APPENDIX ‘F’

GEOTECHNICAL REPORT

GEOTECHNICAL INVESTIGATION
RESIDENTIAL STREETS RECONSTRUCTION
WINNIPEG, MANITOBA

Submitted to:

MMM Group Limited
111-93 Lombard Avenue
Winnipeg, Manitoba
R3B 3B1

Attention: Mr. Vilko Maroti

Submitted by:

Amec Foster Wheeler Environment & Infrastructure

440 Dovercourt Drive
Winnipeg, Manitoba
R3Y 1N4

21 January 2015

Amec Foster Wheeler File No. WX17565R1

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler), was retained by MMM Group Limited (MMM) to conduct a pavement coring and geotechnical investigation for proposed upgrading projects for several streets in Winnipeg, Manitoba. The investigation was conducted on sections of 13 residential Winnipeg streets, as follows:

Coring and Geotechnical Investigation:

- Andrews Street: Jefferson Avenue To Hartford Avenue
- Church Avenue: Aikins Street to Salter Street
- Machray Avenue: Main Street to Emslie Street
- Powers Street: Burrows Avenue To Pritchard Avenue
- Redwood Avenue: Battery Street to Sergeant Tommy Prince Street

Coring Only:

- Airlies Street: Merriwood Avenue to Jefferson Avenue
- Ashmore Drive: Mandalay Drive to Adsum Drive
- Burrows Avenue: Keewatin Street to Dorset Street
- Duval Street: Adsum Drive to Margate Road
- Hallet Street: Rover Avenue to Euclid Avenue
- Redwood Avenue: Shaughnessy Street to Sheppard Street
- Rose Hill Place: Rose Hill Way to Rose Hill Way
- Rose Hill Way: Garton Avenue to Rose Hill Place.

The purpose of the investigation was to determine the pavement condition and soil profile at selected locations along the subject section of each street. The numbers of test holes per street were determined by MMM. Amec Foster Wheeler selected the test hole locations and confirmed the locations with MMM prior to the investigation.

2.0 SITE CONDITIONS

At the streets investigated, the roadway surface consisted of either asphalt or concrete. At the time of the investigation, the roadways were snow and ice covered and therefore a detailed review of the pavement condition was not possible. Typical of roads in the Winnipeg area, the roads were generally flat lying and level, with local slopes between catch basins to facilitate drainage.

3.0 FIELD INVESTIGATON

Prior to coring and drilling, Amec Foster Wheeler had public underground utilities located. Between 3 and 9 December 2014, following utility clearances, all 40 test hole locations were cored in order to determine the asphalt and/or concrete thicknesses. Because of variable conditions encountered in the initial coring at Airlies Street and Hallet Street, two additional locations were cored on each of these streets on 15 January 2015. All coring was completed

with a 150 mm diameter diamond coring barrel. Each of the cores was photographed and photos are presented in Appendix B.

On 4 and 5 December 2014, Amec Foster Wheeler supervised the drilling of 24 test holes by Maple Leaf Drilling Ltd. using their B40 truck mounted drill rig, equipped with 125 mm solid stem augers. The test holes were drilled in previously cored locations except for Powers Street TH05 which was obstructed by parked vehicles, and Church Street TH03, which conflicted with underground utilities, and were drilled through the pavement about 3 m away from the cored location. The coring and test hole locations are shown on Figures 1 to 6. Amec Foster Wheeler provided traffic control using flashing light-board trailers, cones, and signs from Guardian Traffic Services.

All soils observed during test hole drilling were visually classified on site according to the Modified Unified Soil Classification System and in accordance with the City of Winnipeg geotechnical guidelines. Groundwater and drilling conditions, as well as any pertinent subsurface observations, were also recorded at the time of the investigation.

Disturbed soil samples were taken at 0.3 m intervals from the auger flights in each test hole. All soil samples obtained during the field investigation were labelled, sealed in plastic bags to limit moisture loss and transported to Amec Foster Wheeler's soils laboratory in Winnipeg for further examination and testing. The test hole logs are presented in Appendix A, Figures 7 to 30, and show the soil profile, results of the field and laboratory testing, and comments relative to groundwater and sloughing conditions encountered.

Each test hole was backfilled with the auger cuttings and patched with asphalt after coring and drilling, with excess cuttings removed from the road.

4.0 LABORATORY TESTING

Soil samples were returned to Amec Foster Wheeler’s soils laboratory in Winnipeg for geotechnical laboratory testing. The soil samples were visually classified and tested for in-situ moisture contents, and selected samples were tested for Atterberg limits and hydrometer analysis, in accordance with City requirements.

5.0 SUBSURFACE CONDITIONS

The generalized stratigraphy, as noted in the test holes for each investigated street is summarized in the following sections. It should be noted that the maximum gravel sizes noted are inferred, since drilling in freezing conditions can break the gravel into finer particles. Detailed soil stratigraphy is illustrated in the test hole logs presented in Appendix A.

5.1 Andrews Street – Test Holes TH01 to TH06

Concrete pavement, between 130 and 155 mm thick, was present at the ground surface at every test hole, and was underlain by 80 to 460 mm of clay fill. Alternating layers of native clay and silt, between 0.3 to 0.7 m thick, were encountered below the pavement and fill layers and extended to the maximum depths explored. The ground was frozen to 0.5 to 0.8 m below the pavement surface.

The clay fill generally contained variable silt, sand, and gravel, and was medium to high plastic, damp to moist, firm to stiff or friable when thawed, and brown or grey.

The silt generally contained trace to some clay, and was low plastic, moist to very moist, soft to stiff, grey or tan-brown, and contained occasional clay inclusions.

The native clay generally contained variable silt (some silt to silty), and was high plastic, damp to moist, stiff to very stiff, and brown or grey.

Table 1 summarizes the thickness and types of pavements and soils encountered at each of the test hole locations on Andrews Street.

Table 1: Andrews Street Pavement and Soil Thickness (mm)

Test Hole #	TH01	TH02	TH03	TH04	TH05	TH06
Concrete	145	155	130	140	145	150
Fill – Clay	80	305	320	460	460	165
Clay	700			610		460
Silt	900	300	760	610	460	610
Clay		300	610		760	460
Silt		300				
Clay		460				

5.2 Church Avenue – Test Holes TH01 to TH04

Asphalt pavement, between 27 and 65 mm thick, was present at the ground surface at every test hole, and was underlain by 30 to 120 mm of gravel fill. In TH02 and TH03 the asphalt pavement was observed to contain two distinct layers. In TH02 and TH03 clay fill between 275 and 640 mm thick was encountered below the gravel fill. Alternating layers of native high plastic clay and low plastic silt, between 0.3 to 0.8 m thick, were encountered below the pavement and fill layers and extended to the maximum depths explored. The ground was frozen to 0.5 to 0.8 m below the pavement surface.

The gravel fill was generally well graded, compact, with sub-rounded to angular particles, was damp to moist, and had maximum aggregate diameters between 19 and 50 mm at the test hole locations.

The clay fill generally was silty and contained traces of sand and gravel, was high plastic, damp to moist, firm or friable when thawed, and grey.

The silt generally contained trace to some clay, and was low plastic, moist to very moist, soft to stiff, and tan-brown.

The native clay generally contained variable silt (some silt to silty), and was high plastic, damp to moist, firm to very stiff, and brown or grey.

Table 2 summarizes the thickness and types of pavements and soils encountered at each of the test hole locations on Church Street.

Table 2: Church Avenue Pavement and Soil Thickness (mm)

Test Hole #	TH01	TH02	TH03	TH04
Asphalt	30	25+28	28+37	27
Fill – Gravel	120	120	60	30
Fill – Clay		275	640	
Clay	610		300	670
Silt	1070	760	760	300
Clay		610	610	760

5.3 Machray Avenue – Test Holes TH01 to TH04

Asphalt pavement, between 73 and 133 mm thick, was present at the ground surface at every test hole. In TH01 the asphalt pavement was observed to contain two distinct layers, and in TH03 the asphalt pavement was underlain by concrete pavement measuring 95 mm thick. Gravel fill between 30 and 90 mm thick was encountered immediately below the pavement in all test holes. The gravel fill in TH04 was underlain by a 150 mm thick layer of clay fill. In TH01 to TH03, native high plastic clay was encountered immediately below the pavement and fill layers and extended to the test hole termination depths. In TH02 a layer of silt 0.8 m thick was encountered between layers of the clay. In TH04 a layer of silt 1.2 m thick was encountered immediately below the fill, and was underlain by clay which extended to the maximum depth explored. The ground was frozen up to 0.6 m below the pavement surface.

The gravel fill was poorly graded in TH02, but was otherwise generally well graded. The gravel was compact, with sub-rounded to angular particles, was damp, brown or grey, and had maximum aggregate diameters between 12 and 25 mm at the test hole locations.

The clay fill was silty and contained traces of sand and gravel, was high plastic, damp to moist, friable when thawed, and grey.

The silt generally contained trace to some clay, and was low to medium plastic, moist to very moist, soft to stiff, and tan-brown.

The native clay generally contained variable silt (some silt to silty), and was high plastic, damp to moist, stiff to very stiff, and brown or grey.

Table 3 summarizes the thickness and types of pavements and soils encountered at each of the test hole locations on Machray Avenue.

