.7M 10 **DEPTH AFTER COMPLETION OF** DRILLING. **End of Testhole** 12 13 Drill Method: S/S Auger WSP Canada Inc. Elevation: 232.11 m 1600 Buffalo Place Checked by: SSU Drill Date: 04/19/16 Winnipeg, MB. **R3T 6B8** 

Sheet: 1 of 1

Hole Size: 125mm

Client: City of Winnipeg

**TH51** 

Sheet: 1 of 1

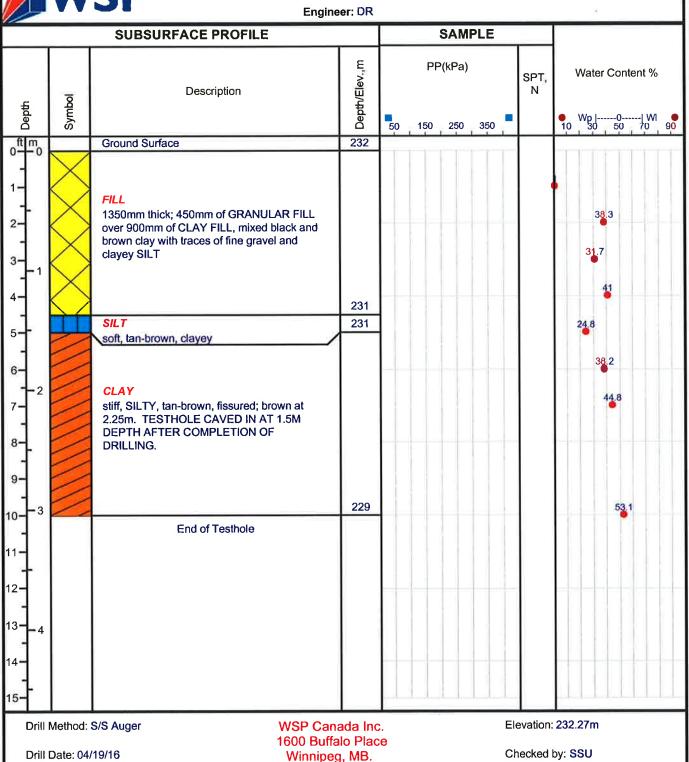
Project: Back Alley Renewal, 2016

Location: Between Poplarwood and Berrydale Ave.



Hole Size: 125mm

Enclosure:



**R3T 6B8** 

Client: City of Winnipeg

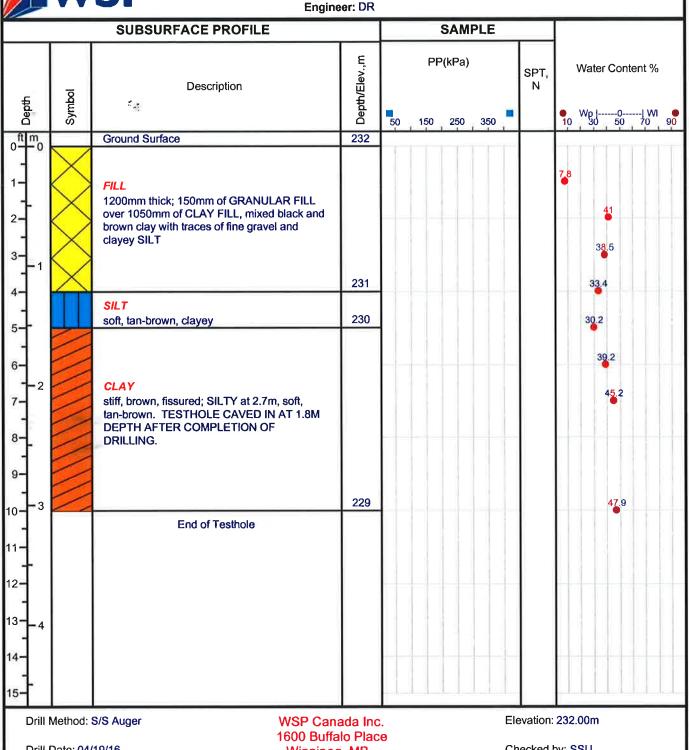
**TH52** 

Project: Back Alley Renewal, 2016

Location: Between Poplarwood and Berrydale Ave.



