GEOTECHNICAL INVESTIGATION
LOCAL STREET EVALUATION
WINNIPEG, MANITOBA

Submitted to:

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

Attention: Mr. Mark Vogt

Submitted by:

Amec Foster Wheeler Environment & Infrastructure

440 Dovercourt Drive
Winnipeg, Manitoba
R3Y 1N4

8 March 2016

Amec Foster Wheeler File No. WX17879

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1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler), was retained by MMM Group Limited (MMM) to conduct a pavement coring and test hole drilling program related to the pavement evaluation and potential upgrades on Manhattan Avenue, Rothesay Street, Poplar Avenue and McLeod Avenue in Winnipeg, Manitoba. The investigation consisted of the following:

- Manhattan Avenue: 6 Core Holes / 6 Test Holes, 3 from Eastbound Lanes, 3 from Westbound Lanes
- Rothesay Street: 6 Core Holes, 3 from Northbound Lanes, 3 from Southbound Lanes
- Poplar Avenue (one-way street): 2 Core Holes, 1 from North Lane, 1 from South Lane
- McLeod Avenue: 2 Core Holes, 1 from Eastbound Lane, 1 from Westbound Lane

The purpose of the investigation was to determine the pavement thickness at selected locations along the subject section of each avenue, as well as determine soil conditions below the pavement surface on Manhattan Avenue. The numbers of test holes per street and the test hole locations were determined by MMM. It should be noted that core #R6 was moved slightly from the original location proposed by MMM to prevent blocking access to adjacent businesses during coring.

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 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 MANHATTAN AVENUE

3.1 Field Investigation

On 17 February 2016, Amec Foster Wheeler obtained the six cores noted in Section 1.0 on Manhattan Avenue using a 150 mm diameter core barrel. The coring locations are shown in Appendix A on Figure A1. Amec Foster Wheeler provided traffic control using flashing light-board trailers, cones, and signs provided by Guardian Traffic Services. Six test holes were subsequently drilled at the core hole locations on 18 February 2016 using a rubber-track mounted GeoProbe 7822DT drill rig equipped with 125 mm solid stem augers, owned and operated by Maple Leaf Drilling of Springfield, Manitoba. Prior to drilling, Amec Foster Wheeler met with the various public utility companies in accordance with ground disturbance requirements. All field activities were completed without incident, however during drilling it was suspected that test hole TH01 may be within a utility trench, and as a result was terminated at a depth of 1.5 m below the pavement surface to prevent potential utility contact.

Upon retrieval of the core and soil samples, each test hole was backfilled with auger cuttings and topped with a layer of bentonite. The pavement surface was then repaired with asphalt in accordance with City requirements.

3.2 Pavement Summary

Table 1 summarizes the pavement thickness at the six test holes on Manhattan Avenue.

Table 1: Manhattan Avenue Pavement Summary

Core Hole #	M1	M2	M3	M4	M5	M6
Asphalt (mm)	--	--	--	--	--	--
Concrete (mm)	275	175	250	200	225	225

"—" indicates none found

Photos of all core samples obtained can be found in Appendix A, Figures A2 through A7.

3.3 Soil Summary

During test hole drilling, the observed soils were visually classified according to the Modified Unified Soil Classification System. Groundwater and drilling conditions, as well as other pertinent subsurface observations, were also recorded at the time of the investigation. Disturbed soil samples were taken at regular intervals from the auger cuttings. Pocket penetrometer tests were completed on grab samples to characterize the consistency of cohesive soils.

The test holes were left open for approximately ten minutes after completion of drilling to observe the short-term groundwater seepage and sloughing conditions.

Test hole logs recording soil descriptions, soil strata elevations, sample locations, field and laboratory test results, and depths to groundwater are presented in Appendix A, Figures A8 through A13.

The soil stratigraphy encountered, as noted in descending order from the ground surface at the test hole locations, was as follows:

- Concrete
- Granular Fill (M1 only)
- Clay Fill
- Clay with Silt Layer

<u>Concrete</u>

Concrete was found at the surface in each test hole. Concrete thicknesses are noted in Table 1, above.