Table 3: Machray Avenue Pavement and Soil Thickness (mm)

Test Hole #	TH01	TH02	TH03	TH04
Asphalt	52+37	133	73	110
Concrete	0	0	95	0
Fill – Gravel	90	30	60	45
Fill – Clay				150
Clay	1650	760	1580	
Silt		760		1220
Clay		150		300

5.4 Powers Street – Test Holes TH01 to TH05

Asphalt pavement, between 20 and 90 mm thick, was present at the ground surface at every test hole. In TH04 the asphalt pavement was observed to contain two distinct layers. The asphalt was underlain by 30 to 120 mm of concrete rubble or gravel fill in all test holes. In TH04 and TH05 clay fill was encountered immediately below the rubble or gravel fill. The pavement and fill layers were underlain by high plastic clay in all test holes, and extended to the maximum depths explored. In TH01, TH02, and TH05 a layer of silt, between 0.3 and 0.6 m thick, was encountered within the clay layer. The ground was frozen to 0.6 to 0.8 m below the pavement surface.

The gravel fill was generally well graded, compact, with sub-rounded to angular particles, was damp, brown or grey, and had maximum aggregate diameters between 19 and 50 mm at the test hole locations.

The clay fill contained variable silt (silty to “and silt”) and traces of sand and gravel, was high plastic, damp to moist, stiff or friable when thawed, and brown or grey.

The silt generally contained some clay, and was low plastic, moist to very moist, very soft to soft, and tan-brown.

The native clay generally contained variable silt (trace silt to silty), and was high plastic, damp to moist, soft to very stiff, and black, grey or brown.

Table 4 summarizes the thickness and types of pavements and soils encountered at each of the test hole locations on Powers Street.

Table 4: Powers Street Pavement and Soil Thickness (mm)

Test Hole #	TH01	TH02	TH03	TH04	TH05
Asphalt	54	35	20	15+75	30
Concrete	100 (Rubble)			30 (Rubble)	
Fill – Gravel		120	120		120
Fill – Clay				185	610
Clay	460	610	1830	1520	460
Silt	610	550			300
Clay	610	520			300

5.5 Redwood Avenue (Battery St. to Sgt. Tommy Prince St.) – Test Holes TH01 to TH05

Asphalt pavement, between 45 and 105 mm thick, was present at the ground surface at every test hole, and was underlain by gravel fill between 25 and 185 mm thick. In all test holes a layer of silt, between 0.5 and 0.9 m thick, was encountered immediately below the pavement and fill layers and was underlain by high plastic clay, which extended to the maximum depths explored. The ground was frozen up to 0.3 m below the pavement surface.

The gravel fill was poorly graded in TH03 but otherwise generally well graded, compact, with sub-rounded to angular particles, and was damp, brown or grey, and had maximum aggregate diameters between 12 and 35 mm.

The silt generally contained trace to some clay, and was low plastic, moist to very moist, soft to very stiff, and tan-brown.

The native clay generally contained variable silt (some silt to silty), and was high plastic, moist, firm to very stiff, and brown or grey.

Table 5 summarizes the thickness and types of pavements and soils encountered at each of the test hole locations on Redwood Avenue between Battery Street and Sergeant Tommy Prince Street.

Table 5: Redwood Avenue (Battery St. to Sgt. Tommy Prince St.) Pavement and Soil Thickness (mm)

Test Hole #	TH01	TH02	TH03	TH04	TH05
Asphalt	55	60	105	45	78
Fill – Gravel	170	105	25	185	65
Silt	530	750	940	820	620
Clay	1370	1220	1070	1070	1370

5.6 Coring Summary

Table 6 summarizes the thickness and types of pavements encountered at each of the coring locations not previously described with the drilling results. Photographs of all cores along with detailed coring location descriptions are presented in Appendix B.

Table 6: Pavement Thickness (mm)

Street	Pavement Type	Core #			
		C01	C02	C03	C04
Airlies Street	Asphalt	42	0	60	55
	Concrete	Rubble	158	150	160
Ashmore Drive	Asphalt	0	0	0	--
	Concrete	154	155	140	--
Hallet Street	Asphalt	55	0	45	50
	Concrete	0	150	230	50 (Rubble) + 130
Burrows Avenue	Asphalt	78	28	--	--
	Concrete	235	220	--	--
Duval Street	Asphalt	0	0	--	--
	Concrete	145	140	--	--
Redwood Avenue (Shaughnessy St. to Sheppard St.)	Asphalt	0	0	0	--
	Concrete	235	225	190	--
Rose Hill Way	Asphalt	0	0	--	--
	Concrete	155	175	--	--

The results from the initial and additional cores on Airlies Street and Hallet Street were as follows:

Airlies Street

- C01 indicated asphalt over concrete rubble. This location was not subsequently drilled and the depth of rubble was not determined.
- C02 indicated concrete with no asphalt overlay. Since the street was covered in approximately 10 cm of compacted snow and ice during the coring, no visual assessment of the pavement surface was made.
- C03 and C04 showed asphalt over a concrete pavement structure.

Hallet Street

- C01 indicated asphalt over a gravel base. It is possible that there was additional concrete below the gravel base. This location was not subsequently drilled and the depth of gravel was not determined.
- C02 indicated concrete with no asphalt overlay. Since the street was covered in approximately 10 cm of compacted snow and ice during the coring, no visual assessment of the pavement surface was made.
- C03 showed asphalt over a concrete pavement structure.
- C04 showed asphalt over concrete rubble over weathered but intact concrete.

6.0 CLOSURE

The findings of this report were based on the results of field and laboratory investigations at test hole locations as selected by MMM Group Limited.

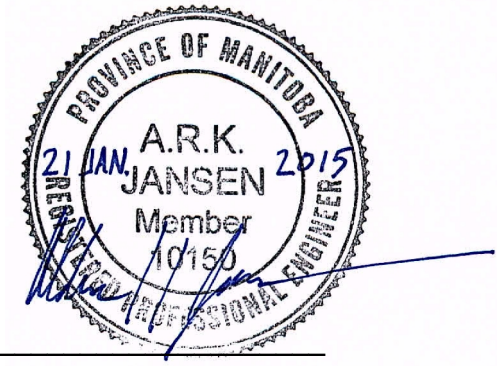
The site investigation was conducted for the sole purpose of profiling the pavement and subsurface conditions. Although no environmental issues were identified during the fieldwork, this does not indicate that no such issues exist. If the owner or other parties have any concern regarding the presence of environmental issues, then an appropriate level environmental assessment should be conducted.

Soil conditions, by their nature, can be highly variable across a site. The placement of fill and prior construction activities on a site can contribute to the variability especially near surface soil conditions. A contingency should always be included in any construction budget to allow for the possibility of variation in soil conditions, which may result in modification of any potential design and construction procedures which may arise from this factual investigative report.

This report was prepared exclusively for MMM Group Limited, and their clients and agents for the proposed development as described in the report. The data provided herein are presented in a factual manner only with no engineering interpretation provided, and should not be used for any other purpose, or by any other parties, without review and advice from a qualified geotechnical engineer. No other warranty, expressed or implied, is given.

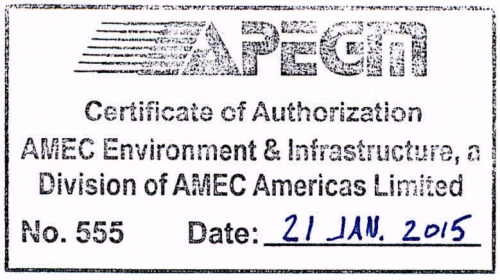
Sincerely,

Amec Foster Wheeler
Environment & Infrastructure



Aldin Jansen, P.Eng.
Geotechnical Engineer

Reviewed By:



Harley Pankratz, P.Eng.
Senior Associate Geotechnical Engineer
VP; Eastern Prairies and Northern Alberta

FIGURES

P:\JOBS\17500'S\17560S\17565 MMM - WPG STREETS CORING 2014\DRAWINGS\WX17565.DWG

LEGEND:
TEST HOLE LOCATION

CLIENT LOGO

CLIENT:
MMM GROUP LIMITED

AMEC Environment & Infrastructure
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MANITOBA R3Y 1N4 PHONE:
204.488.2997 FAX:204.489.8261

DWN BY:	MD
CHK'D BY:	AJ
DATUM:	NAD83
PROJECTION:	UTM Zone 14 U
SCALE:	AS SHOWN

STREET CORING PROGRAM
VARIOUS STREET LOCATIONS
WINNIPEG, MANITOBA

CORE/TEST HOLE LOCATIONS
(POWERS ST/CHURCH ST)

DATE:	DECEMBER 2014
PROJECT NO:	WX17565
REV. NO.:	A
FIGURE NO:	FIGURE 1

P:\JOBS\17500'S\17560'S\17565 MMM - WPG STREETS CORING 2014\DRAWINGS\WX17565.DWG

LEGEND:
TEST HOLE LOCATION

CLIENT LOGO

CLIENT:
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DWN BY:	MD
CHK'D BY:	AJ
DATUM:	NAD83
PROJECTION:	UTM Zone 14 U
SCALE:	AS SHOWN

STREET CORING PROGRAM
VARIOUS STREET LOCATIONS
WINNIPEG, MANITOBA

CORE/TEST HOLE LOCATIONS (ANDREWS ST/MACHRAY AVE)