Enclosure:

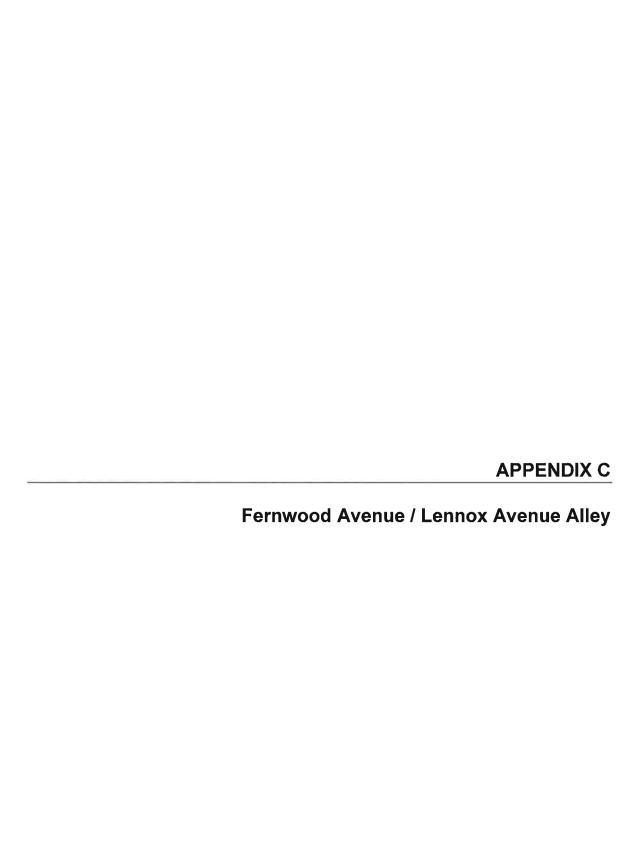


Drill Date: 04/19/16

Hole Size: 125mm

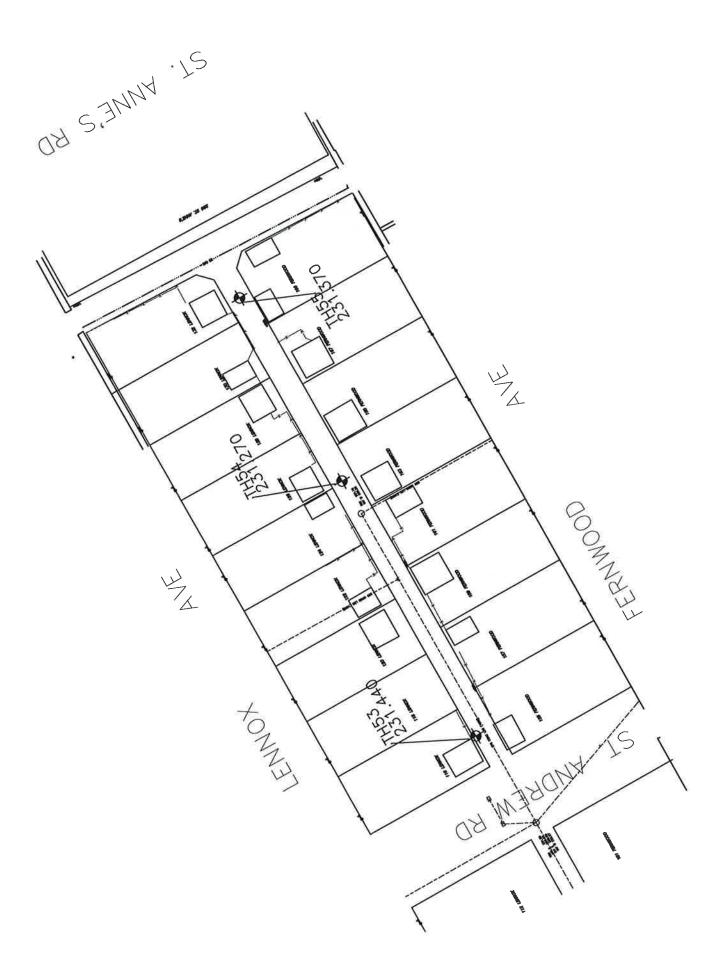
Winnipeg, MB. **R3T 6B8** 

Checked by: SSU



Fernwood Avenue/ Lennox Avenue Alley St. Andrew Road to St. Anne's Road

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	Plasticity Index	Î	Ī	I
Atterberg Limits	Liquid Limit Plastic Limit	Į	ı	1
	Liquid Limit	1	1	
	Clay (%)	1	51	-
e Analysis	Silt (%)	Ĭ	43	Í
Particle Size Analysis	Sand (%)	1	φ	
	Gravel (%)	ı	<u>I</u>	
Moisture Content (%)		I	31.1	1
Sample Depth (m)		•	9.0	1
Soil Description		Clay Fill, mixed	Clay Fill, mixed	Clay Fill, mixed
Structure	Thickness (mm)	450	750	750
Pavement Structure Material	Туре	Clay Fill, mixed	Clay Fill, mixed	Clay Fill, mixed