<u>Granular Fill</u>

Granular fill was observed directly below the concrete in test hole M1 only. The granular fill was found to be poorly graded, medium grained, frozen and brown. The maximum nominal aggregate size was estimated at 20 mm. As noted above, the granular fill was suspected to be utility trench backfill, and as a result test hole M1 was terminated at 1.5 m below the pavement surface.

Clay Fill

Clay fill was found directly below the concrete in test holes M2 to M6. The clay fill was silty, high plastic, frozen and grey to dark grey. Traces of sand were found within the clay fill. Moisture content of the clay fill varied between 30% and 40%. One clay fill sample was tested for Atterberg Limits and grain size distribution (hydrometer method). Results of the testing are provided in the Table below.

Table 2: Test Hole M4, Sample #2 Atterberg Limit and Hydrometer Grain Size Analysis Results

Sample Depth (m)	Atterberg Limit Testing			Hydrometer Grain Size Analysis			
	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Gravel	% Sand	% Silt	% Clay
0.45 – 0.6	71	18	53	0.0	2.9	33.0	64.1

The clay fill extended to depths ranging between about 0.4 m and 1.1 m below the pavement surface.

Clay

Native high plastic clay was found either directly below the clay fill (test holes M2 and M6) or below a thin silt layer (test holes M3, M4 and M5) and extended to the maximum depths explored. The clay was silty, high plastic, moist, stiff and brown to brown mottled grey. The moisture content of the clay varied between 30% and 50%, and showed an increasing trend with depth. One clay sample was tested for Atterberg Limits and grain size distribution (hydrometer method). Results of the testing are provided in the Table below.

Table 3: Test Hole M6, Sample #3 Atterberg Limit and Hydrometer Grain Size Analysis Results

Sample Depth (m)	Atterberg Limit Testing			Hydrometer Grain Size Analysis			
	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Gravel	% Sand	% Silt	% Clay
0.75 – 0.9	86	22	64	0.0	1.5	24.6	73.9

Silt

A silt layer was present either directly below the clay fill (test holes M3, M4 and M5) or within the native clay layer (test hole M2). Silt was not found in test hole M1 or M6. The silt was found to be

low plastic, moist, soft and brown. Some clay and traces of sand were found within the silt. The moisture content of the silt varied between 20% and 25%. One silt sample was tested for Atterberg Limits and grain size distribution (hydrometer method). Results of the testing are provided in the Table below.

Table 4: Test Hole M2, Sample #6 Atterberg Limit and Hydrometer Grain Size Analysis Results

Sample Depth (m)	Atterberg Limit Testing			Hydrometer Grain Size Analysis			
	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Gravel	% Sand	% Silt	% Clay
1.65 – 1.8	23	17	6	0.0	1.9	85.4	12.7

The silt layer began at depths ranging between 0.9 m and 1.5 m, and extended to between 1.5 m and 2.5 m below the pavement surface.

3.4 Sloughing and Seepage

The test holes were left open for approximately 10 minutes after completion of drilling to observe short-term seepage and sloughing conditions. No sloughing or seepage occurred in the test holes prior to backfilling.

It should be noted that only short-term seepage and sloughing conditions were observed and that groundwater levels can fluctuate annually, seasonally or as a result of construction activity. Furthermore, some zones were frozen at the time of the investigation and therefore observations should not be considered to represent unfrozen conditions,

4.0 ROTHESAY AVENUE

4.1 Field Investigation

On 19 February 2016 and 3 March 2016, Amec Foster Wheeler obtained the six cores noted in Section 1.0 on Rothesay Avenue using a 150 mm diameter core barrel. The coring locations are shown in Appendix B on Figure B1. Amec Foster Wheeler provided traffic control using flashing light-board trailers, cones, and signs provided by Guardian Traffic Services.

Upon retrieval of the core samples, the pavement surface was then repaired with asphalt in accordance with City requirements.

4.2 Pavement Summary

Table 5: Rothesay Avenue Pavement Summary

Core Hole #	R1	R2	R3	R4	R5	R6
Asphalt (mm)	25	50	15	65	75	50
Concrete (mm)	275	250	260	160	250	250

Photos of all core samples obtained can be found in Appendix B, Figures B2 through B7.

