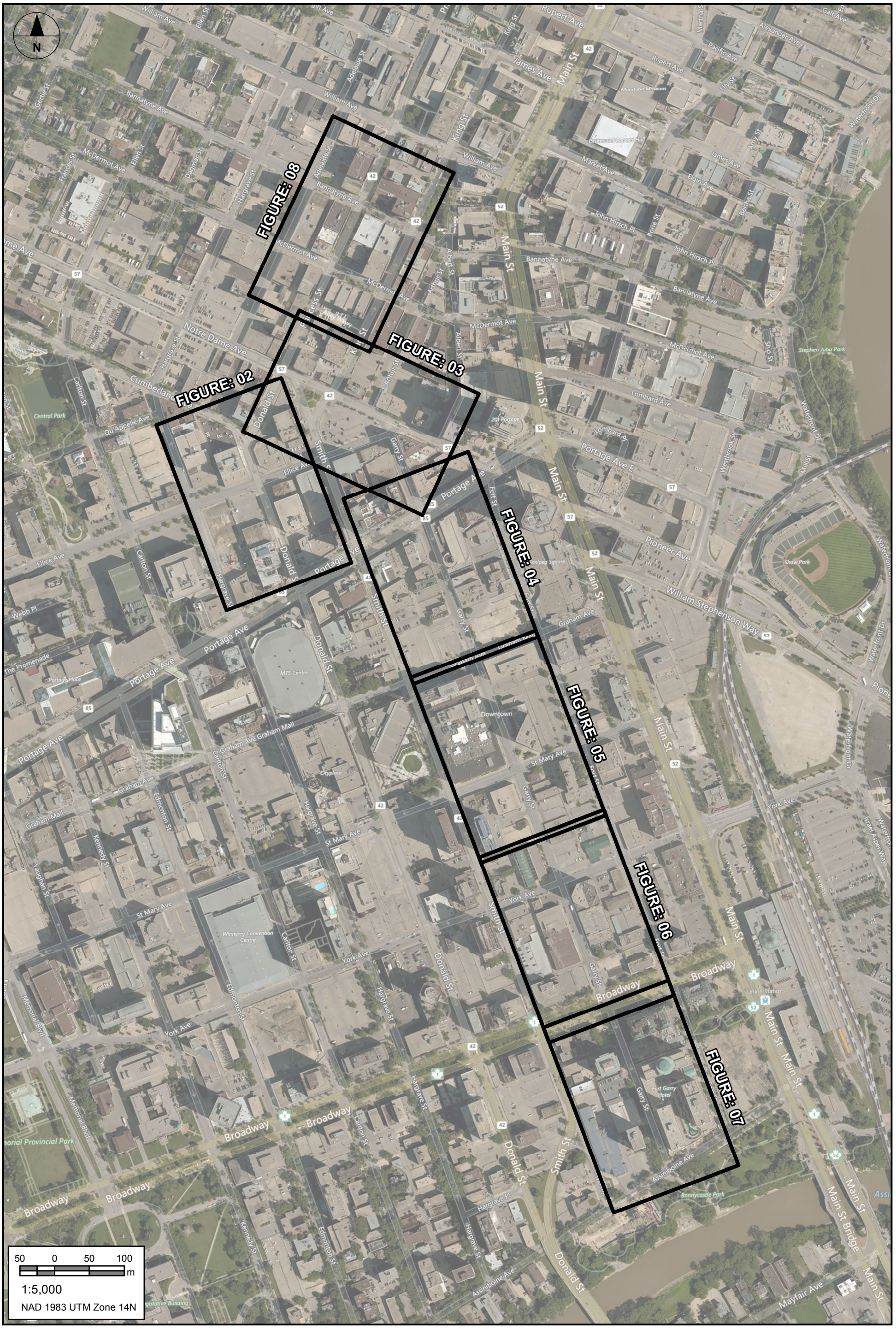
APPENDIX ‘A’

GEOTECHNICAL REPORT

Last saved by: MAHEC (2017-04-27) Last Plotted: 2013-04-22
Filename: P:\60540686\900-CAD_GIS\920-929 (GIS-GRAPHICS)\B\G001_60540686_01V1_OVERALLLOCATIONS.MXD

Project Management Initials: Designer: Checked: Approved:

ANSI B 279.4mm x 431.8mm



Downtown Pavement Renewals, Protected Bike Lanes & Streetscaping 17-B-02
City of Winnipeg

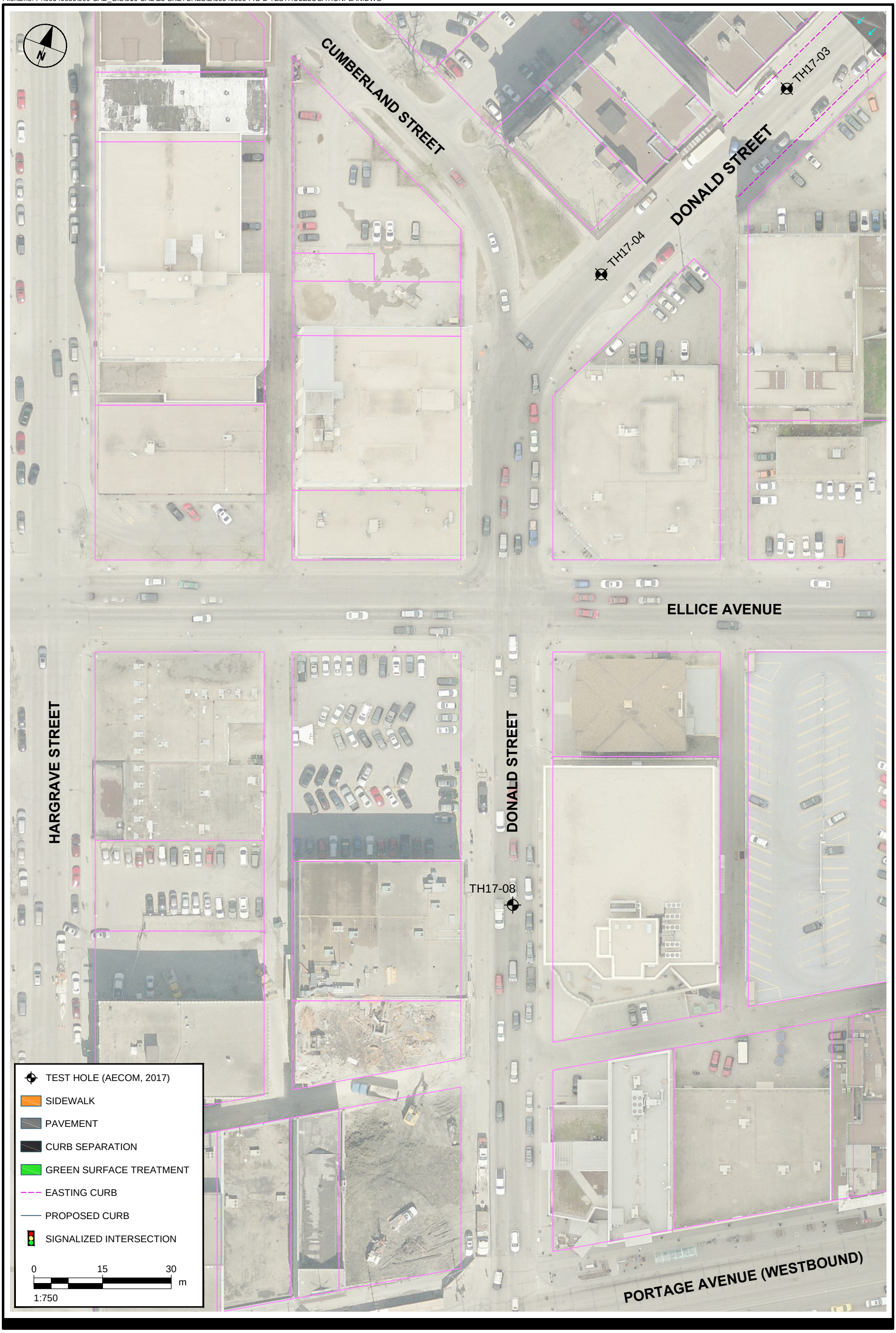
Pavement Core/Test Hole Location Plan
Cover Sheet