DATE:	DECEMBER 2014
PROJECT NO:	WX17565
REV. NO.:	A
FIGURE NO:	FIGURE 2

P:\JOBS\17500'S\17560S\17565 MMM - WPG STREETS CORING 2014\DRAWINGS\WX17565.DWG

LEGEND:

- TEST HOLE LOCATION
- CORE HOLE LOCATION

CLIENT LOGO

CLIENT:

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DWN BY:	MD
CHK'D BY:	AJ
DATUM:	NAD83
PROJECTION:	UTM Zone 14 U
SCALE:	AS SHOWN

STREET CORING PROGRAM
VARIOUS STREET LOCATIONS
WINNIPEG, MANITOBA

CORE/TEST HOLE LOCATIONS (REDWOOD AVE)

DATE:	DECEMBER 2014
PROJECT NO:	WX17565
REV. NO.:	A
FIGURE NO:	FIGURE 3

LEGEND:
CORE HOLE LOCATION

CLIENT LOGO

CLIENT:
MMM GROUP LIMITED

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DWN BY:	MD
CHK'D BY:	AJ
DATUM:	NAD83
PROJECTION:	UTM Zone 14 U
SCALE:	AS SHOWN

STREET CORING PROGRAM
VARIOUS STREET LOCATIONS
WINNIPEG, MANITOBA

CORE/TEST HOLE LOCATIONS
(ASHMORE DR/DUVAL ST)

DATE:	DECEMBER 2014
PROJECT NO:	WX17565
REV. NO.:	A
FIGURE NO:	FIGURE 4

P:\JOBS\17500\S\17560S\17565 MMM - WPG STREETS CORING 2014\DRAWINGS\WX17565.DWG

P:\JOBS\17500'S\17560S\17565 MMM - WPG STREETS CORING 2014\DRAWINGS\WX17565.DWG

LEGEND:
CORE HOLE LOCATION

CLIENT LOGO

CLIENT:
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DWN BY:	MD
CHK'D BY:	AJ
DATUM:	NAD83
PROJECTION:	UTM Zone 14 U
SCALE:	AS SHOWN

STREET CORING PROGRAM
VARIOUS STREET LOCATIONS
WINNIPEG, MANITOBA

CORE/TEST HOLE LOCATIONS
(HALLET ST/AIRLIES ST)

DATE:	JANUARY 2015
PROJECT NO:	WX17565
REV. NO.:	A
FIGURE NO:	FIGURE 5

P:\JOBS\17500'S\17560S\17565 MMM - WPG STREETS CORING 2014\DRAWINGS\WX17565.DWG

LEGEND:

CORE HOLE LOCATION

CLIENT LOGO

CLIENT:

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DWN BY:	MD
CHK'D BY:	AJ
DATUM:	NAD83
PROJECTION:	UTM Zone 14 U
SCALE:	AS SHOWN

STREET CORING PROGRAM
VARIOUS STREET LOCATIONS
WINNIPEG, MANITOBA

CORE/TEST HOLE LOCATIONS
(BURROWS AVE/ROSE HILL WAY)

DATE:	DECEMBER 2014
PROJECT NO:	WX17565
REV. NO.:	A
FIGURE NO:	FIGURE 6

APPENDIX A

TEST HOLE LOGS

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Andrews - TH01**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		CONC	CONCRETE (145 mm thick)				- frozen to 0.6 m	0
		CH	CLAY (FILL) - silty, sandy, high plastic, moist, firm, brown		1			
			CLAY - some silt, trace sand, high plastic, damp to moist, stiff, dark greyish brown, occasional silt inclusions		2			
		CH	- moist, very stiff, greyish brown below 0.6 m		3		Particle Size Analysis @ 0.5m: Gravel= 0.0% Sand= 1.0% Silt= 22.0% Clay= 77.0%	
1			SILT - trace clay, low plastic, moist, stiff, grey-light brown		4			1
					5			
		CL	- moist to very moist, soft, tan-brown below 1.2 m		6			
			- light brown, occasional oxidation inclusions below 1.5 m		7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

36 26 32 24 23 24 22

17565 MMM - WINNIPEG STREETS.GPJ 14/12/19 06:04 PM (GEOTECHNICAL - REVISED)

amec

AMEC
Winnipeg, Manitoba

LOGGED BY: AL	COMPLETION DEPTH: 1.8 m
REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
Figure No. A1	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Andrews - TH02**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		CONC	CONCRETE (155 mm thick)				- frozen to 0.8 m	0
		CH	CLAY (FILL) - silty, sandy, trace fine gravel, high plastic, damp to moist, friable, dark grey - and SILT, mottled grey and brown		1 2			
		CL	SILT - trace clay, low plastic, very moist, soft, tan-brown, occasional clay inclusions		3			
1		CH	CLAY - silty, high plastic, moist, stiff, greyish brown, occasional silt inclusions		4			1
		CL	SILT - trace clay, low plastic, moist, soft, tan-brown		5			
		CH	CLAY - silty, high plastic, moist, very stiff, greyish brown, occasional silt inclusions - brownish grey, stiff below 1.7 m		6 7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

31 25 30 36 24 32 40

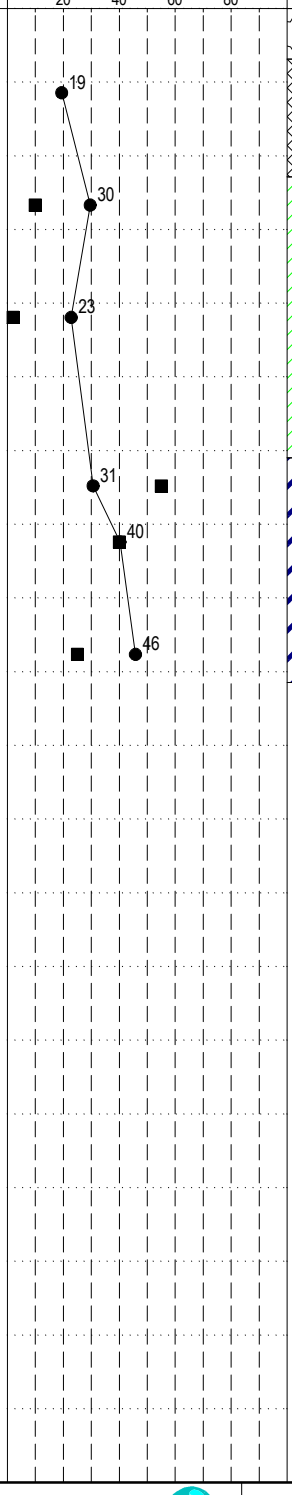
17565 MMM - WINNIPEG STREETS.GPJ 14/12/19 06:04 PM (GEOTECHNICAL - REVISED)

amec	**AMEC** **Winnipeg, Manitoba**	LOGGED BY: AL	COMPLETION DEPTH: 1.8 m
		REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
		Figure No. A2	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Andrews - TH03**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		CONC	CONCRETE (130 mm thick)				- frozen to 0.8 m	0
		CH	CLAY (FILL) - silty, trace sand and fine gravel, high plastic, friable, grey to dark grey		1			
		CL	SILT - some clay, low plastic, firm, greyish brown, occasional to frequent clay inclusions		2			
1		CL	- trace clay, low plastic, moist, soft, tan-brown, occasional clay inclusions below 0.8 m		3			1
		CH	CLAY - silty, high plastic, moist, very stiff, greyish brown, occasional silt inclusions		4			
		CH	- grey, stiff to very stiff below 1.5 m		5			
					6			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

17565 MMM - WINNIPEG STREETS.GPJ 14/12/19 06:04 PM (GEOTECHNICAL - REVISED)

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LOGGED BY: AL	COMPLETION DEPTH: 1.8 m
REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
Figure No. A3	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Andrews - TH04**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		CONC	CONCRETE (140 mm thick)				- frozen to 0.6 m	0
		CH	CLAY (FILL) - sandy, trace fine gravel, high plastic, damp to moist, friable, grey to dark grey - and SILT, trace sand, high plastic, moist, firm, mottled dark grey and tan, frequent silt inclusions		1 2			
		CL	SILT - some clay, low plastic, very moist, soft, tan-brown - occasional light grey silt lenses ~5 mm thick below 0.9 m		3 4		Particle Size Analysis @ 0.8m: Gravel= 0.0% Sand= 2.5% Silt= 82.7% Clay= 14.7%	
1								1
		CH	CLAY - silty, high plastic, moist, stiff, occasional silt and sulphate inclusions, brown - greyish brown, very stiff below 1.5 m - brownish grey, stiff below 1.7 m		5 6 7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

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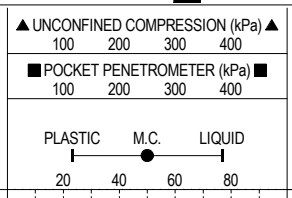
REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
Figure No. A4	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Andrews - TH05**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		CONC	CONCRETE (145 mm thick)				- frozen to 0.5 m	0
		CI	CLAY (FILL) - and SILT, some sand, medium plastic, damp to moist, friable, dark grey		1			
		CL	SILT - trace clay, low plastic, moist, soft, tan-brown, occasional clay inclusions		2			
1			- occasional ~5 mm clay inclusions below 0.9 m		3			1
		CH	CLAY - silty, high plastic, damp to moist, very stiff, greyish brown, occasional silt inclusions		4			
			- moist, stiff below 1.7 m		5			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE		6			2
3			Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					3
4								