5.0 POPLAR AVENUE

5.1 Field Investigation

On 17 February 2016 and 3 March 2016, Amec Foster Wheeler obtained the two cores noted in Section 1.0 on Poplar Avenue using a 150 mm diameter core barrel. The coring locations are shown in Appendix C on Figure C1. Amec Foster Wheeler provided traffic control using flashing light-board trailers, cones, and signs provided by Guardian Traffic Services.

Upon retrieval of the core samples, the pavement surface was then repaired with asphalt in accordance with City requirements.

5.2 Pavement Summary

Table 6: Poplar Avenue Pavement Summary

Core Hole #	P1	P2
Asphalt (mm)	175	25
Concrete (mm)	--	90

Photos of all core samples obtained can be found in Appendix C, Figures C2 through C3.

6.0 MCLEOD AVENUE

6.1 Field Investigation

On 4 March 2016, Amec Foster Wheeler obtained the two cores noted in Section 1.0 on McLeod Avenue using a 150 mm diameter core barrel. The coring locations are shown in Appendix D on Figure D1. Amec Foster Wheeler provided traffic control using flashing light-board trailers, cones, and signs provided by Guardian Traffic Services.

Upon retrieval of the core samples, the pavement surface was then repaired with asphalt in accordance with City requirements.

6.2 Pavement Summary

Table 7: McLeod Avenue Pavement Summary

Core Hole #	ML1	ML2
Asphalt (mm)	50	50
Concrete (mm)	275	275

Photos of all core samples obtained can be found in Appendix D, Figures D2 through D3.

7.0 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.

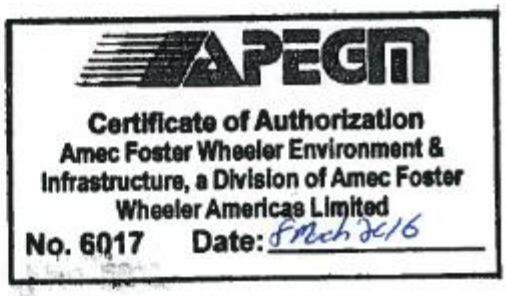
Soil conditions, by their nature, can be highly variable across a site. The placement of fill and prior construction activities on a site can contribute to the variability especially near surface soil conditions. A contingency should always be included in any construction budget to allow for the possibility 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

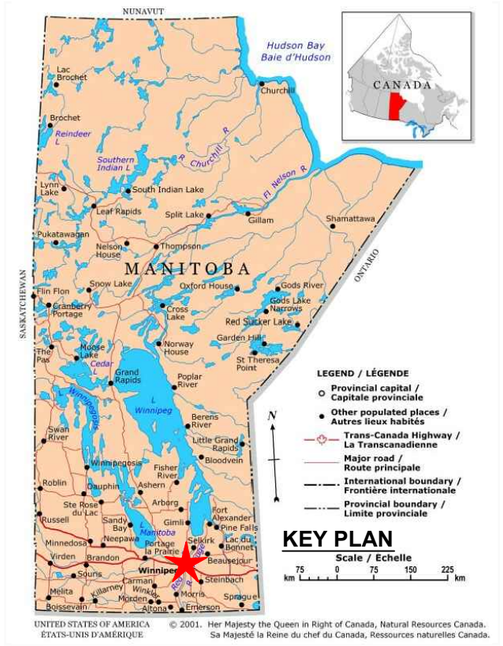
Reviewed By:

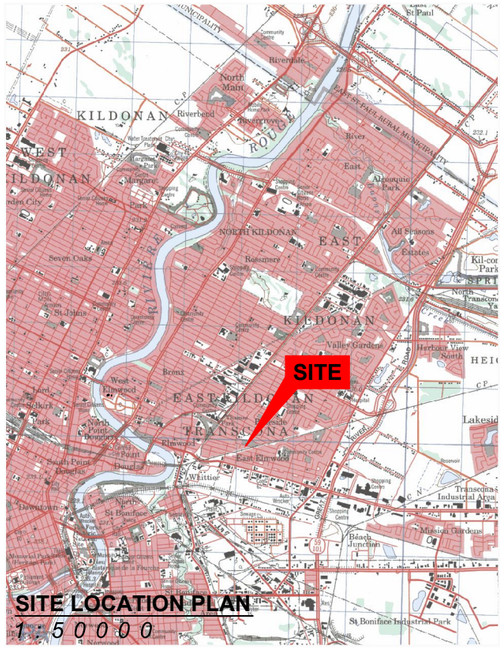


Jorden Wiwcharyk, P.Eng.
Geotechnical Engineer

Harley Pankratz, P.Eng.
Vice President; Eastern Prairies / Northern Alberta

APPENDIX A:
Manhattan Avenue Test Hole Location Plan, Core Photos and Test Hole Logs