AECOM

Figure: 01

Last saved by: MAHEC(2017-04-26) Last Plotted: 2017-04-27
Filename: P:\60540686\900-CAD_GIS\910-CAD\25-SKETCHES\B\60540686-FIG-B-TESTHOLELOCATIONPLAN.DWG

Project Management Initials: Designer: _____ Checked: _____ Approved: _____ ANSI B 279.4mm x 431.8mm



Downtown Pavement Renewals, Protected Bike Lanes & Streetscaping 17-B-02
City of Winnipeg
Winnipeg, Manitoba

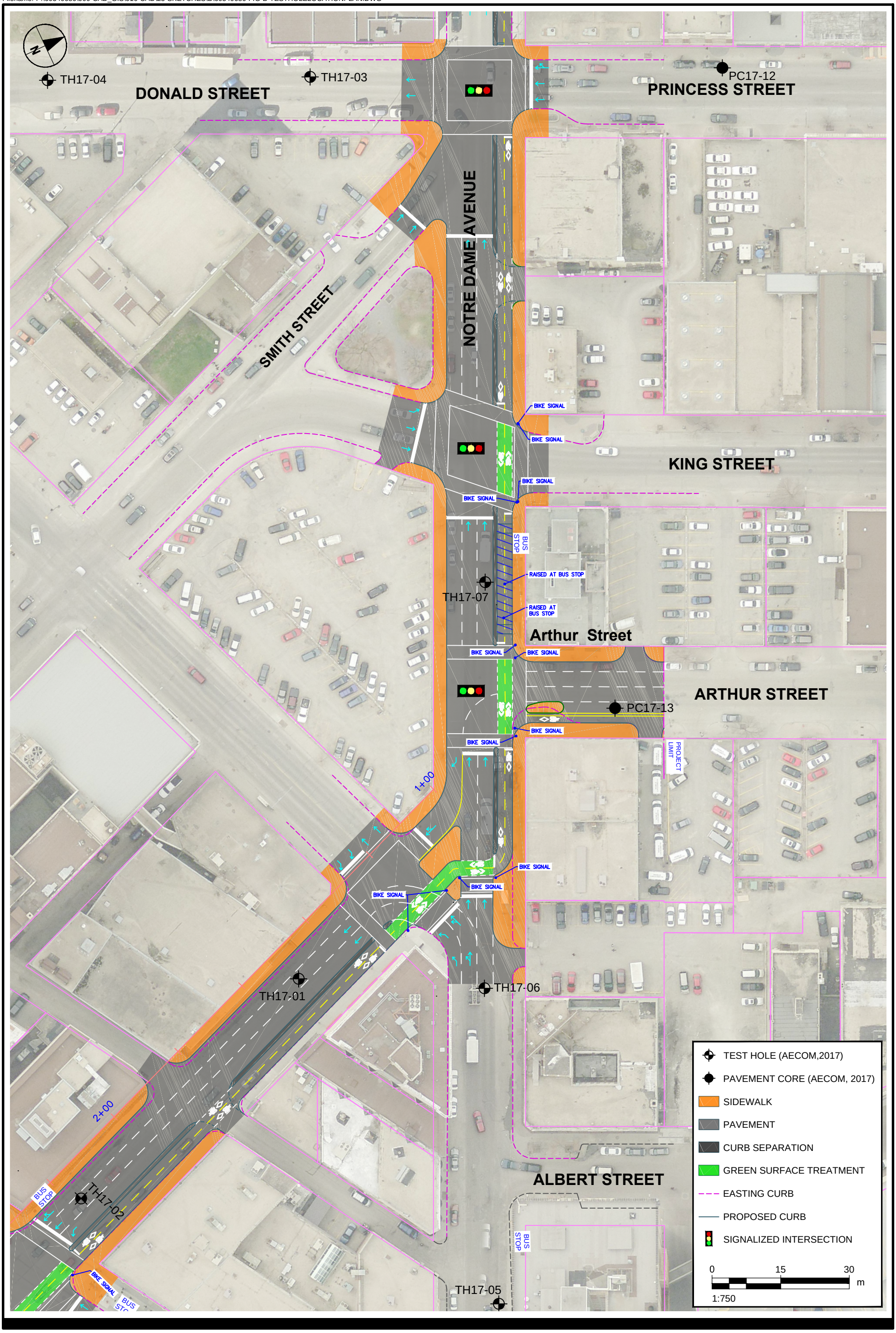
Pavement Core/Test Hole Location Plan

AECOM

Figure: 02

Last saved by: MAHEC(2017-04-26) Last Plotted: 2017-04-27
Filename: P:\60540686\900-CAD_GIS\910-CAD\25-SKETCHES\B\60540686-FIG-B-TESTHOLELOCATIONPLAN.DWG

Project Management Initials: Designer: _____ Checked: _____ Approved: _____ ANSI B 279.4mm x 431.8mm



Downtown Pavement Renewals, Protected Bike Lanes & Streetscaping 17-B-02
City of Winnipeg
Winnipeg, Manitoba