ırface	Thickness (mm)	450	300	300
Pavement Surface	Туре	Granular Fill	Granular Fill	Granular Fill
Testhole Location		See site plan	See site plan	See site plan
Testhole ID		TH53	TH54	TH55



Client: City of Winnipeg

**TH53** 

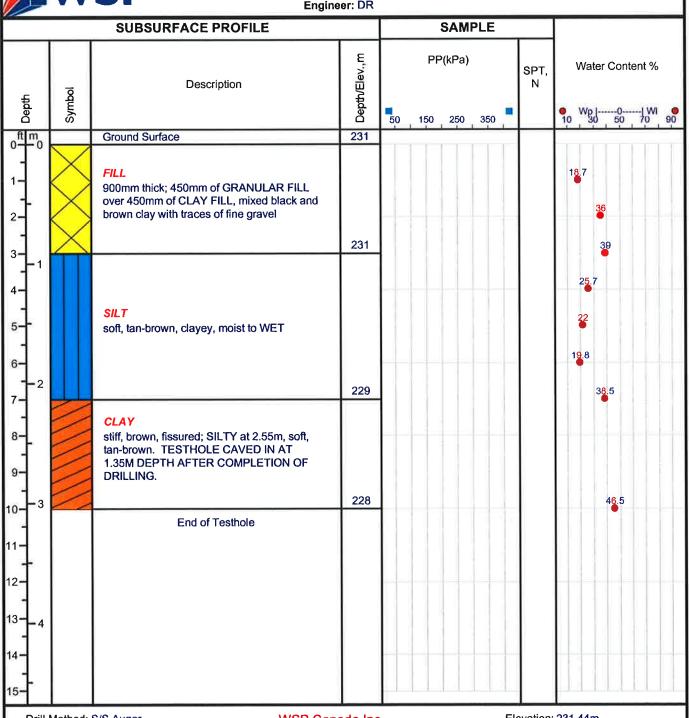
Project: Back Alley Renewal, 2016

Location: Between Fernwood and Lennox Ave.



Enclosure:

Engineer: DR



Drill Method: S/S Auger

Drill Date: 04/19/16

Hole Size: 125mm

WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB. **R3T 6B8** 

Elevation: 231.44m

Checked by: SSU

Client: City of Winnipeg

**TH54** 

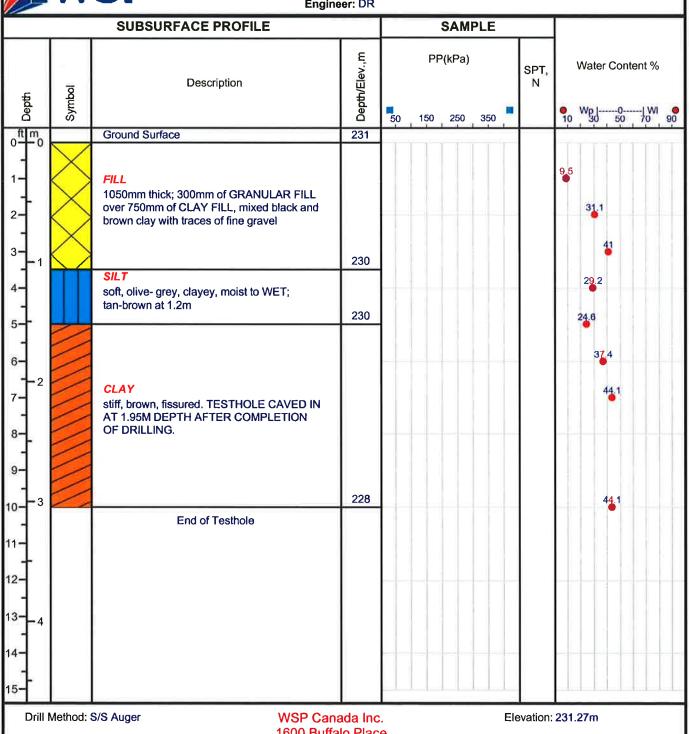
Project: Back Alley Renewal, 2016

Location: Between Fernwood and Lennox Ave.