UTM 14 U COORDINATES		
ID	NORTHING	EASTING
M01	5529937	637000
M02	5529929	637045
M03	5529913	637095
M04	5529905	637147
M05	5529888	637195
M06	5529881	637238

LEGEND:

CORE AND TEST HOLE LOCATION

REVISION	BY	DATE
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CLIENT: MMM GROUP LTD.

Amec Foster Wheeler
Environment & Infrastructure
440 DOVERCOURT DRIVE
WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX:204.489.8261

amec foster wheeler

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

GEOTECHNICAL INVESTIGATION
LOCAL STREET PAVEMENT EVALUATION
MANHATTAN AVENUE
WINNIPEG, MANITOBA

CORE AND TEST HOLE LOCATION PLAN

DATE: MARCH 2016
PROJECT NO: WX17879
REV. NO.: A
FIGURE NO: FIGURE A1

P:\JOBS\17800'S\17870'S\17879 – CITY OF WINNIPEG STREETS\DRAWINGS\WX17879.DWG

CORE #M1

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #M1 MANHATTAN AVENUE WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: A2

CORE #M2

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #M2 MANHATTAN AVENUE WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: A3

CORE #M3

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #M3 MANHATTAN AVENUE WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: A4

CORE #M4

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #M4 MANHATTAN AVENUE WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: A5

CORE #M5

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #M5 MANHATTAN AVENUE WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: A6

CORE #M6

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #M6 MANHATTAN AVENUE WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: A7

PROJECT: City of Winnipeg Local Street Evaluation	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **M1**
CLIENT: MMM Group Ltd.		PROJECT NO: WX17879
LOCATION: Manhattan Avenue	DRILL METHOD: 125mm 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			CONCRETE					
		GP	GRANULAR FILL - poorly graded, medium grained, compact (inferred), frozen, brown		1		- maximum nominal aggregate size of granular fill estimated at 20 mm	
					2			
					3			
1					4			1
					5			
			TEST HOLE TERMINATED AT 1.5m BELOW GRADE DUE TO SUSPECTED UTILITY TRENCH NOTES: - No seepage or sloughing was observed during drilling. - Test hole remained open to 1.5m below grade upon completion of drilling. - Test hole was backfilled with auger cuttings and bentonite. Pavement surface repaired with asphalt.					
2								2
3								3
4								

AMEC Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: CM	COMPLETION DEPTH: 1.5 m
REVIEWED BY: JW	COMPLETION DATE: 18 February 2016
Figure No. A8	Page 1 of 1

WX17879 - CITY OF WINNIPEG STREETS MANHATTAN AVE.GPJ 16/03/08 01:00 PM (GEOTECHNICAL REVISED)

PROJECT: City of Winnipeg Local Street Evaluation	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **M2**
CLIENT: MMM Group Ltd.		PROJECT NO: WX17879
LOCATION: Manhattan Avenue	DRILL METHOD: 125mm 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			CONCRETE					0
		CH	CLAY FILL - silty, trace sand, high plastic, frozen, dark grey		1			
					2			
					3			
1								1
		CH	CLAY - silty, high plastic, frozen, brown to grey		4			
					5			
		ML	SILT - some clay, trace sand, low plastic, moist, soft, brown, occasional oxidation		6		Hydrometer Analysis Results @ "1.7m": Gravel= 0.0% Sand= 1.9% Silt= 85.4% Clay= 12.7%	
					7			
2								2
					8			
		CH	CLAY - silty, high plastic, moist, stiff, brown mottled grey, occasional sulphates, occasional silt inclusions		9			
					10			
3			TEST HOLE TERMINATED AT 3.0m BELOW GRADE. NOTES: - No seepage or sloughing was observed during drilling. - Test hole remained open to 3.0m below grade upon completion of drilling. - Test hole was backfilled with auger cuttings and bentonite. Pavement surface repaired with asphalt.					3
4								