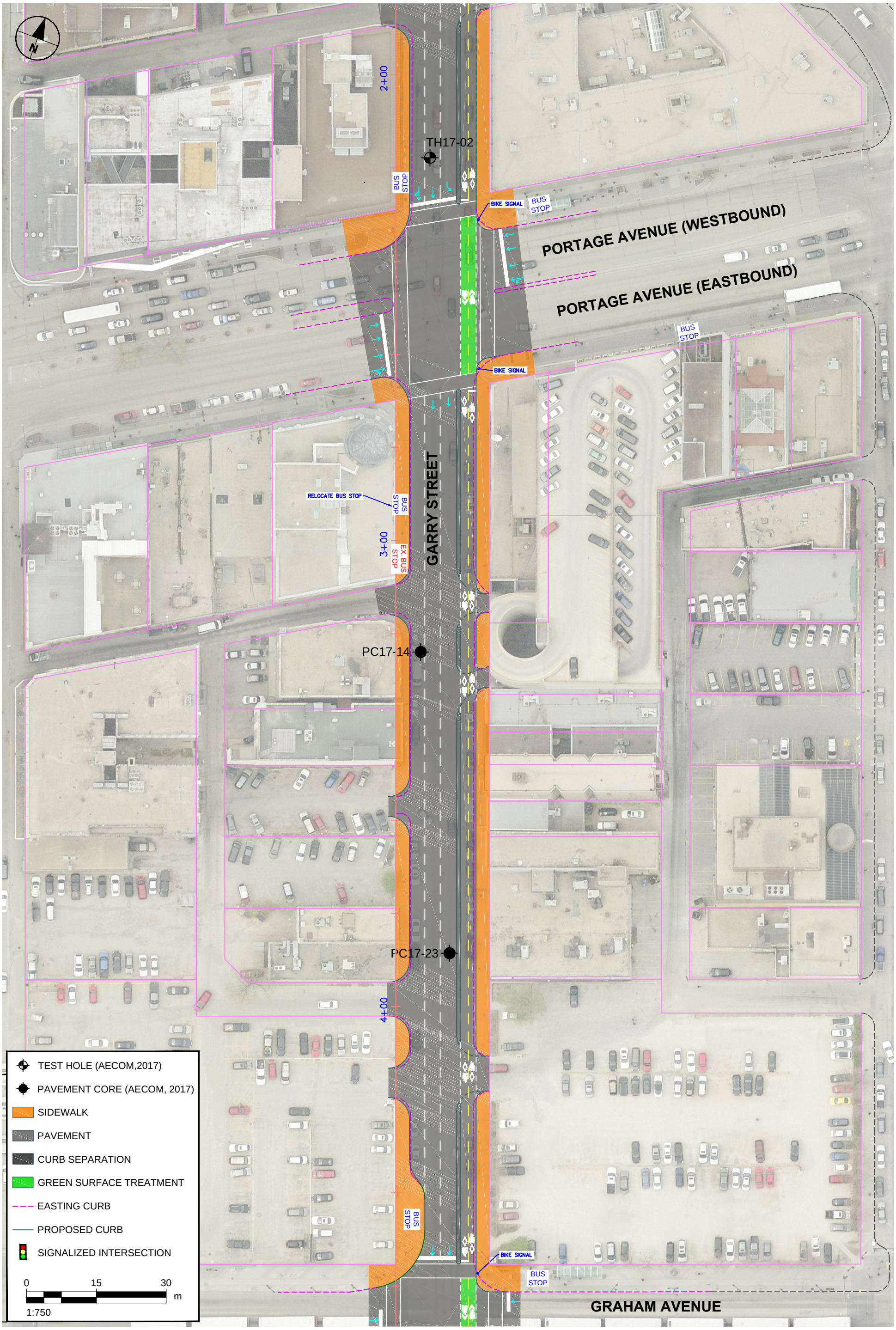
Pavement Core/Test Hole Location Plan

AECOM

Figure: 03

Last saved by: MAHEC(2017-04-26) Last Plotted: 2017-04-27
Filename: P:\60540686\900-CAD_GIS\910-CAD\25-SKETCHES\B\60540686-FIG-B-TESTHOLELOCATIONPLAN.DWG

Project Management Initials: Designer: _____ Checked: _____ Approved: _____ ANSI B 279.4mm x 431.8mm



Downtown Pavement Renewals, Protected Bike Lanes & Streetscaping 17-B-02
City of Winnipeg
Winnipeg, Manitoba