22 22 24 28 86 40

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REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
Figure No. A5	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Andrews - TH06**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		CONC	CONCRETE (150 mm thick)				- frozen to 0.8 m	0
		CH	CLAY (FILL) - silty, some sand, trace gravel, high plastic, damp, friable, dark grey to black		1			
		CH	CLAY - silty, high plastic, frozen, very stiff (inferred), dark grey, occasional silt inclusions		2			
1		CL	SILT - clayey, low plastic, damp, stiff, occasional to frequent clay inclusions, light greyish brown		3			1
			- stiff, tan-brown, occasional clay inclusions below 1.2 m		4			
		CH	CLAY - silty, high plastic, moist, very stiff, greyish brown, occasional silt inclusions		5			
			- stiff, dark greyish brown below 1.7 m		6			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

21 39 28 27 37 38

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REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
Figure No. A6	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Church - TH01**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (30 mm thick)				- frozen to 0.6 m	0
		GW	GRAVEL (FILL) - sandy, clayey, well graded, coarse grained (50 mm minus), sub-angular to sub-rounded, compact (inferred), moist, grey to dark grey		1			
					2			
		CH	CLAY - silty, high plastic, damp, firm, grey to dark grey, occasional silt inclusions					
					3			
			- trace fine sand, greyish brown below 0.6 m					
			SILT - trace clay, low to medium plastic, moist, soft, tan-brown		4			
1								1
			- some clay, stiff		5			
		CL						
					6			
			- very moist, firm below 1.7 m		7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE					2
			Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					
3								3
4								

30 34 24 23 25 23

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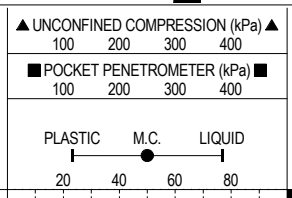
REVIEWED BY: AJ	COMPLETION DATE: 4 December 2014
Figure No. A7	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Church - TH02**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (25 mm thick)				- frozen to 0.5 m	0
		ASPH	ASPHALT (28 mm thick)					
		GW	GRAVEL (FILL) - sandy, well graded, fine to coarse grained (25 mm minus crushed limestone), angular to sub-angular, compact (inferred), damp, grey		1			
		CH	CLAY (FILL) - silty, trace sand, high plastic, moist, friable, grey to dark grey, occasional silt inclusions		2			
		CH	CLAY - silty, trace fine sand, high plastic, moist, very stiff, brown, occasional rootlets		3		Particle Size Analysis @ 0.5m: Gravel= 0.0% Sand= 1.7% Silt= 26.1% Clay= 72.2%	
1		CL	SILT - trace clay, low plastic, moist, soft, tan-brown		4			1
			- moist to very moist, light brown below 1.2 m		5			
					6			
		CH	CLAY - silty, high plastic, moist, very stiff, brown to tan, occasional silt inclusions		7			
2			- stiff, greyish brown, occasional sulphate inclusions below 2.0 m		8			2
			TEST HOLE TERMINATED AT 2.1 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					
3								3
4								

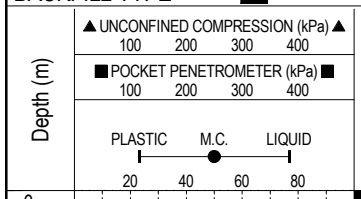
amec	**AMEC** **Winnipeg, Manitoba**	LOGGED BY: AL	COMPLETION DEPTH: 2.1 m
		REVIEWED BY: AJ	COMPLETION DATE: 4 December 2014
		Figure No. A8	Page 1 of 1

17565 MMM - WINNIPEG STREETS.GPJ 14/12/19 06:04 PM (GEOTECHNICAL - REVISED)

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Church - TH03**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (28 mm thick)				- frozen to 0.8 m	0
		ASPH	ASPHALT (37 mm thick)		1			
		GW	GRAVEL (FILL) - sandy, well graded, fine grained (19 mm minus crushed limestone), angular to subangular, compact (inferred), damp, light brown		2			
		CH	CLAY (FILL) - silty, trace sand and gravel, high plastic, damp, friable, grey to dark grey - frequent silt inclusions, grey-tan below 0.6 m		3			
1		CH	CLAY - silty, high plastic, moist, stiff, greyish brown, occasional to frequent silt inclusions		4			1
		CL	SILT - some clay, low plastic, very moist, soft, tan-brown		5		Particle Size Analysis @ 1.1m: Gravel= 0.0% Sand= 5.6% Silt= 78.1% Clay= 16.4%	
			- occasional clay inclusions below 1.7 m		6			
2		CH	CLAY - silty, high plastic, moist, very stiff, greyish brown, occasional to frequent silt inclusions and lenses ~5 mm thick		7			2
			TEST HOLE TERMINATED AT 2.1 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.		8			
3								3
4								

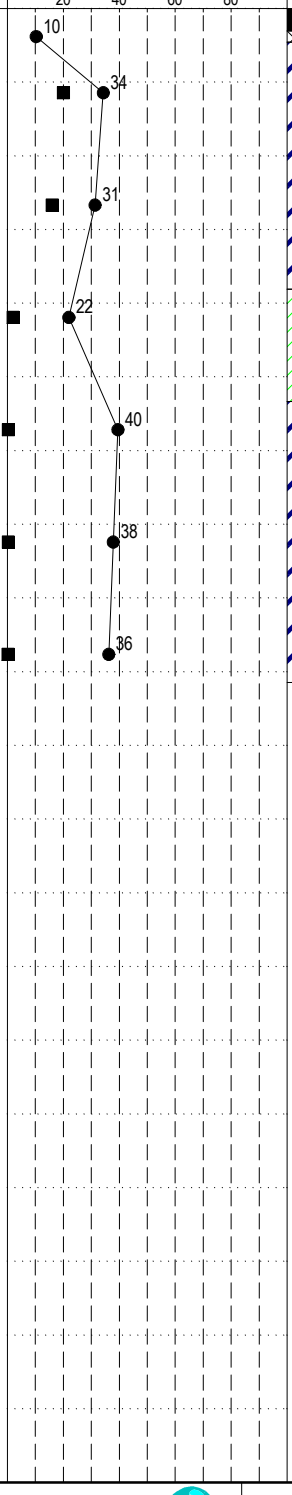
amec	**AMEC** **Winnipeg, Manitoba**	LOGGED BY: AL	COMPLETION DEPTH: 2.1 m
		REVIEWED BY: AJ	COMPLETION DATE: 4 December 2014
		Figure No. A9	Page 1 of 1

17565 MMM - WINNIPEG STREETS.GPJ 14/12/19 06:04 PM (GEOTECHNICAL - REVISED)

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Church - TH04**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (27 mm thick)		1		- frozen to 0.8 m	0
		GP	GRAVEL (FILL) - sandy, some clay to clayey, poorly graded, fine grained (19 mm minus), sub-angular to sub-rounded, compact (inferred), damp, grey					
		CH	CLAY - silty, trace sand, high plastic, damp, stiff, brownish grey, occasional silt inclusions		2			
			- firm below 0.5 m		3			
			- dark grey below 0.6 m					
1		CL	SILT - trace clay, low plastic, moist, soft, tan-brown to light brown		4			1
		CH	CLAY - silty, high plastic, moist, soft, brown, occasional silt inclusions		5			
					6			
			- occasional to frequent silt lenses ~10 mm thick below 1.7 m		7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

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		REVIEWED BY: AJ	COMPLETION DATE: 4 December 2014
		Figure No. A10	Page 1 of 1

17565 MMM - WINNIPEG STREETS.GPJ 14/12/19 06:04 PM (GEOTECHNICAL - REVISED)

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Machray - TH01**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (52 mm thick)				- frozen to 0.5 m	0
		ASPH	ASPHALT (37 mm thick)					
		GW	GRAVEL (FILL) - sandy, well graded, fine grained (19 mm minus crushed limestone), angular, compact (inferred), damp, light brown		1			
			CLAY - silty, trace organics, high plastic, moist, stiff to very stiff, dark grey to black		2			
					3		Particle Size Analysis @ 0.5m: Gravel= 0.0% Sand= 2.2% Silt= 30.1% Clay= 67.8%	
					4			
1		CH	- dark grey below 0.9 m					1
					5			
					6			
			- brown, no organics, occasional silt and sulphate inclusions below 1.5 m - occasional to frequent silt inclusions below 1.7 m		7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

5 38 38 37 33 32 33

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REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
Figure No. A11	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Machray - TH02**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (133 mm thick)		1			0
		GP	GRAVEL (FILL) - sandy, trace clay, poorly graded, fine grained (12 mm minus), sub-rounded, compact (inferred), damp, dark greyish brown		2			
		CH	CLAY - silty, high plastic, moist, stiff to very stiff, grey to dark grey, occasional sulphate inclusions		3			
			- greyish brown, occasional rootlets below 0.6 m					
1		CL	SILT - trace clay, low plastic, moist, soft, tan-brown		4			1
			- trace sand, very moist below 1.2 m		5			
			- light grey to light brown below 1.5 m		6			
		CH	CLAY - silty, high plastic, damp, stiff, brown, occasional silt inclusions		7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE					2
			Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					
3								3
4								