1723

WX17879 - CITY OF WINNIPEG STREETS MANHATTAN AVE.GPJ 16/03/08 01:00 PM (GEOTECHNICAL REVISED)

AMEC Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: CM	COMPLETION DEPTH: 3 m
REVIEWED BY: JW	COMPLETION DATE: 18 February 2016
Figure No. A9	Page 1 of 1

PROJECT: City of Winnipeg Local Street Evaluation	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **M3**
CLIENT: MMM Group Ltd.		PROJECT NO: WX17879
LOCATION: Manhattan Avenue	DRILL METHOD: 125mm 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			CONCRETE					0
		CI	CLAY FILL - silty, trace sand, high plastic, frozen, grey		1			
					2			
			- no sand or gravel below 0.8m		3			
1			SILT - some clay, trace sand, low plastic, moist, soft, brown					1
		ML			4			
					5			
			CLAY - silty, high plastic, moist, stiff, brown mottled grey, occasional oxidation, occasional silt inclusions, occasional sulphates		6			
2					7			2
		CH			8			
			- grey below 2.6m		9			
3					10			3
			TEST HOLE TERMINATED AT 3.0m BELOW GRADE. NOTES: - No seepage or sloughing was observed during drilling. - Test hole remained open to 3.0m below grade upon completion of drilling. - Test hole was backfilled with auger cuttings and bentonite. Pavement surface repaired with asphalt.					
4								

WX17879 - CITY OF WINNIPEG STREETS MANHATTAN AVE.GPJ 16/03/08 01:00 PM (GEOTECHNICAL REVISED)

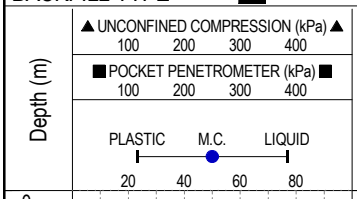
AMEC Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: CM	COMPLETION DEPTH: 3 m
REVIEWED BY: JW	COMPLETION DATE: 18 February 2016
Figure No. A10	Page 1 of 1

PROJECT: City of Winnipeg Local Street Evaluation	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **M4**
CLIENT: MMM Group Ltd.		PROJECT NO: WX17879
LOCATION: Manhattan Avenue	DRILL METHOD: 125mm 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			CONCRETE					0
		CH	CLAY FILL - silty, high plastic, frozen, dark grey - occasional silt inclusions below 0.3m		1 2 3		Hydrometer Analysis Results @ "0.5m": Gravel= 0.0% Sand= 2.9% Silt= 33.0% Clay= 64.1%	
1		ML	SILT - some clay, trace sand, low plastic, frozen, brown		4 5			1
		CH	CLAY - silty, high plastic, moist, stiff, brown mottled grey, occasional silt inclusions, occasional sulphates, occasional oxidation - grey below 2.3m		6 7 8 9 10			
2								2
3			TEST HOLE TERMINATED AT 3.0m BELOW GRADE. NOTES: - No seepage or sloughing was observed during drilling. - Test hole remained open to 3.0m below grade upon completion of drilling. - Test hole was backfilled with auger cuttings and bentonite. Pavement surface repaired with asphalt.					3
4								

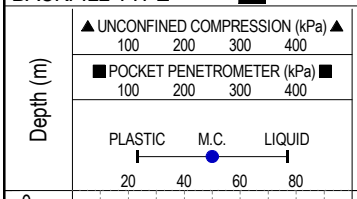
AMEC Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: CM	COMPLETION DEPTH: 3 m
REVIEWED BY: JW	COMPLETION DATE: 18 February 2016
Figure No. A11	Page 1 of 1

PROJECT: City of Winnipeg Local Street Evaluation	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **M5**
CLIENT: MMM Group Ltd.		PROJECT NO: WX17879
LOCATION: Manhattan Avenue	DRILL METHOD: 125mm 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			CONCRETE					0
		CI	CLAY FILL - silty, trace sand, high plastic, frozen, grey		1			
					2			
					3			
1			SILT - some clay, trace sand, low plastic, frozen, brown		4			1
			- moist, soft below 1.2m		5			
		ML	- very soft below 1.5m		6			
2					7			2
			CLAY - silty, high plastic, moist, stiff, brown mottled grey, occasional silt inclusions		8			
		CH			9			
3					10			3
			TEST HOLE TERMINATED AT 3.0m BELOW GRADE. NOTES: - No seepage or sloughing was observed during drilling. - Test hole remained open to 3.0m below grade upon completion of drilling. - Test hole was backfilled with auger cuttings and bentonite. Pavement surface repaired with asphalt.					
4								