Enclosure:

**Engineer: DR** 



Drill Date: 04/20/16

Hole Size: 125mm

1600 Buffalo Place Winnipeg, MB. **R3T6B8** 

Checked by: SSU

Client: City of Winnipeg

**TH55** 

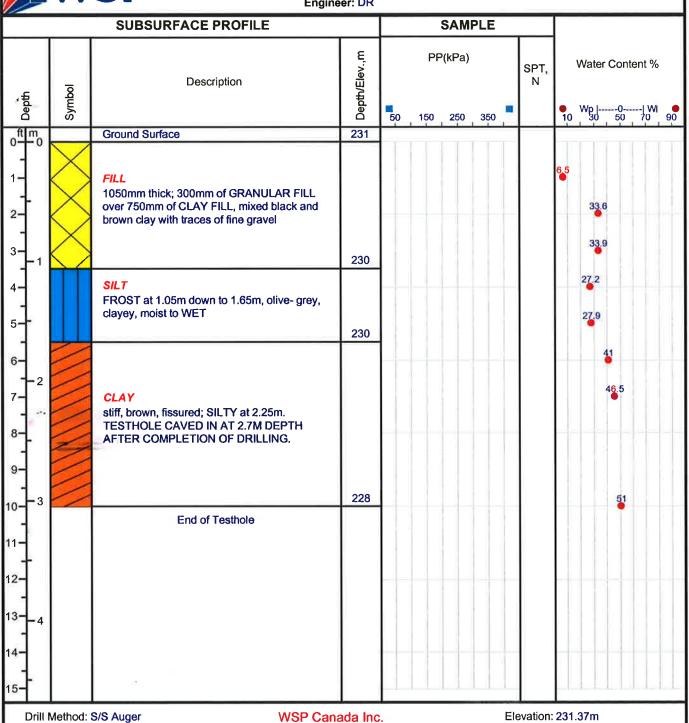
Project: Back Alley Renewal, 2016

Location: Between Fernwood and Lennox Ave.