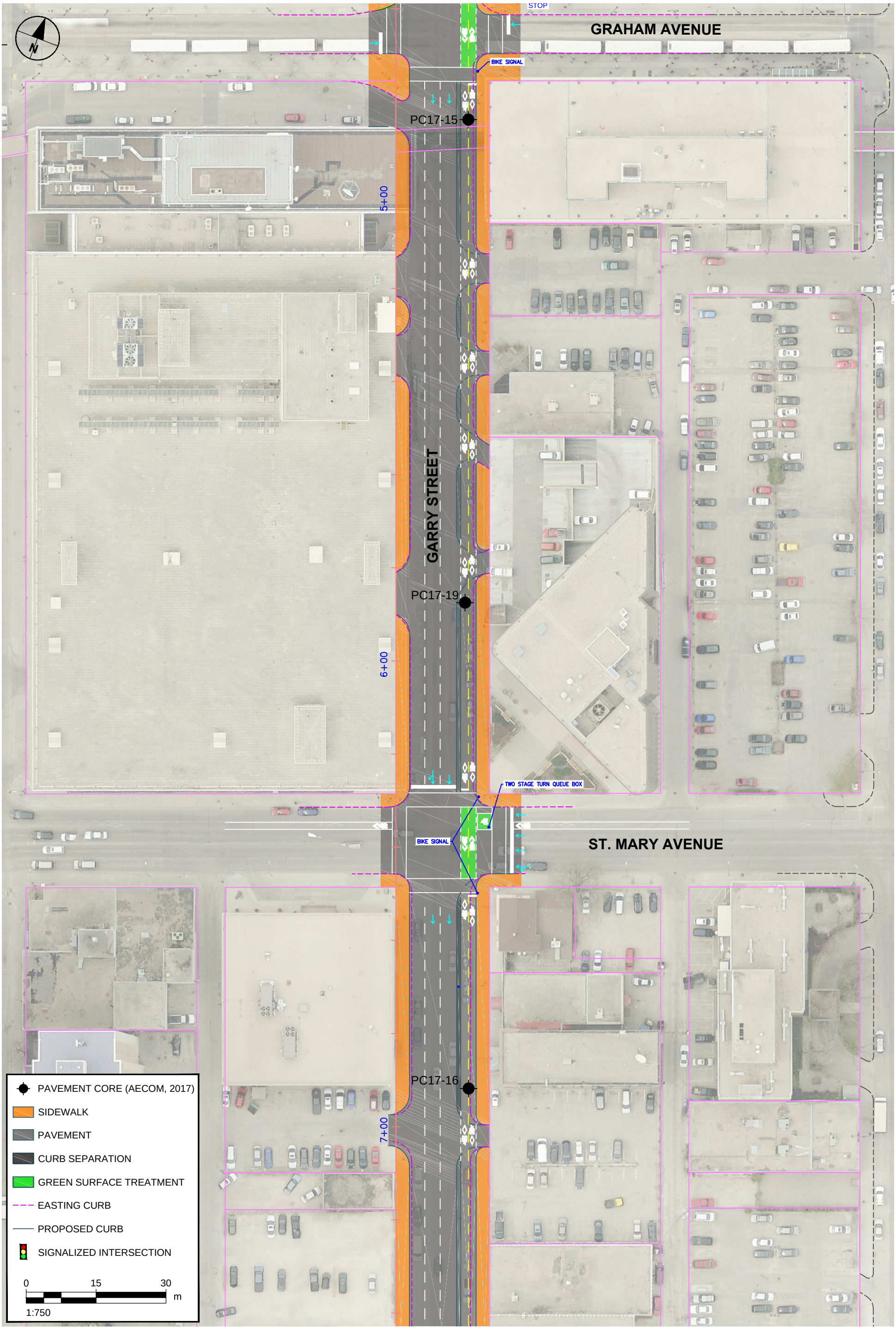
Pavement Core/Test Hole Location Plan

AECOM

Figure: 04

Last saved by: MAHEC(2017-04-26) Last Plotted: 2017-04-27
Filename: P:\60540686\900-CAD_GIS\910-CAD\25-SKETCHES\B\60540686-FIG-B-TESTHOLELOCATIONPLAN.DWG

Project Management Initials: Designer: _____ Checked: _____ Approved: _____ ANSI B 279.4mm x 431.8mm



Downtown Pavement Renewals, Protected Bike Lanes & Streetscaping 17-B-02
City of Winnipeg
Winnipeg, Manitoba

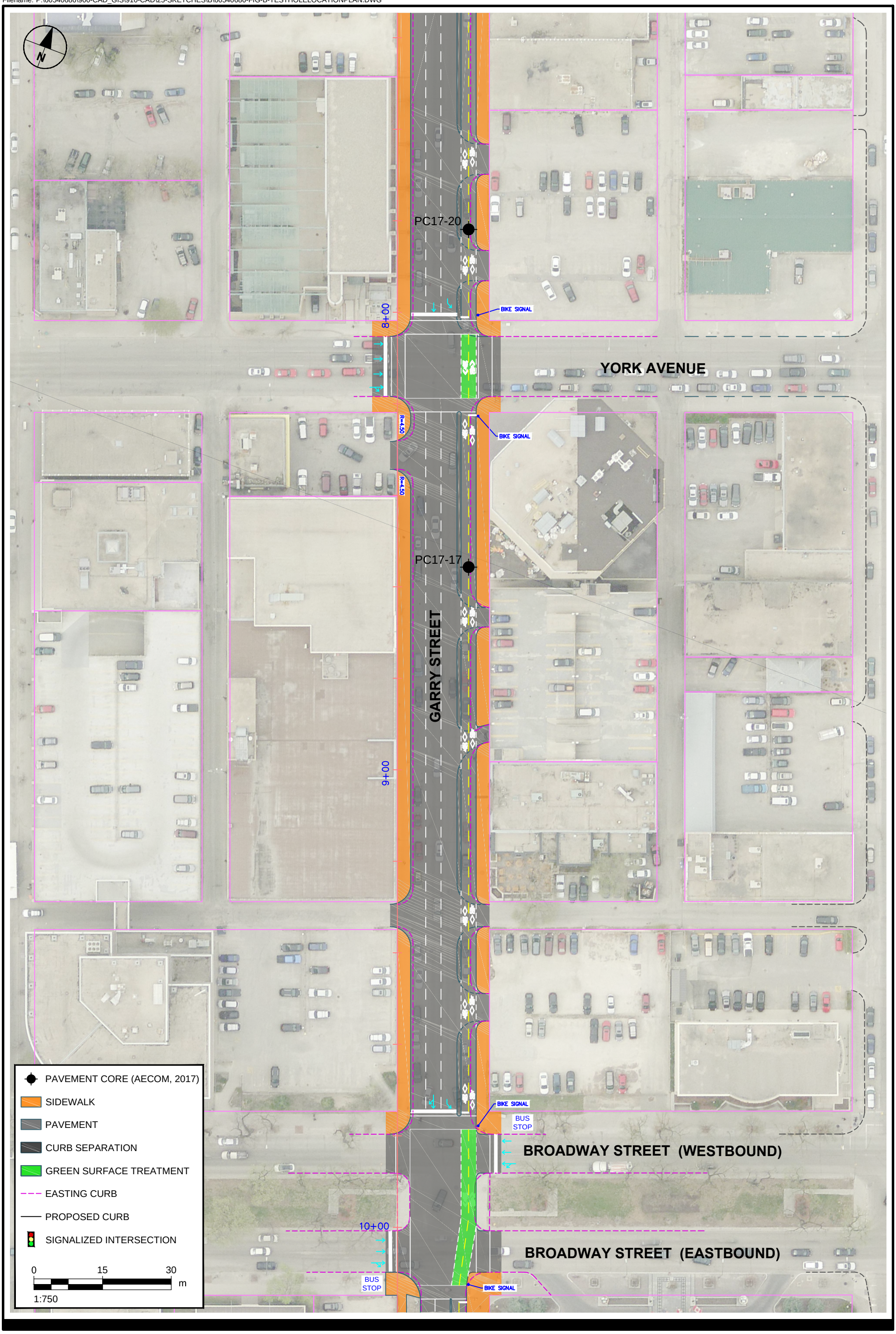
Pavement Core/Test Hole Location Plan

AECOM

Figure: 05

Last saved by: MAHEC(2017-04-26) Last Plotted: 2017-04-27
Filename: P:\60540686\900-CAD_GIS\910-CAD\25-SKETCHES\B\60540686-FIG-B-TESTHOLELOCATIONPLAN.DWG

Project Management Initials: Designer: _____ Checked: _____ Approved: _____ ANSI B 279.4mm x 431.8mm



Downtown Pavement Renewals, Protected Bike Lanes & Streetscaping 17-B-02
City of Winnipeg
Winnipeg, Manitoba