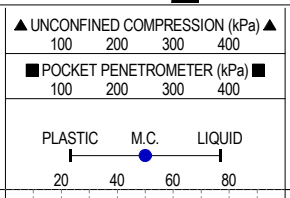
AMEC Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: CM	COMPLETION DEPTH: 3 m
REVIEWED BY: JW	COMPLETION DATE: 18 February 2016
Figure No. A12	Page 1 of 1

PROJECT: City of Winnipeg Local Street Evaluation	DRILLED BY: Maple Leaf Drilling	BORE HOLE NO: **M6**
CLIENT: MMM Group Ltd.		PROJECT NO: WX17879
LOCATION: Manhattan Avenue	DRILL METHOD: 125mm 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

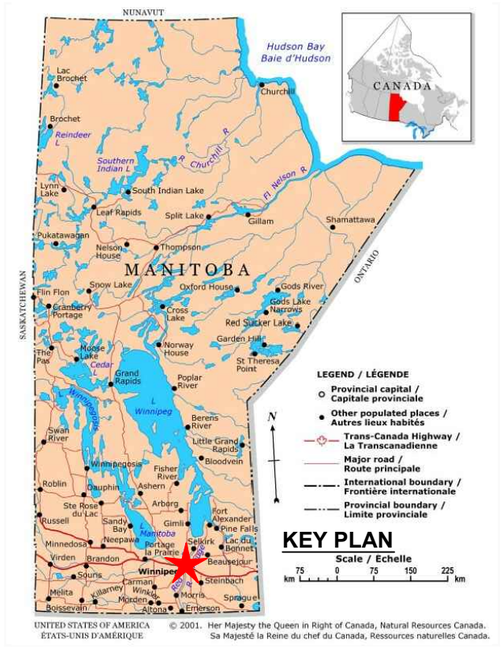


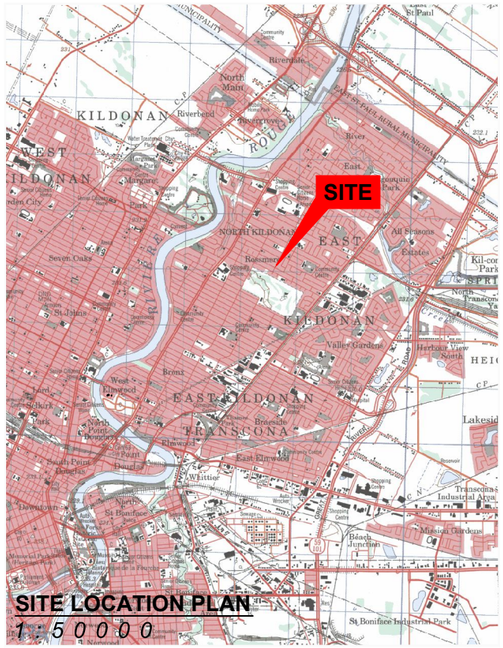
Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			CONCRETE					
		CI	CLAY FILL - silty, trace sand, high plastic, frozen, dark grey		1			
			CLAY - silty, high plastic, frozen, dark grey		2			
					3		Hydrometer Analysis Results @ "0.8m": Gravel= 0.0% Sand= 1.5% Silt= 24.6% Clay= 73.9%	
1			- moist, stiff, brown below 0.9m		4			1
					5			
		CH	- brown mottled grey, occasional silt inclusions below 1.5m		6			
2					7			2
					8			
					9			
					10			
3			- firm below 2.9m		11			3
			TEST HOLE TERMINATED AT 3.0m BELOW GRADE. NOTES: - No seepage or sloughing was observed during drilling. - Test hole remained open to 3.0m below grade upon completion of drilling. - Test hole was backfilled with auger cuttings and bentonite. Pavement surface repaired with asphalt.					
4								

AMEC Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: CM	COMPLETION DEPTH: 3 m
REVIEWED BY: JW	COMPLETION DATE: 18 February 2016
Figure No. A13	Page 1 of 1

APPENDIX B:
Rothesay Street Core Hole Location Plan and Core Photos





UTM 14 U COORDINATES		
ID	NORTHING	EASTING
R01	5533034	637582
R02	5533093	637604
R03	5533171	637647
R04	5533254	637681
R05	5533351	637733
R06	5533458	637777

LEGEND:

CORE HOLE LOCATION

REVISION	BY	DATE
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CLIENT: MMM GROUP LTD.