6 34 33 24 23 22 23

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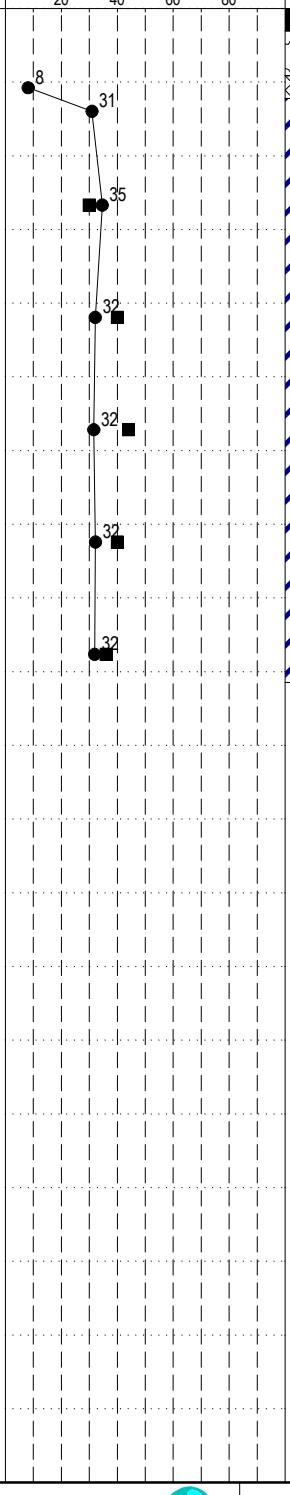
amec	**AMEC Winnipeg, Manitoba**	LOGGED BY: AL	COMPLETION DEPTH: 1.8 m
		REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
		Figure No. A12	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Machray - TH03**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (73 mm thick)				- frozen to 0.6 m	0
		CONC	CONCRETE (95 mm thick)					
		GW	GRAVEL (FILL) - sandy, some clay, well graded, fine grained (19 mm minus crushed limestone), angular, compact (inferred), damp, grey		1			
					2			
			CLAY - trace organic, high plastic, damp, stiff, dark grey to black		3			
			- moist, dark grey below 0.6 m		4			
1		CH	- very stiff, occasional grey silt inclusions below 0.9 m					1
					5			
			- trace fine sand below 1.2 m		6			
			- stiff below 1.7 m		7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE					2
			Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					
3								3
4								

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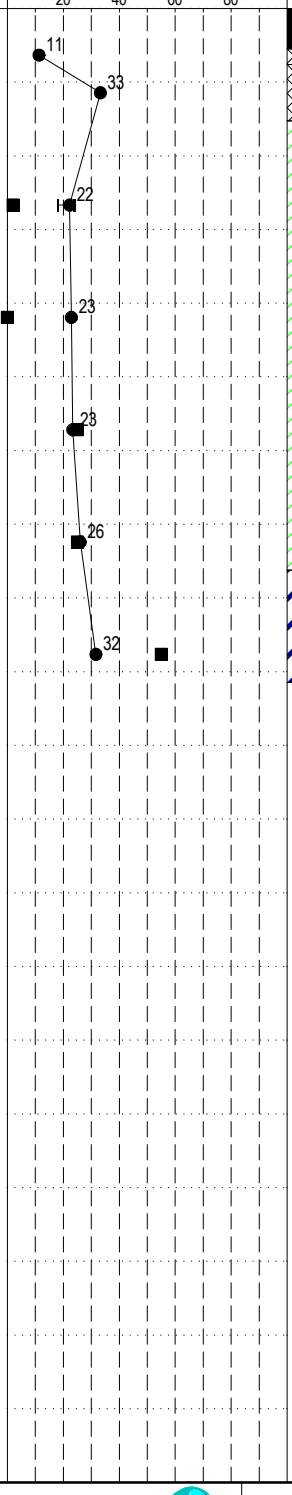
REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
Figure No. A13	Page 1 of 1

17565 MMM - WINNIPEG STREETS.GPJ 14/12/19 06:04 PM (GEOTECHNICAL - REVISED)

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Machray - TH04**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (110 mm thick)				- frozen to 0.3 m	0
		GW	GRAVEL (FILL) - sandy, some clay, well graded, coarse grained (25 mm minus crushed limestone), angular to sub-rounded, compact (inferred), damp, grey		1			
		CH	CLAY (FILL) - silty, trace sand and gravel, high plastic, damp to moist, friable, grey		2			
			SILT - some clay, low plastic, very moist, soft, tan-brown, occasional clay inclusions		3		Particle Size Analysis @ 0.5m: Gravel= 0.0% Sand= 6.8% Silt= 77.6% Clay= 15.6%	
					4			
1		CL	- light greyish brown below 0.9 m					1
					5			
			- clayey, low to medium plastic, stiff, frequent clay inclusions below 1.2 m		6			
		CH	CLAY - silty, high plastic, moist, very stiff, greyish brown, occasional silt inclusions		7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

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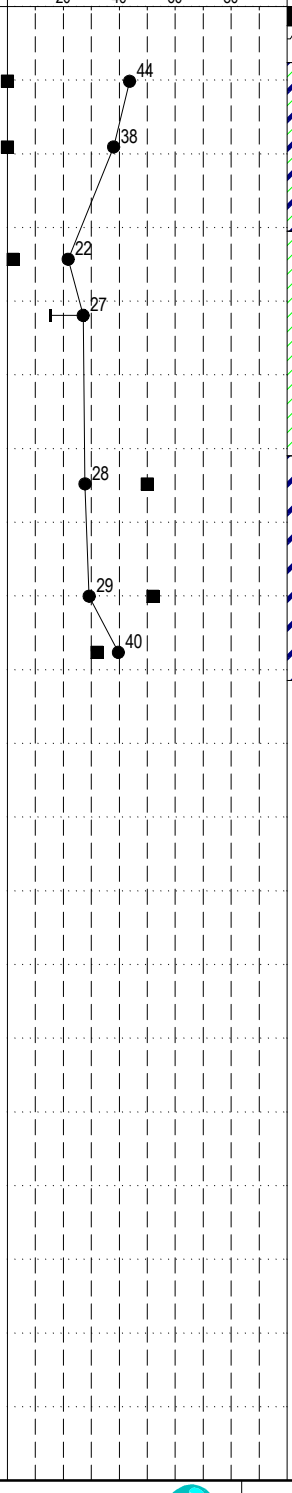
REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
Figure No. A14	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Powers - TH01**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (54 mm thick)				- frozen to 0.6 m	0
		CONC	CONCRETE RUBBLE (100 mm thick)					
		CI	CLAY - and SILT, sandy, medium plastic, moist, very soft, dark brown with tan inclusions, frequent 1 mm thick silt laminations		1 2			
		CL	SILT - some clay, low plastic, moist to very moist, soft, tan-brown, occasional clay inclusions		3 4		Particle Size Analysis @ 0.8m: Gravel= 0.0% Sand= 6.0% Silt= 74.4% Clay= 19.6%	
1			- trace to some clay lenses, mottled grey and tan below 0.9 m					1
		CH	CLAY - silty, high plastic, moist, very stiff, grey to brown, frequent silt inclusions		5			
			- brownish grey, stiff below 1.6 m		6 7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

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LOGGED BY: AL	COMPLETION DEPTH: 1.8 m
REVIEWED BY: AJ	COMPLETION DATE: 4 December 2014
Figure No. A15	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Powers - TH02**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (35 mm thick)				- frozen to 0.6 m	0
		GW	GRAVEL (FILL) - sandy, trace silt, well graded, fine to coarse grained (25 mm minus), angular to sub-rounded, compact (inferred), damp, light greyish brown, occasional asphalt fragments		1			
			CLAY - silty, trace sand, high plastic, moist, friable, grey to black		2			
		CH	- greyish brown, frequent silt lenses ~10 mm thick below 0.5 m		3			
1		CL	SILT - some clay, low plastic, moist, tan-brown, very soft, occasional clay inclusions		4			1
					5			
		CH	CLAY - silty, high plastic, moist, stiff, greyish brown, occasional silt inclusions		6			
2					7			2
			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE					
			Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					
3								3
4								

9 40 34 22 24 32 42

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		REVIEWED BY: AJ	COMPLETION DATE: 4 December 2014
		Figure No. A16	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Powers - TH03**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (20 mm thick)				- frozen to 0.5 m	0
		GW	GRAVEL (FILL) - sandy, well graded, fine grained (19 mm minus crushed limestone), angular to sub-angular, compact (inferred), damp, light brown		1			
			CLAY - silty, trace sand, high plastic, moist, friable, dark grey to black		2			
			- moist, very stiff below 0.6 m		3			
			- stiff, grey, occasional silt inclusions below 0.9 m		4			
1		CH			5			1
			- soft to firm, tan-brown with frequent 2 mm thick silt laminations from 1.5 to 1.7 m		6			
			- brown, occasional sulphate inclusions below 1.7 m		7			
2			TEST HOLE TERMINATED AT 2.0 m BELOW PAVEMENT SURFACE					2
3								3
4								

Notes:
No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.