**Enclosure:** 

Engineer: DR

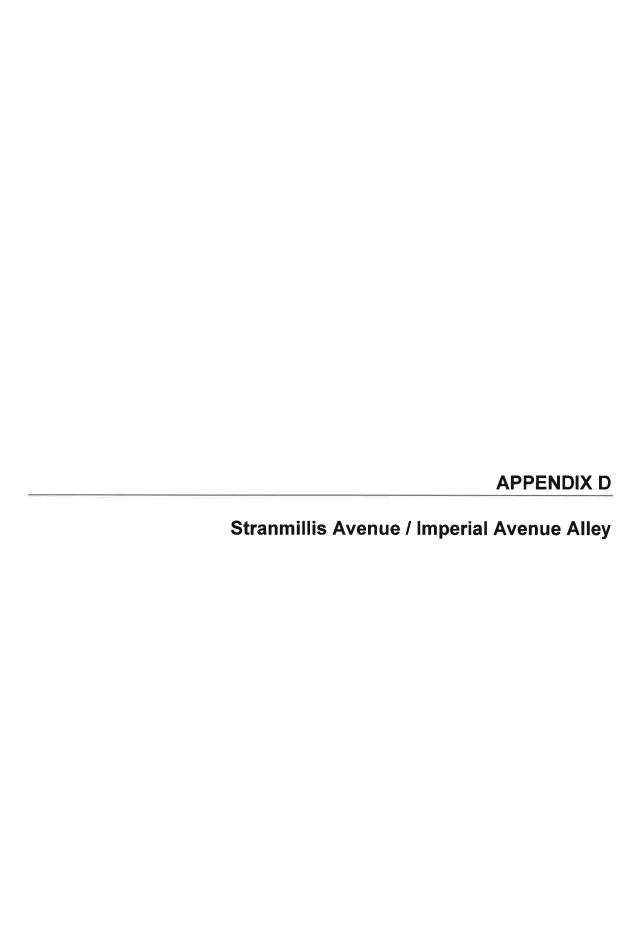


Drill Date: 04/20/16

Hole Size: 125mm

WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB. **R3T 6B8** 

Checked by: SSU



Stranmillis Avenue/ Imperial Avenue Alley St. Anne's Road to Rue Des Meurons

		1			
Atterbert Limits	Plasticity Index	1	1	Ì	
	Plastic Limit	I,	1	į	
	Liquid Limit	ľ	1	1	
	Clay (%)	47	(1)	1	
e Analysis	Silt (%)	43	1	1	
Particle Size Analysis	Sand (%)	10	1	1	
	Gravel (%)	I	11	) <b>.</b>	
Moisture Content (%)		27.7	I		
Sample Depth (m)		9.0	-	ı	
Soil		Clay Fill, mixed clay	Clay Fill, mixed	Clay Fill, mixed	
	Thickness (mm)	006	1350	1200	
Pavement Structure Material	Туре	Clay Fill, mixed	Clay Fill, mixed	Clay Fill, mixed	
Pavement Surface	Thickness (mm)	300	150	300	
	Туре	Granular Fill	Granular Fill	Granular Fiil	
Testhole Location		See site plan	See site plan	See site plan	
Testhole ID		TH56	TH57	TH58	

Client: City of Winnipeg

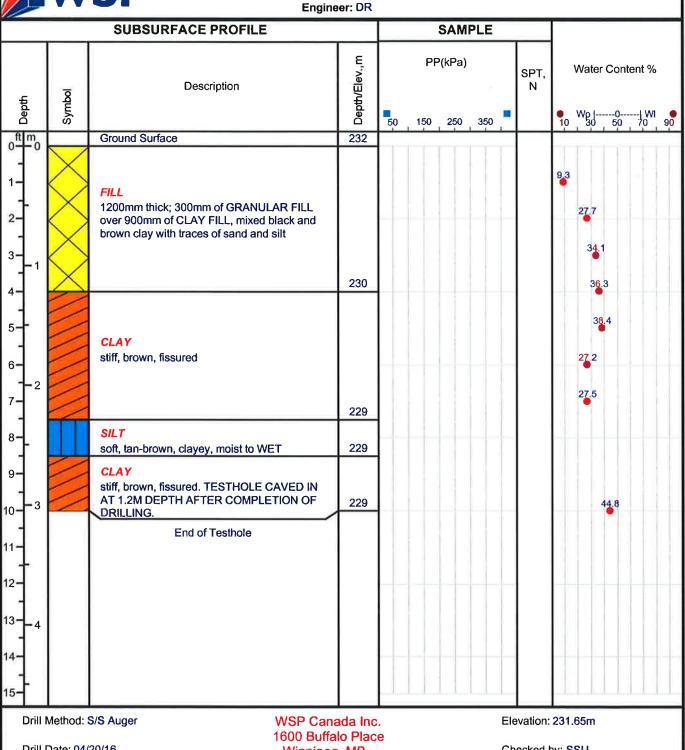
**TH56** 

Project: Back Alley Renewal, 2016

Location: Between Stranmillis and Imperial Ave.



**Enclosure:** 



Drill Date: 04/20/16

Hole Size: 125mm

Winnipeg, MB. **R3T 6B8** 

Checked by: SSU

Client: City of Winnipeg

**TH57** 

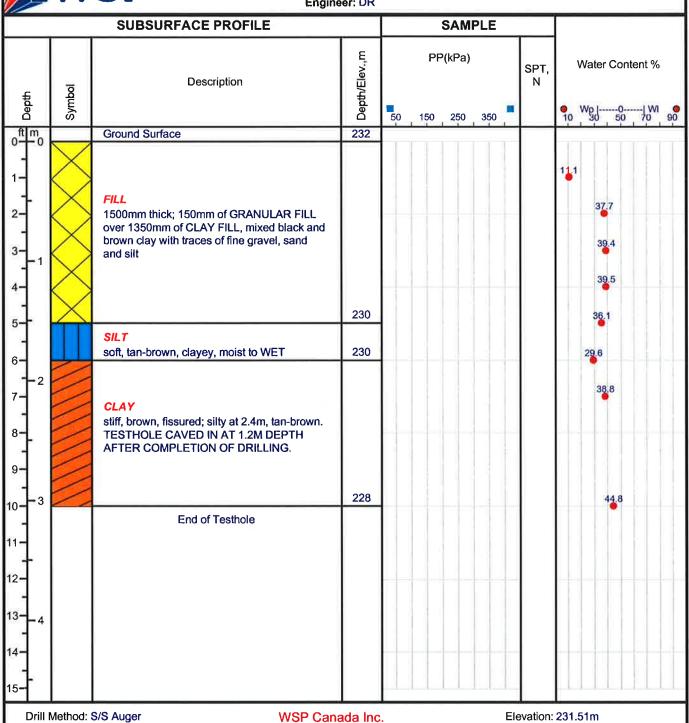
Project: Back Alley Renewal, 2016

Location: Between Stranmillis and Imperial Ave.