Amec Foster Wheeler
Environment & Infrastructure
440 DOVERCOURT DRIVE
WINNIPEG, MANITOBA R3Y 1N4
PHONE: 204.488.2997 FAX:204.489.8261

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

GEOTECHNICAL INVESTIGATION
LOCAL STREET PAVEMENT EVALUATION
ROTHESAY STREET
WINNIPEG, MANITOBA

CORE HOLE LOCATION PLAN

DATE:	MARCH 2016
PROJECT NO:	WX17879
REV. NO.:	A
FIGURE NO:	FIGURE B1

P:\JOBS\17800'S\17870'S\17879 - CITY OF WINNIPEG STREETS\DRAWINGS\WX17879.DWG

CORE #R1

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #R1 ROTHESAY STREET WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: B2

CORE #R2

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #R2 ROTHESAY STREET WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: B3

CORE #R3

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #R3 ROTHESAY STREET WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: B4

CORE #R4

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #R4 ROTHESAY STREET WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: B5

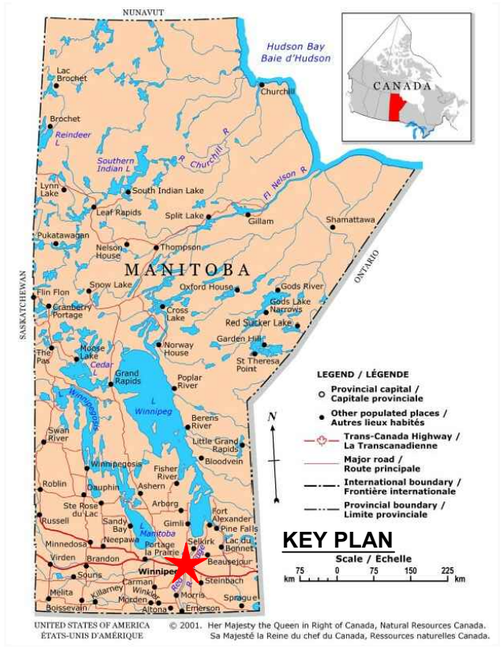
CORE #R5

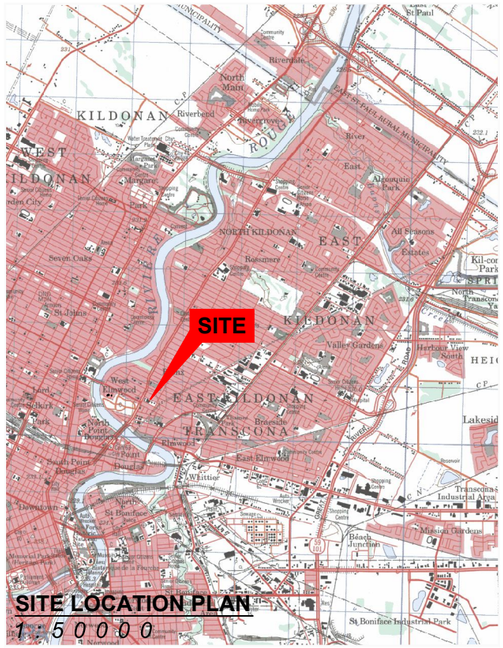
Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #R5 ROTHESAY STREET WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: B6

CORE #R6

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #R6 ROTHESAY STREET WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: B7

APPENDIX C:
Poplar Avenue Core Hole Location Plan and Core Photos





UTM 14 U COORDINATES		
ID	NORTHING	EASTING
P01	5530724	635339
P02	5530653	635493

LEGEND:

CORE HOLE LOCATION

REVISION	BY	DATE
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CLIENT: MMM GROUP LTD.