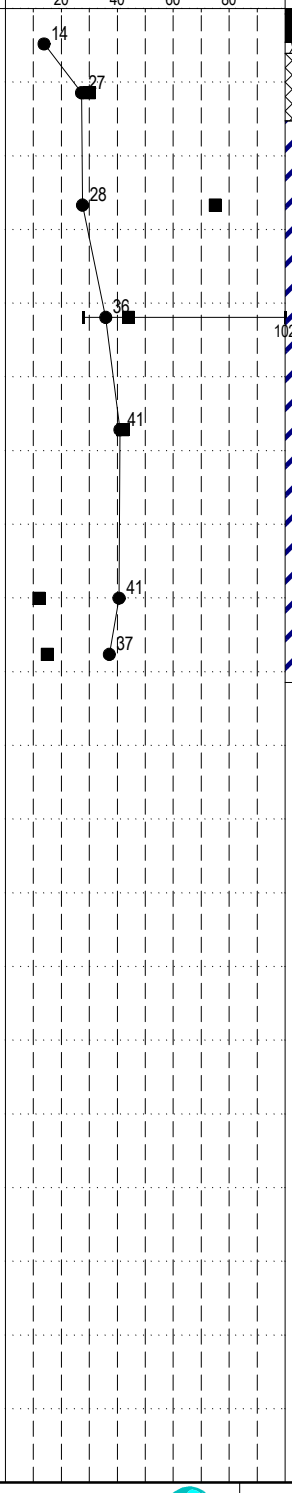
amec	**AMEC Winnipeg, Manitoba**	LOGGED BY: AL	COMPLETION DEPTH: 1.8 m
		REVIEWED BY: AJ	COMPLETION DATE: 4 December 2014
		Figure No. A17	Page 1 of 1

17565 MMM - WINNIPEG STREETS.GPJ 14/12/19 06:04 PM (GEOTECHNICAL - REVISED)

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Powers - TH04**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (15 mm thick)				- frozen to 0.6 m	0
		ASPH	ASPHALT (75 mm thick)		1			
		CONC	CONCRETE RUBBLE - sandy, some clay, well graded, coarse grained (50 mm minus stones and concrete rubble), compact (inferred), angular to sub-rounded, moist to wet, grey		2			
		CH	CLAY and SILT (FILL) - trace sand, high plastic, damp to moist, stiff, mottled tan-grey					
			CLAY - silty, high plastic, damp, very stiff, greyish brown, occasional silt inclusions		3			
			- trace silt, moist below 0.8 m		4		Particle Size Analysis @ 0.8m: Gravel= 0.0% Sand= 0.1% Silt= 7.3% Clay= 92.5%	
1		CH						1
			- brown, occasional sulphate inclusions below 1.2 m		5			
			- firm, light brown, frequent silt inclusions below 1.5 m		6			
			- greyish brown, occasional silt inclusions and sulphate inclusions below 1.7 m		7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

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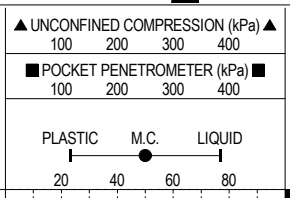
LOGGED BY: AL	COMPLETION DEPTH: 1.8 m
REVIEWED BY: AJ	COMPLETION DATE: 4 December 2014
Figure No. A18	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Powers - TH05**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (30 mm thick)				- frozen to 0.8 m	0
		GW	GRAVEL (FILL) - sandy, well graded, fine to coarse grained (19 mm minus crushed limestone), angular to sub-rounded, compact (inferred), damp, yellowish brown		1			
			CLAY (FILL) - silty, some sand, trace fine gravel, high plastic, moist, friable, dark brown with grey silt inclusions		2			
		CH			3			
			CLAY - silty, high plastic, moist, soft, mottled tan and grey, occasional to frequent silt inclusions		4			
1		CH						1
			SILT - some clay, low plastic, moist, soft, tan-brown, frequent clay inclusions		5			
		CL						
			CLAY - silty, high plastic, damp to moist, very stiff, dark greyish brown		6			
		CH			7			
2			TEST HOLE TERMINATED AT 1.8 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					2
3								3
4								

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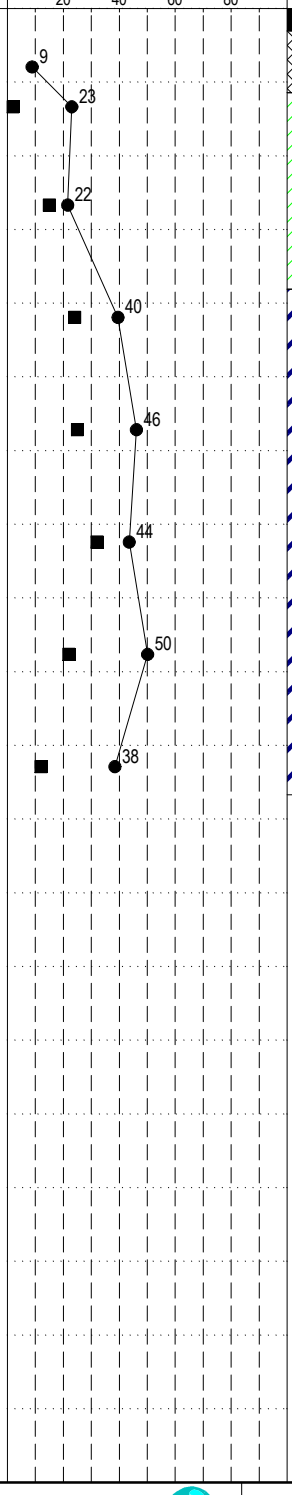
LOGGED BY: AL	COMPLETION DEPTH: 1.8 m
REVIEWED BY: AJ	COMPLETION DATE: 4 December 2014
Figure No. A19	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Redwood - TH01**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (55 mm thick)					0
		GW	GRAVEL (FILL) - sandy, well graded, fine grained (19 mm minus crushed limestone), angular to sub-angular, compact (inferred), damp, light grey-light brown		1		- hard drilling in frozen gravel fill	
			SILT - trace clay, low plastic, moist, soft, light brown		2			
		CL	- some clay, firm below 0.6 m		3			
			CLAY - silty, high plastic, moist, stiff, greyish brown, occasional silt and sulphate inclusions		4			
1					5			1
		CH			6			
			- dark greyish brown below 1.8 m		7			
2			- firm below 2.0 m		8			2
			TEST HOLE TERMINATED AT 2.1 m BELOW PAVEMENT SURFACE					
3								3
4								

Notes:
No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.

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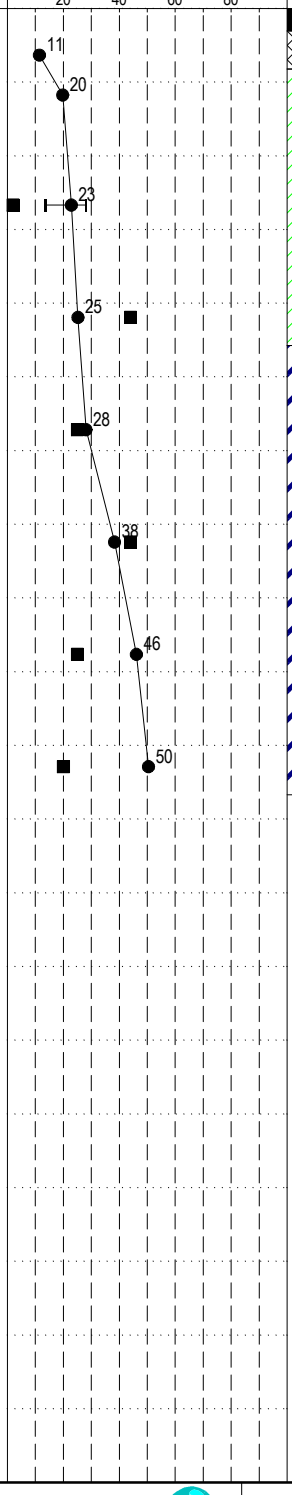
REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
Figure No. A20	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Redwood - TH02**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (60 mm thick)					0
		GW	GRAVEL (FILL) - sandy, well graded, fine grained (19 mm minus), angular to subangular, compact (inferred), damp, light brown		1		- hard drilling in frozen gravel fill	
			SILT - trace clay, low plastic, moist, soft, light brown		2			
		CL	- some clay below 0.5 m		3		Particle Size Analysis @ 0.5m: Gravel= 0.0% Sand= 6.4% Silt= 75.7% Clay= 17.9%	
			- very stiff below 0.8 m		4			
1			CLAY - silty, high plastic, moist, stiff to very stiff, greyish brown, occasional to frequent silt lenses ~5 mm thick		5			1
			- mottled tan-brown below 1.2 m		6			
		CH	- dark greyish brown, very stiff below 1.5 m		7			
			- stiff below 1.8 m		8			
2			TEST HOLE TERMINATED AT 2.1 m BELOW PAVEMENT SURFACE					2
3			Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					3
4								

amec	AMEC Winnipeg, Manitoba	LOGGED BY: AL	COMPLETION DEPTH: 2.1 m
		REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
		Figure No. A21	Page 1 of 1