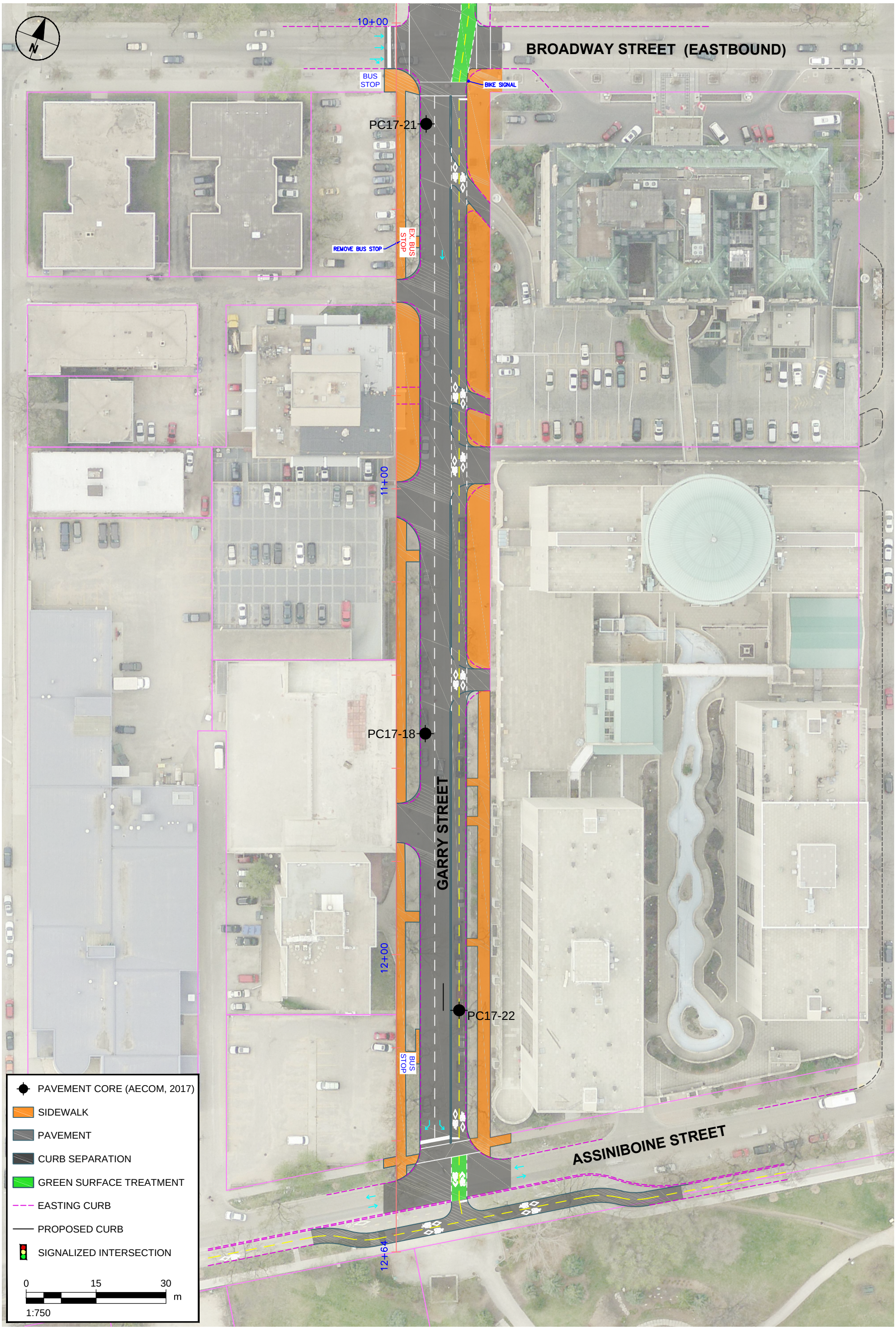
Pavement Core/Test Hole Location Plan

AECOM

Figure: 06

Last saved by: MAHEC(2017-04-26) Last Plotted: 2017-04-27
Filename: P:\60540686\900-CAD_GIS\910-CAD\25-SKETCHES\B\60540686-FIG-B-TESTHOLELOCATIONPLAN.DWG

Project Management Initials: Designer: _____ Checked: _____ Approved: _____ ANSI B 279.4mm x 431.8mm



Downtown Pavement Renewals, Protected Bike Lanes & Streetscaping 17-B-02
City of Winnipeg
Winnipeg, Manitoba