Enclosure:

Engineer: DR



Drill Date: 04/20/16

Hole Size: 125mm

1600 Buffalo Place Winnipeg, MB. **R3T 6B8** 

Checked by: SSU

Client: City of Winnipeg

**TH58** 

Sheet: 1 of 1

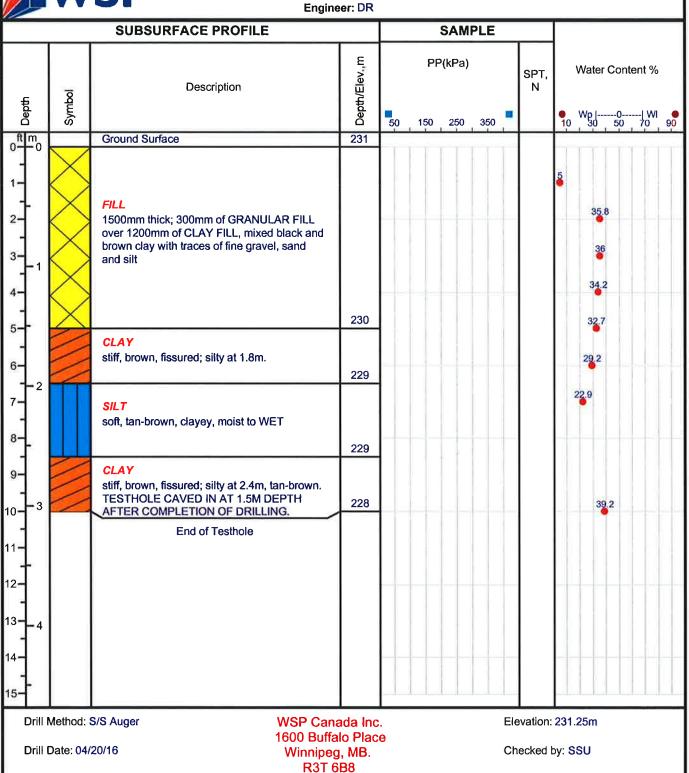
Project: Back Alley Renewal, 2016

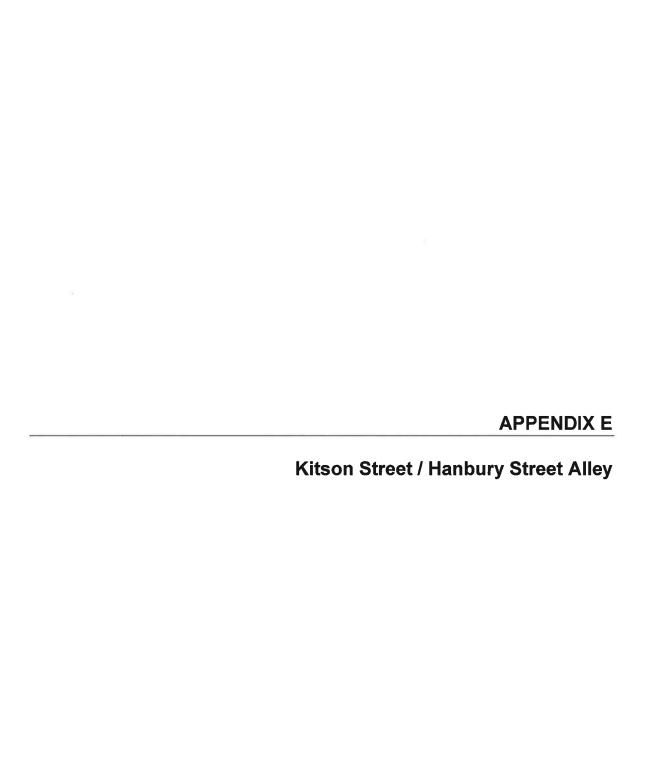
Location: Between Stranmillis and Imperial Ave.