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PHONE: 204.488.2997 FAX:204.489.8261

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

GEOTECHNICAL INVESTIGATION
LOCAL STREET PAVEMENT EVALUATION
POPLAR AVENUE
WINNIPEG, MANITOBA

CORE HOLE LOCATION PLAN

DATE:	MARCH 2016
PROJECT NO:	WX17879
REV. NO.:	A
FIGURE NO:	FIGURE C1

P:\JOBS\17800'S\17870'S\17879 - CITY OF WINNIPEG STREETS\DRAWINGS\WX17879.DWG

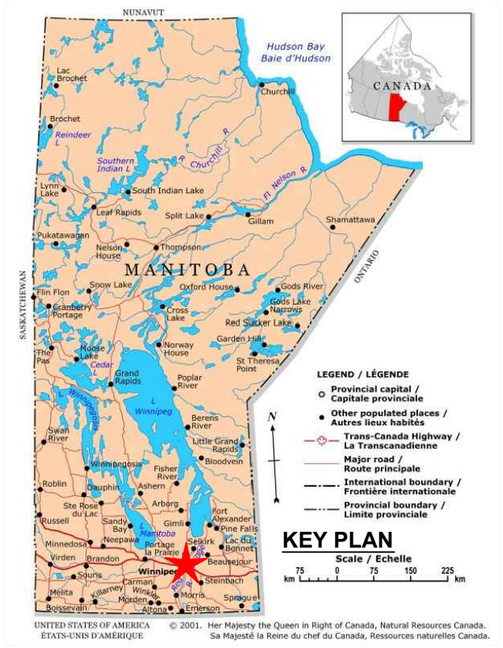
CORE #P1

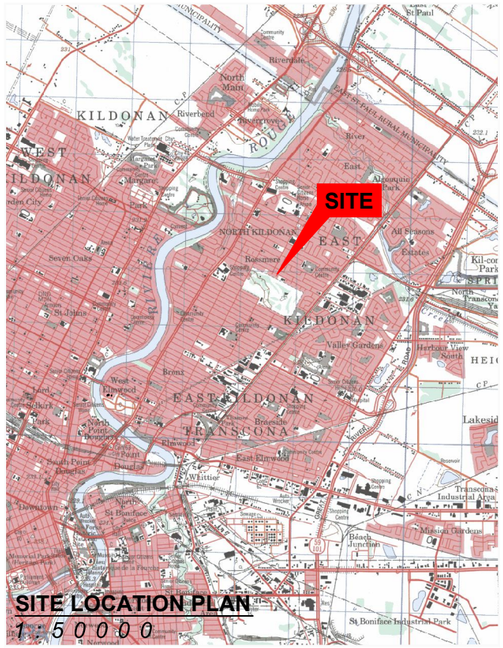
Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #P1 POPLAR AVENUE WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: C2

CORE #P2

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #P2 POPLAR AVENUE WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: C3

APPENDIX D:
McLeod Avenue Core Hole Location Plan and Core Photos





UTM 14 U COORDINATES		
ID	NORTHING	EASTING
ML01	5532976	637583
ML02	5532902	637747

LEGEND:

CORE HOLE LOCATION

REVISION	BY	DATE
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CLIENT: MMM GROUP LTD.

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PHONE: 204.488.2997 FAX:204.489.8261

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

GEOTECHNICAL INVESTIGATION
LOCAL STREET PAVEMENT EVALUATION
McLEOD AVENUE
WINNIPEG, MANITOBA

CORE HOLE LOCATION PLAN

DATE:	MARCH 2016
PROJECT NO:	WX17879
REV. NO.:	A
FIGURE NO:	FIGURE D1

P:\JOBS\17800'S\17870'S\17879 – CITY OF WINNIPEG STREETS\DRAWINGS\WX17879.DWG

CORE #ML1

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #ML1 MCLEOD AVENUE WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: D2

CORE #ML2

Amec Foster Wheeler Environment and Infrastructure		**CORE PHOTOGRAPHS CORE #ML2 MCLEOD AVENUE WINNIPEG, MANITOBA**		
Drawn: JW	Scale: N/A	Date: 7 March 2016	Project No.: WX17879	Figure: D3