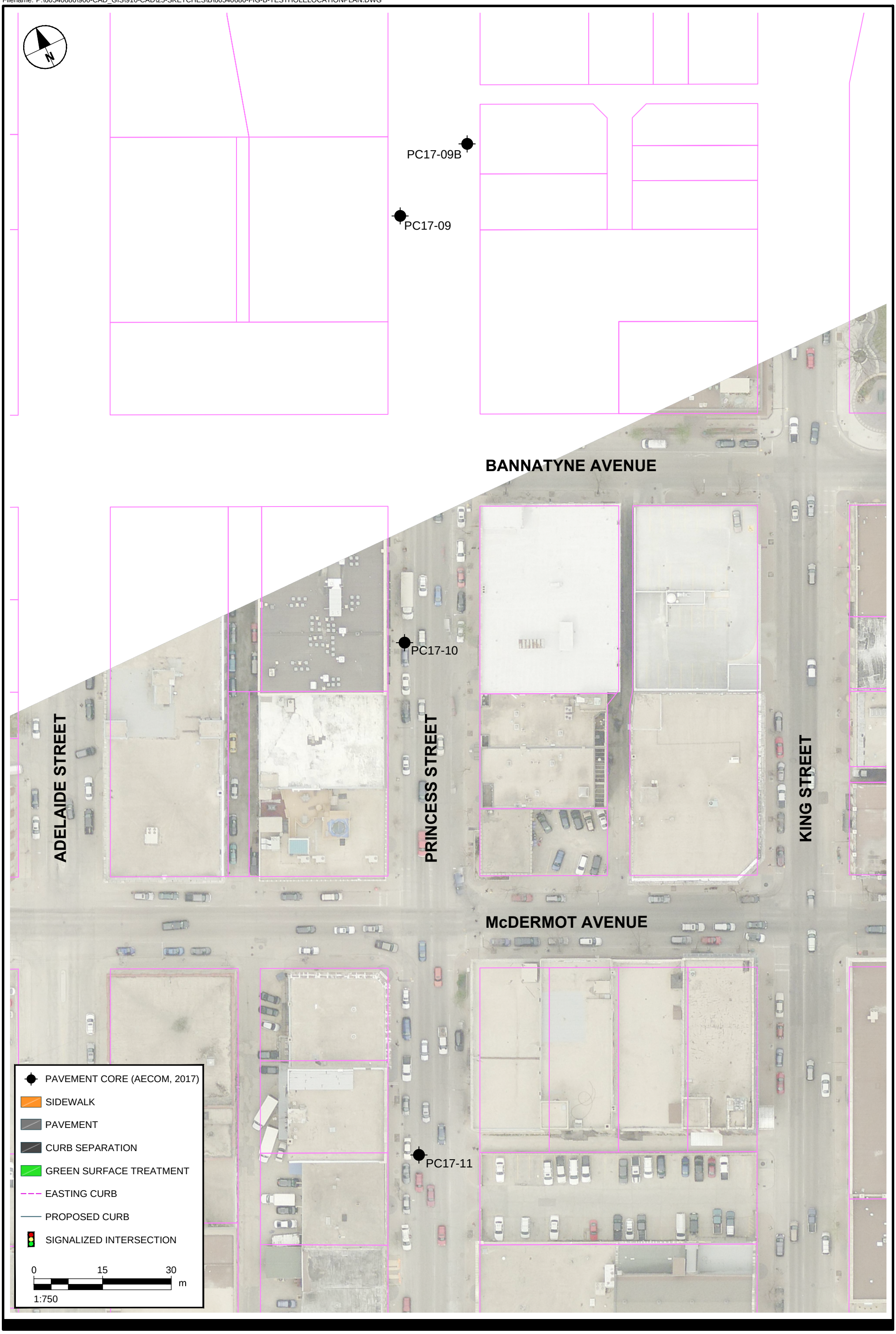
Pavement Core/Test Hole Location Plan

AECOM

Figure: 07

Last saved by: MAHEC(2017-04-26) Last Plotted: 2017-04-27
Filename: P:\60540686\900-CAD_GIS\910-CAD\25-SKETCHES\B\60540686-FIG-B-TESTHOLELOCATIONPLAN.DWG

Project Management Initials: Designer: _____ Checked: _____ Approved: _____ ANSI B 279.4mm x 431.8mm



Downtown Pavement Renewals, Protected Bike Lanes & Streetscaping 17-B-02
City of Winnipeg
Winnipeg, Manitoba

Pavement Core/Test Hole Location Plan

AECOM

Figure: 08

EXPLANATION OF FIELD & LABORATORY TEST DATA

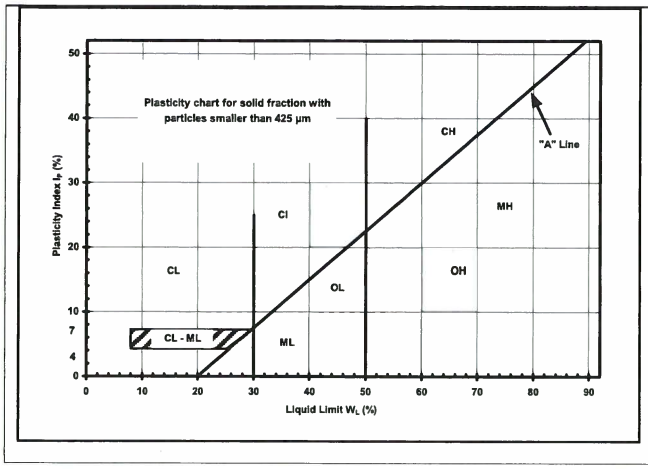
Description				UMA Log Symbols	USCS Classification	Laboratory Classification Criteria			
						Fines (%)	Grading	Plasticity	Notes
COARSE GRAINED SOILS	GRAVELS (More than 50% of coarse fraction of gravel size)	CLEAN GRAVELS (Little or no fines)	Well graded gravels, sandy gravels, with little or no fines		GW	0-5	$C_U > 4$ $1 < C_C < 3$		Dual symbols if 5-12% fines. Dual symbols if above "A" line and $4<W_P<7$ $C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} x D_{60}}$
			Poorly graded gravels, sandy gravels, with little or no fines		GP	0-5	Not satisfying GW requirements		
		DIRTY GRAVELS (With some fines)	Silty gravels, silty sandy gravels		GM	> 12		Atterberg limits below "A" line or $W_P<4$	
			Clayey gravels, clayey sandy gravels		GC	> 12		Atterberg limits above "A" line or $W_P<7$	
	SANDS (More than 50% of coarse fraction of sand size)	CLEAN SANDS (Little or no fines)	Well graded sands, gravelly sands, with little or no fines		SW	0-5	$C_U > 6$ $1 < C_C < 3$		
			Poorly graded sands, gravelly sands, with little or no fines		SP	0-5	Not satisfying SW requirements		
		DIRTY SANDS (With some fines)	Silty sands, sand-silt mixtures		SM	> 12		Atterberg limits below "A" line or $W_P<4$	
			Clayey sands, sand-clay mixtures		SC	> 12		Atterberg limits above "A" line or $W_P<7$	
FINE GRAINED SOILS	SILTS (Below 'A' line negligible organic content)	$W_L<50$	Inorganic silts, silty or clayey fine sands, with slight plasticity		ML			Classification is Based upon Plasticity Chart	
		$W_L>50$	Inorganic silts of high plasticity		MH				
	CLAYS (Above 'A' line negligible organic content)	$W_L<30$	Inorganic clays, silty clays, sandy clays of low plasticity, lean clays		CL				
		$30<W_L<50$	Inorganic clays and silty clays of medium plasticity		CI				
		$W_L>50$	Inorganic clays of high plasticity, fat clays		CH				
	ORGANIC SILTS & CLAYS (Below 'A' line)	$W_L<50$	Organic silts and organic silty clays of low plasticity		OL				
		$W_L>50$	Organic clays of high plasticity		OH				
HIGHLY ORGAINIC SOILS			Peat and other highly organic soils		Pt	Von Post Classification Limit		Strong colour or odour, and often fibrous texture	

	Asphalt		Till		
	Concrete		Bedrock (Undifferentiated)		AECOM
	Fill		Bedrock (Limestone)		

When the above classification terms are used in this report or test hole logs, the designated fractions may be visually estimated and not measured.

NOT USED TO CLASSIFY SUBGRADE. REFER TO CITY OF WINNIPEG SPECIFICATIONS FOR GEOTECHNICAL INVESTIGATION REQUIREMENTS FOR PUBLIC WORKS PROJECTS (SEPTEMBER, 2015)

NOT USED TO CLASSIFY SUBGRADE. REFER TO CITY OF WINNIPEG SPECIFICATIONS FOR GEOTECHNICAL INVESTIGATIONS REQUIREMENTS FOR PUBLIC WORKS PROJECTS (SEPTEMBER, 2015)



FRACTION		SEIVE SIZE (mm)		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS	
		Passing	Retained	Percent	Identifier
Gravel	Coarse	76	19	35-50	and
	Fine	19	4.75		
Sand	Coarse	4.75	2.00	20-35	"y" or "ey" *
	Medium	2.00	0.425		
	Fine	0.425	0.075	10-20	some
Silt (non-plastic) or Clay (plastic)		< 0.075 mm		1-10	trace

* for example: gravelly, sandy clayey, silty

Definition of Oversize Material

COBBLES: 76mm to 300mm diameter
BOULDERS: >300mm diameter

LEGEND OF SYMBOLS

Laboratory and field tests are identified as follows:

- q_u - undrained shear strength (kPa) derived from unconfined compression testing.
- T_v - undrained shear strength (kPa) measured using a torvane
- pp - undrained shear strength (kPa) measured using a pocket penetrometer.
- L_v - undrained shear strength (kPa) measured using a lab vane.
- F_v - undrained shear strength (kPa) measured using a field vane.
- γ - bulk unit weight (kN/m^3).
- SPT - Standard Penetration Test. Recorded as number of blows (N) from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 51 mm O.D. Raymond type sampler 0.30 m into the soil.
- DPPT - Drive Point Pentrometer Test. Recorded as number of blows from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 50 mm drive point 0.30 m into the soil.
- w - moisture content (W_L, W_P)

The undrained shear strength (Su) of a cohesive soil can be related to its consistency as follows:

Su (kPa)	CONSISTENCY
<12	very soft
12 – 25	soft
25 – 50	medium or firm
50 – 100	stiff
100 – 200	very stiff
200	hard

The resistance (N) of a non-cohesive soil can be related to compactness condition as follows

N – BLOWS/0.30 m	COMPACTNESS
0 - 4	very loose
4 - 10	loose
10 - 30	compact
30 - 50	dense
50	very dense

PROJECT: Downtown Pavement Renewals - 17-B-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH17-01
LOCATION: 14U - 0633476 m E, 5528692 m N, Garry Street, 5.16 m E of W curb		PROJECT NO.: 60540686
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Truck-mounted CME 55, 125 mm SSA	ELEVATION (m): N/A

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ☒ SPLIT SPOON ▤ BULK ▨ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		ASPHALT - 254 mm						
		CONCRETE - 330 mm						
		SILT - clayey, sandy - brown, frozen to 0.9 m - low to intermediate plasticity	■	G2				
1		- soft to firm, moist below 0.9 m - (G3): LL = 32.3%, PL = 13.5%	■	G3			(G3): Gravel: 0.1%, Sand: 24.5%, Silt: 49.1%, Clay: 26.3%	1
			■	G4				
			■	G5				
			■	G6				
2		END OF TEST HOLE AT 1.98 m IN CLAY						2
3		Notes: 1. No seepage observed during drilling. 2. Test hole open to 1.7 m upon removal of auger. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.						

PENETRATION TESTS: ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100
■ Total Unit Wt ■ (kN/m^3) 16 17 18 19 20 21
Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: + Torvane + × QU/2 × ☐ Lab Vane ☐ △ Pocket Pen. △ ⬘ Field Vane ⬘ (kPa) 50 100 150 200

AECOM

LOGGED BY: Tessa Christi	COMPLETION DEPTH: 1.98 m
REVIEWED BY: Alex Hill	COMPLETION DATE: 3/27/17
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE BOREHOLE LOGS TC REV1.GPJ UMA WINN.GDT 4/27/17

PROJECT: Downtown Pavement Renewals - 17-B-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH17-02
LOCATION: 14U - 0633489 m E, 5528581 m N, Garry Street, 5.33 m E of W curb		PROJECT NO.: 60540686
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Truck-mounted CME 55, 125 mm SSA	ELEVATION (m): N/A

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ▨ SPLIT SPOON ▤ BULK ▨ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m³) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100	UNDRAINED SHEAR STRENGTH + Torvane + × QU/2 × ☐ Lab Vane ☐ △ Pocket Pen. △ ⬘ Field Vane ⬘ (kPa) 50 100 150 200	COMMENTS	DEPTH
0		ASPHALT - 165 mm							
		WOOD - streetcar tie - 70 mm							
		CONCRETE - 324 mm							
		CLAY - trace to some silt - dark brown, frozen to 1.1 m		G2					
1		- dry to moist, firm, high plasticity below 1.1 m		G3					1
				G4					
				G5					
				G6					
2		END OF TEST HOLE AT 1.98 m IN CLAY							2
3									

Notes:
1. No seepage observed during drilling.
2. Wooden streetcar tie encountered 0.16 m below ground surface.
3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.

LOG OF TEST HOLE BOREHOLE LOGS TC REV1.GPJ UMA WINN.GDT 4/27/17

AECOM

LOGGED BY: Tessa Christi	COMPLETION DEPTH: 1.98 m
REVIEWED BY: Alex Hill	COMPLETION DATE: 3/27/17
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Downtown Pavement Renewals - 17-B-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH17-03
LOCATION: 14U - 0633298 m E, 5528745 m N, Donald Street, 5.49 m S of N curb		PROJECT NO.: 60540686
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Truck-mounted CME 55, 125 mm SSA	ELEVATION (m): N/A

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

PENETRATION TESTS: Becker | Dynamic Cone | SPT (Standard Pen Test) (Blows/300mm) 0 20 40 60 80 100 | Total Unit Wt (kN/m³) 16 17 18 19 20 21 | Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: Torvane | QU/2 | Lab Vane | Pocket Pen. | Field Vane (kPa) 50 100 150 200

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0		ASPHALT - 83 mm					
		CONCRETE - 476 mm					
		SAND and GRAVEL FILL - 102 mm					
		CLAY - some silt, some sand - dark brown, frozen to 1.1 m - high plasticity - (G2): LL = 66.7%, PL = 17.9%		G2		(G2): Gravel: 0.0%, Sand: 16.4%, Silt: 21.4%, Clay: 62.3%	
1		- firm, dry to moist below 1.1 m		G3			1
				G4			
		SILT - clayey, some sand to sandy - light brown, soft, moist - low to intermediate plasticity		G5			
				G6			
2		END OF TEST HOLE AT 1.98 m IN SILT					2
		Notes: 1. No seepage observed during drilling. 2. Test hole open to 1.6 m upon removal of auger. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.					
3							

AECOM

LOGGED BY: Tessa Christi	COMPLETION DEPTH: 1.98 m
REVIEWED BY: Alex Hill	COMPLETION DATE: 3/27/17
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE BOREHOLE LOGS TC REV1.GPJ UMA WINN.GDT 4/27/17

PROJECT: Downtown Pavement Renewals - 17-B-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH17-04
LOCATION: 14U - 0633276 m E, 5528716 m N, Donald Street, 5.46 m S of N curb		PROJECT NO.: 60540686
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Truck-mounted CME 55, 125 mm SSA	ELEVATION (m): N/A

SAMPLE TYPE ■ GRAB ▯ SHELBY TUBE ☒ SPLIT SPOON ▬ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m³) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100	UNDRAINED SHEAR STRENGTH + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⬘ Field Vane ⬘ (kPa) 50 100 150 200	COMMENTS	DEPTH
0		ASPHALT - 210 mm							
		CONCRETE - 114 mm							
		WOOD - streetcar tie - 152 mm							
		SAND and GRAVEL FILL - 57 mm							
		CLAY - trace to some silt - dark brown, frozen to 0.9 m		G2					
1		- firm, dry to moist, high plasticity below 0.9 m		G3					1
		SILT - clayey, some sand - light brown, firm, dry to moist - low plasticity - (G4): LL = 26.2%, PL = 15.4%		G4				(G4): Gravel: 0.0%, Sand: 19.2%, Silt: 61.0%, Clay: 19.9%	
				G5					
				G6					
2		END OF TEST HOLE AT 1.98 m IN SILT							2
3		Notes: 1. No seepage observed during drilling. 2. Wooden streetcar tie encountered 0.3 m below ground surface 3. Test hole open to 1.7 m upon removal of auger. 4. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.							