17565 MMM - WINNIPEG STREETS.GPJ 14/12/19 06:04 PM (GEOTECHNICAL - REVISED)

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Redwood - TH03**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (105 mm thick)		1		- frozen to 0.1 m - hard drilling in gravel fill	0
		GP	GRAVEL (FILL) - and SAND, poorly graded, fine to coarse grained (12 mm minus with occasional 35 mm diameter stones), sub-angular to sub-rounded, compact (inferred), light brown		2			
			SILT - trace clay, low plastic, moist, soft, light brown					
		ML	- occasional clay lenses ~3mm thick below 0.6 m		3			
					4			
1			CLAY - silty, high plastic, moist, stiff to very stiff, greyish brown, occasional to frequent silt inclusions		5			1
					6			
		CH			7			
			- brownish grey below 1.8 m					
2			- firm below 2.0 m		8			2
			TEST HOLE TERMINATED AT 2.1 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					
3								3
4								

6, 21, 20, 21, 32, 16, 43, 47

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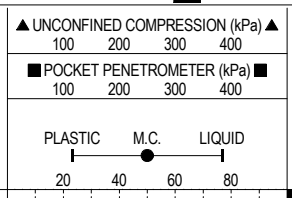
LOGGED BY: AL	COMPLETION DEPTH: 2.1 m
REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
Figure No. A22	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Redwood - TH04**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



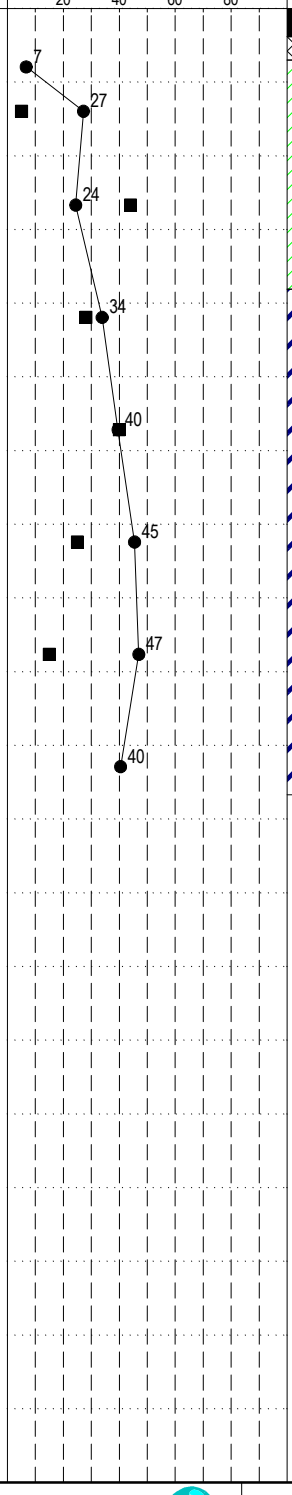
Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (45 mm thick)				- frozen to 0.3 m	0
		GW	GRAVEL (FILL) - sandy, well graded, fine grained (19 mm minus), angular to sub-rounded, compact (inferred), grey-light brown		1			
			SILT - some clay, low plastic, moist to very moist, soft, light brown		2			
		CL			3			
					4			
1			CLAY - some silt, high plastic, moist, stiff, greyish brown, occasional silt inclusions		5		Particle Size Analysis @ 1.1m: Gravel= 0.0% Sand= 0.8% Silt= 14.8% Clay= 84.4%	1
		CH			6			
					7			
2			- dark greyish brown, firm below 2.0 m		8			2
			TEST HOLE TERMINATED AT 2.1 m BELOW PAVEMENT SURFACE Notes: No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.					
3								3
4								

amec	**AMEC** **Winnipeg, Manitoba**	LOGGED BY: AL	COMPLETION DEPTH: 2.1 m
		REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
		Figure No. A23	Page 1 of 1

PROJECT: Residential Street Reconstruction Program	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **Redwood - TH05**
CLIENT: MMM Group Ltd.	DRILL TYPE: B40	PROJECT NO: WX17565
LOCATION: Various Streets	DRILL METHOD: 125 mm Solid Stem Auger	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0		ASPH	ASPHALT (78 mm thick)				- frozen to 0.2 m	0
		GW	GRAVEL (FILL) - sandy, well graded, fine to coarse grained (25 mm minus), angular to sub-rounded, compact (inferred), damp, light brown		1		- hard drilling in gravel fill	
			SILT - some clay, low plastic, moist, soft, light brown		2			
		CL	- stiff to very stiff below 0.5 m		3			
			CLAY - silty, high plastic, moist, stiff to very stiff, greyish brown, occasional silt inclusions		4			
1					5			1
		CH			6			
					7			
2			- firm, occasional sulphate inclusions below 2.0 m		8			2
			TEST HOLE TERMINATED AT 2.1 m BELOW PAVEMENT SURFACE					
3								3
4								

Notes:
No sloughing or seepage were observed during drilling. Test hole remained open to full depth and was dry prior to backfilling. Test hole was backfilled with auger cuttings and bentonite. Pavement surface was repaired with cold-patch asphalt.

amec	**AMEC Winnipeg, Manitoba**	LOGGED BY: AL	COMPLETION DEPTH: 2.1 m
		REVIEWED BY: AJ	COMPLETION DATE: 5 December 2014
		Figure No. A24	Page 1 of 1

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APPENDIX B

CORE PHOTOS

Photo 1: C01: Northbound lane at 884 Airlies Street, 1.0 m from curb

Photo 2: C02: Southbound lane at 856 Airlies Street, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION AIRLIES STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B1

Photo 3: C03: Southbound lane at 872 Airlies Street, 5.0 m from curb

Photo 4: C04: Northbound lane at 896 Airlies Street, 3.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION AIRLIES STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	January 2015	Project No.: WX17565	Figure: B2

Photo 1: TH01: Southbound lane at 409 Jefferson Avenue, 1.0 m from curb

Photo 2: TH02: Northbound lane at 418 St. Anthony Avenue, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION ANDREWS STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B3

Photo 3: TH03: Southbound lane at 417 St. Anthony Street, 1.0 m from curb

Photo 4: TH04: Northbound lane at 418 Perth Avenue, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION ANDREWS STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B4

Photo 5: TH05: Southbound lane at 401 Perth Avenue, 1.0 m from curb

Photo 6: TH06: Northbound lane at 412 Hartford Avenue, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION ANDREWS STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B5

Photo 1: C01: Eastbound lane at 126 Ashmore Drive, 0.9 m from curb

Photo 2: C02: Northbound lane at 54 Ashmore Drive, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION ASHMORE DRIVE WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B6

Photo 3: C03: Southbound lane at 2 Ashmore Drive, 1.5 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION ASHMORE DRIVE WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B7

Photo 1: C01: Eastbound lane 100 m east of Keewatin Street

Photo 2: C02: Westbound lane 20 m west of Dorset Street

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION BURROWS AVENUE WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B8

Photo 1: C01: Westbound lane at 464 Aikins Street, 1.0 m from curb

Photo 2: C02: Eastbound lane at 311 Church Avenue, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION CHURCH AVENUE WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B9

Photo 3: C03: Westbound lane at 337 Church Avenue, 1.5 m from curb

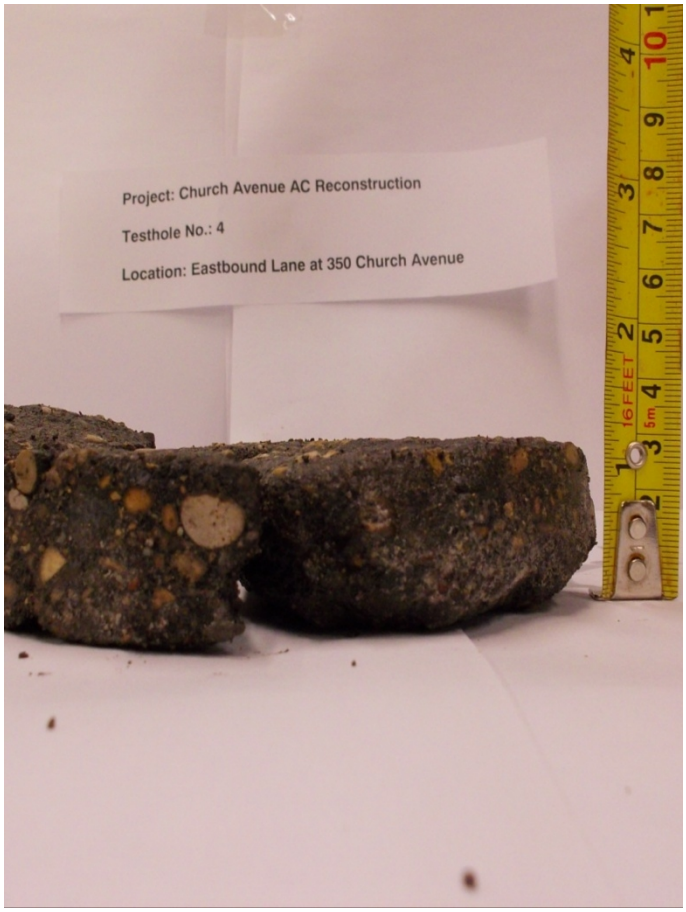

Photo 4: C04: Eastbound lane at 350 Church Avenue, 1 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION CHURCH AVENUE WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B10