Hole Size: 125mm

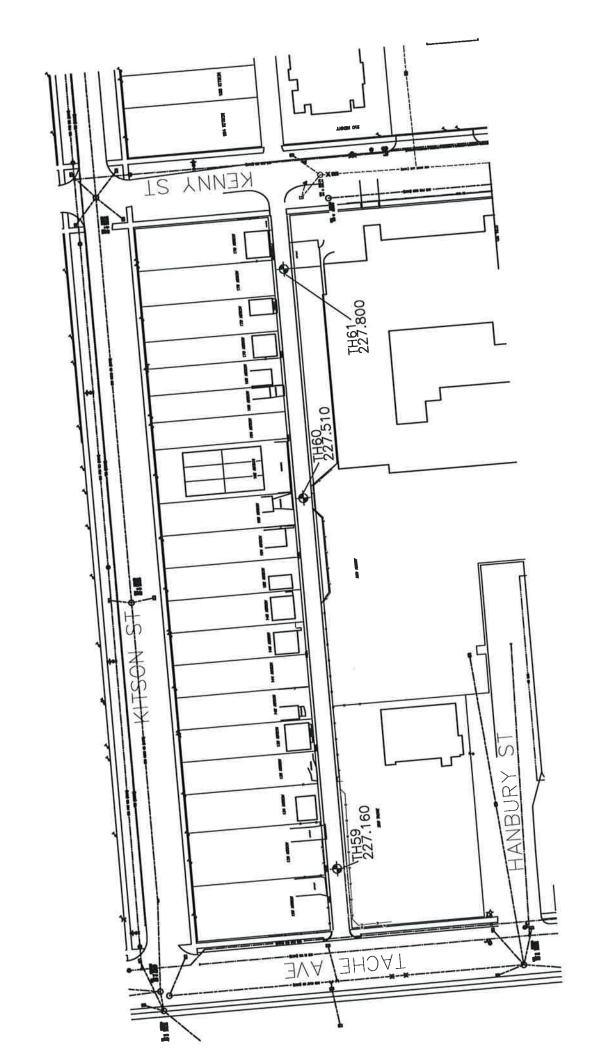
Enclosure:





Kitson Street / Hanbury Street Alley Tache Avenue to Kenny Street

	Plasticity Index	<del></del>	ï	(1)
Atterberg Limits	Plastic Limit	1	Î	I
	Liquid Limit	Ĭ	1	T
	Clay (%)	17	Ĩ	1
Particle Size Analysis	Silt (%)	36	1	-
Particle Siz	Sand (%)	34	Į.	Œ.
	Gravel (%)	13	I	115
Moisture Content (%)		18.8	1	S <b>I</b> S
Sample Depth (m)		9.0	ï	
Soil Description		Clay Fill, mixed	Ctay Fill, mixed	Clay Fill, mixed
Structure irial	Thickness (mm)	1050	1950	1800
Pavement Structure Material	Туре	Clay Fill, mixed	Clay Fil, mixedl	Clay Fill, mixed
Pavement Surface	Thickness (mm)	450	450	009
Paveme	Type	Granular Fill	Granular Fill	Granular Fill
Testhole Location		See site plan	See site plan	See site plan
Testhole ID		TH59	ТН60	ТН61



Client: City of Winnipeg

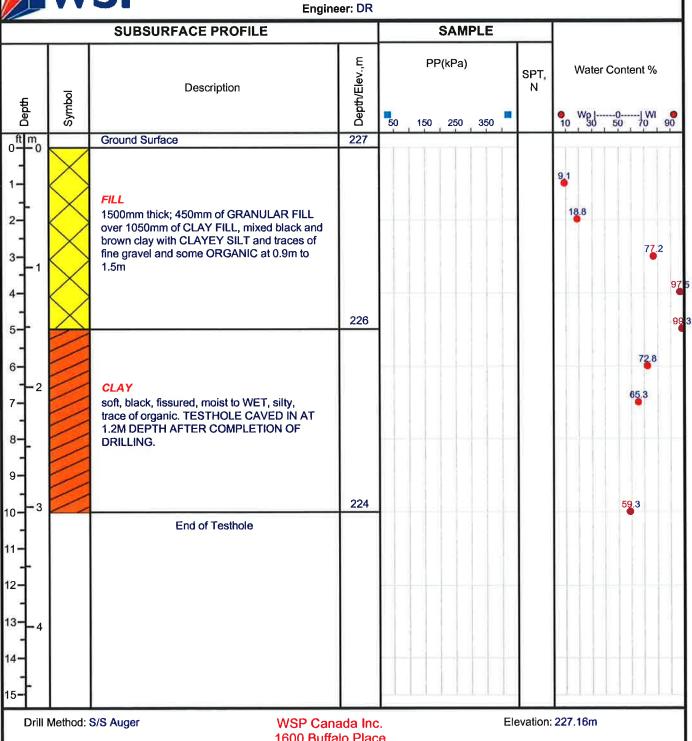
**TH59** 

Project: Back Alley Renewal, 2016

Location: Between Kitson St. and Hanbury St.