Photo 1: C01: Northbound lane at 46 Duval Street, 0.5 m from curb

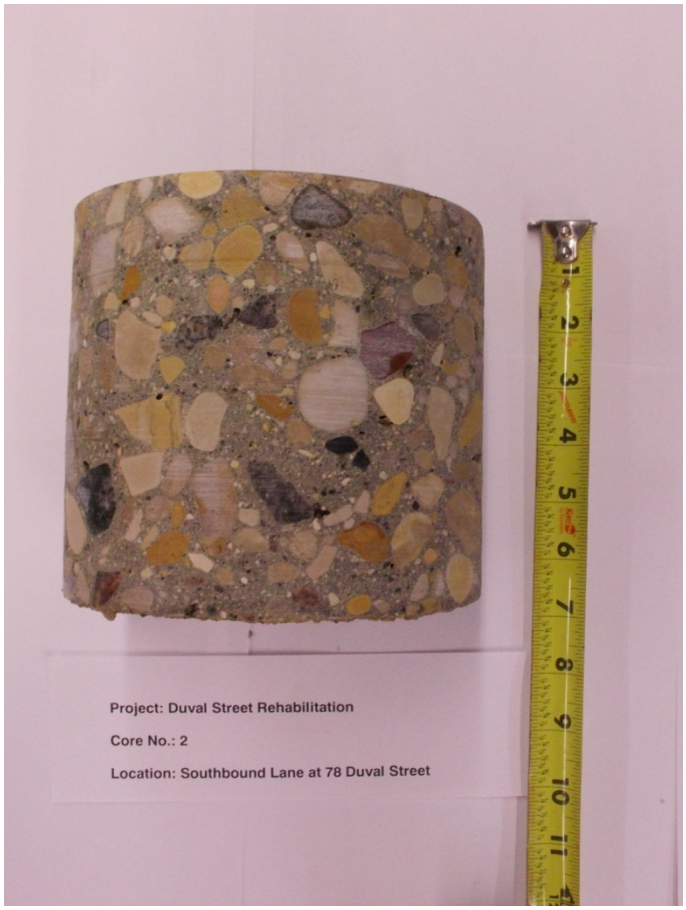

Photo 2: C02: Southbound lane at 78 Duval Street, 0.6 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION DUVAL STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B11

Photo 1: C01: Eastbound lane at 133 Hallet Street, 0.9 m from curb

Photo 2: C02: Westbound lane at 52 Hallet Street, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION HALLET STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B12

Photo 3: C03: Westbound lane at 105 Hallet Street, 2.0 m from curb

Photo 4: C04: Eastbound lane between 72 and 78 Hallet Street, 1.5 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION HALLET STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	January 2015	Project No.: WX17565	Figure: B13

Photo 1: TH01: Westbound lane at 178 Machray Avenue, 1.0 m from curb

Photo 2: TH02: Eastbound lane at 177 Machray Avenue, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION MACHRAY AVENUE WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B14

Photo 3: TH03: Eastbound lane between 155 and 167 Machray Avenue, 1.0 m from curb

Photo 4: TH04: Westbound lane at 145 Machray Avenue, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION MACHRAY AVENUE WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B15

Photo 1: TH01: Northbound lane at 470 Burrows Avenue, 1.0 m from curb

Photo 2: TH02: Southbound lane at 210 Powers Street, 1.5 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION POWERS STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B16

Photo 3: Testhole 03: Southbound lane at 201 Powers Street, 1.5 m from curb

Photo 4: Testhole 04: Northbound lane at 572 Manitoba Avenue, 1 m of curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION POWERS STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B17

Photo 5: TH05: Southbound lane at 471 Pritchard Avenue, 1.5 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION POWERS STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B18

Photo 1: TH01: Westbound lane at 1030 Redwood Avenue, 1.0 m from curb

Photo 2: TH02: Westbound lane at 1035 Redwood Avenue, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION REDWOOD AVENUE (BATTERY TO SGT. TOMMY PRINCE) WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B19

Photo 3: TH03: Eastbound lane at 1050 Redwood Avenue, 1.0 m from curb

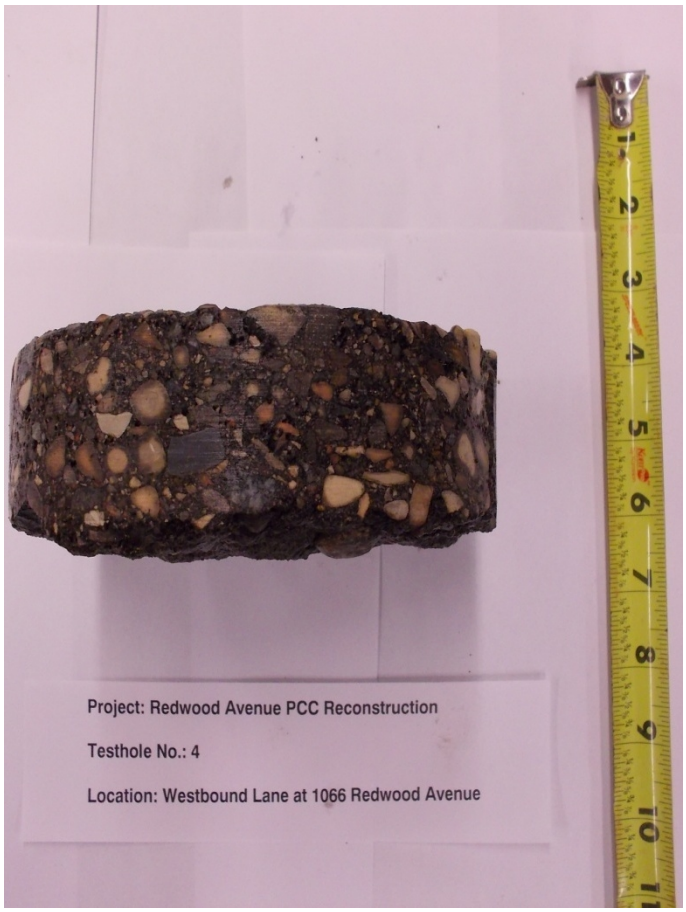

Photo 4: TH04: Westbound lane at 1066 Redwood Avenue, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION REDWOOD AVENUE (BATTERY TO SGT. TOMMY PRINCE) WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B20

Photo 5: TH05: Eastbound lane at 1078 Redwood Avenue, 1.0 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION REDWOOD AVENUE (BATTERY TO SGT. TOMMY PRINCE) WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B21

Photo 1: C01: Westbound lane 2m east of west corner of 19 Bentall Street, 1.0 m from curb

Photo 2: C02: Eastbound lane 75m west of Bentall Street, 1.5 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION REDWOOD AVENUE (SHAUGHNESSY TO SHEPPARD) WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B22

Photo 3: C03: Westbound lane 78 m east of Sheppard Street, 1.8 m from curb

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION REDWOOD AVENUE (SHAUGHNESSY TO SHEPPARD) WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B23

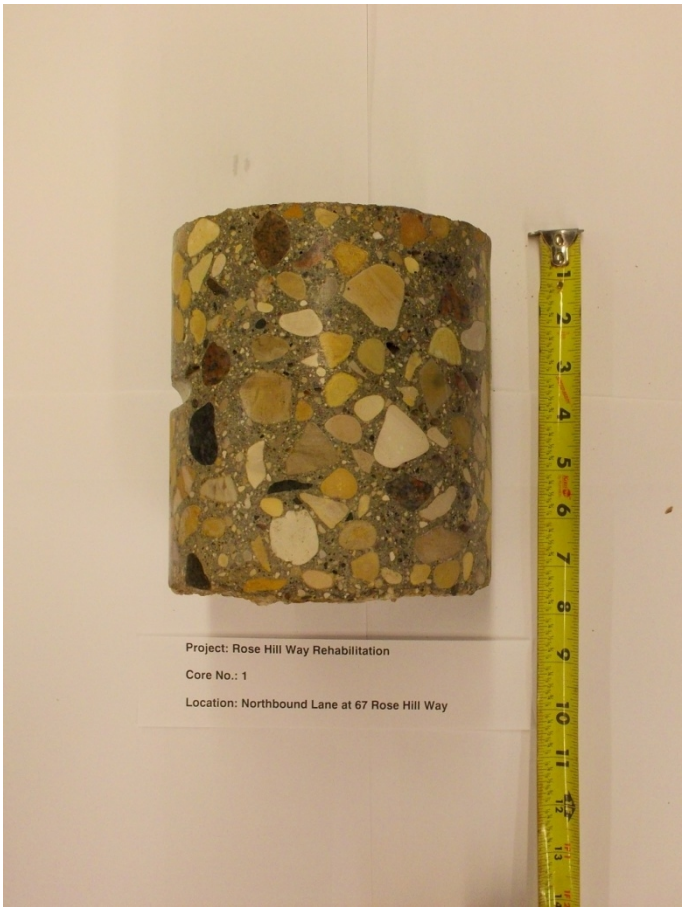

Photo 1: C01: Northbound lane at 67 Rose Hill Way, 0.3 m from curb

Photo 2: C02: 2.0 m from outside curb at 131 Rose Hill Way

amec Environment and Infrastructure **MMM Group**		**GEOTECHNICAL INVESTIGATION ROSE HILL WAY WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	December 2014	Project No.: WX17565	Figure: B24