Enclosure:



Drill Date: 04/20/16

Hole Size: 125mm

WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB. R3T 6B8

Checked by: SSU

Client: City of Winnipeg

**TH60** 

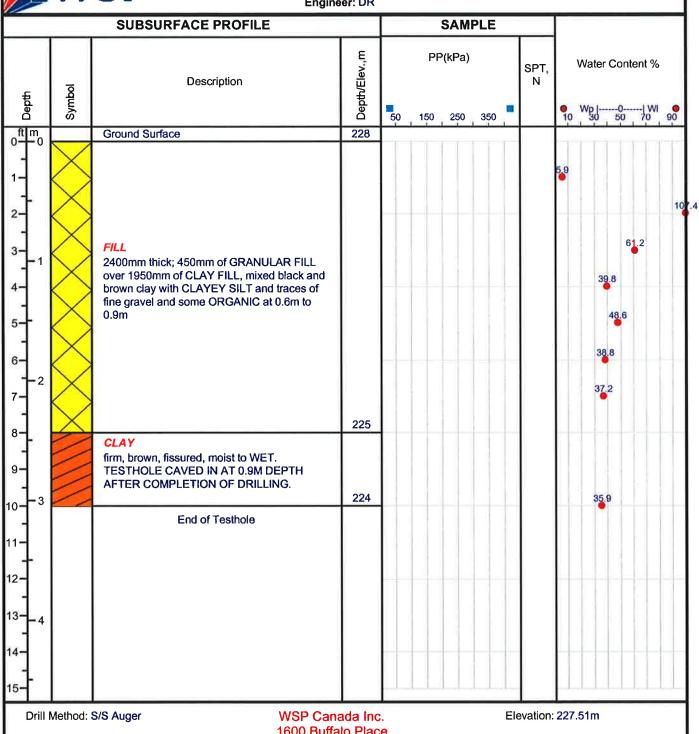
Project: Back Alley Renewal, 2016

Location: Between Kitson St. and Hanbury St.



**Enclosure:** 

**Engineer: DR** 



Drill Date: 04/20/16

Hole Size: 125mm

1600 Buffalo Place Winnipeg, MB. **R3T 6B8** 

Checked by: SSU

Client: City of Winnipeg

**TH61** 

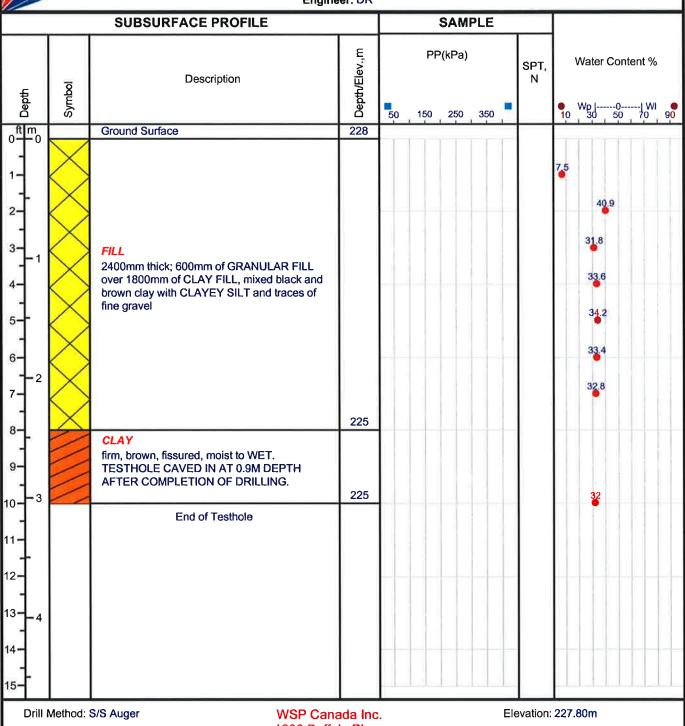
Project: Back Alley Renewal, 2016

Location: Between Kitson St. and Hanbury St.



**Enclosure:** 

Engineer: DR



Drill Date: 04/20/16

Hole Size: 125mm

WSP Canada Inc. 1600 Buffalo Place Winnipeg, MB. R3T 6B8

Checked by: SSU