AECOM

LOGGED BY: Tessa Christi	COMPLETION DEPTH: 1.98 m
REVIEWED BY: Alex Hill	COMPLETION DATE: 3/27/17
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE BOREHOLE LOGS TC REV1.GPJ UMA WINN.GDT 4/27/17

PROJECT: Downtown Pavement Renewals - 17-B-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH17-05
LOCATION: 14U - 0633572 m E, 5528686 m N, Notre Dame Avenue		PROJECT NO.: 60540686
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Truck-mounted CME 55, 125 mm SSA	ELEVATION (m): N/A

SAMPLE TYPE ■ GRAB ▥ SHELBY TUBE ☒ SPLIT SPOON ▤ BULK ⊘ NO RECOVERY ◧ CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS ✳ Becker ✳ ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m³) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100	UNDRAINED SHEAR STRENGTH + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⬘ Field Vane ⬘ (kPa) 50 100 150 200	COMMENTS	DEPTH
0		ASPHALT - 89 mm							
	■	CONCRETE - 191 mm							
	⋰⋱	SAND - light brown, loose to compact, dry to moist - fine to coarse grained - well graded							
1									1
		END OF TEST HOLE AT 1.22 m IN SAND							
		Notes: 1. Granular backfill for possible service trench encountered. Test hole terminated at 1.2 m. 2. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.							
2									2
3									

LOG OF TEST HOLE BOREHOLE LOGS TC REV1.GPJ UMA WINN.GDT 4/27/17

AECOM

LOGGED BY: Tessa Christi	COMPLETION DEPTH: 1.98 m
REVIEWED BY: Alex Hill	COMPLETION DATE: 3/30/17
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Downtown Pavement Renewals - 17-B-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH17-06
LOCATION: 14U - 0633493 m E, 5528680 m N, Notre Dame Avenue, 5.00 m W of E curb		PROJECT NO.: 60540686
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Truck-mounted CME 55, 125 mm SSA	ELEVATION (m): N/A

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

PENETRATION TESTS: Becker; Dynamic Cone; SPT (Standard Pen Test) (Blows/300mm) 0 20 40 60 80 100; Total Unit Wt (kN/m^3) 16 17 18 19 20 21; Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: Torvane; QU/2; Lab Vane; Pocket Pen.; Field Vane (kPa) 50 100 150 200

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0		ASPHALT - 203 mm					
		CONCRETE - 406 mm					
		SAND and GRAVEL FILL - 203 mm					
		CLAY - some silt, trace sand, trace gravel - dark brown, frozen to 1.7 m - high plasticity					
1				G1			1
				G2			
		- (G3): LL = 70.8%, PL = 19.9%		G3		(G3): Gravel: 0.1%, Sand: 4.8%, Silt: 25.7%, Clay: 69.4%	
		- firm, dry to moist below 1.7 m		G4			
2		END OF TEST HOLE AT 1.98 m IN CLAY					2
3							

Notes:
1. No seepage observed during drilling.
2. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.

AECOM

LOGGED BY: Tessa Christi	COMPLETION DEPTH: 1.98 m
REVIEWED BY: Alex Hill	COMPLETION DATE: 3/30/17
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE BOREHOLE LOGS TC REV1.GPJ UMA WINN.GDT 4/27/17

PROJECT: Downtown Pavement Renewals - 17-B-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH17-07
LOCATION: 14U - 0633421 m E, 5528728 m N, Notre Dame Avenue, 4.98 m W of E curb		PROJECT NO.: 60540686
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Truck-mounted CME 55, 125 mm SSA	ELEVATION (m): N/A

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

PENETRATION TESTS: Becker | Dynamic Cone | SPT (Standard Pen Test) (Blows/300mm) 0 20 40 60 80 100 | Total Unit Wt (kN/m³) 16 17 18 19 20 21 | Plastic MC Liquid 20 40 60 80 100

UNDRAINED SHEAR STRENGTH: Torvane | QU/2 | Lab Vane | Pocket Pen. | Field Vane (kPa) 50 100 150 200

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0		ASPHALT - 114 mm					
		CONCRETE - 470 mm					
		CLAY - silty, sandy, trace gravel - brown, soft, moist - intermediate plasticity - silty sand laminations < 5 mm thick - (G1): LL = 42.9%, PL = 19.9%		G1		(G1): Gravel: 7.3%, Sand: 23.5%, Silt: 34.1%, Clay: 35.1%	
1				G2			1
		SILT - clayey, some sand - light brown, soft to firm, moist - low to intermediate plasticity		G2.5			
		CLAY - some silt to silty, some sand to sandy, trace gravel - brown, soft, moist - intermediate to high plasticity - silty sand laminations < 5 mm thick		G4			
				G6			
		CLAY - trace silt - dark brown, firm, dry to moist - high plasticity		G7			
2				G8			2
		END OF TEST HOLE AT 2.30 m IN CLAY					
3							

Notes:
1. No seepage observed during drilling.
2. Suspected wooden streetcar tie encountered 0.4 m below ground surface.
3. Test hole open to 2.3 m upon removal of auger.
4. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.

AECOM

LOGGED BY: Tessa Christi	COMPLETION DEPTH: 2.29 m
REVIEWED BY: Alex Hill	COMPLETION DATE: 3/30/17
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE BOREHOLE LOGS TC REV1.GPJ UMA WINN.GDT 4/27/17

PROJECT: Downtown Pavement Renewals - 17-B-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH17-08
LOCATION: 14U - 0633295 m E, 5528533 m N, Donald Street, 4.42 m W of E curb		PROJECT NO.: 60540686
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Truck-mounted CME 55, 125 mm SSA	ELEVATION (m): N/A

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS: Becker; Dynamic Cone; SPT (Standard Pen Test) (Blows/300mm) 0 20 40 60 80 100; Total Unit Wt (kN/m³) 16 17 18 19 20 21; Plastic MC Liquid 20 40 60 80 100	UNDRAINED SHEAR STRENGTH: Torvane; QU/2; Lab Vane; Pocket Pen.; Field Vane (kPa) 50 100 150 200	COMMENTS	DEPTH
0		ASPHALT - 51 mm							
		CONCRETE - 305 mm							
		SAND and GRAVEL FILL - 102 mm							
		CLAY - silty, some sand, some organics - dark grey to black, firm, dry to moist - high plasticity - silt laminations < 5 mm thick							
		- (G1): LL = 73.1%, PL = 19.1%		G1				(G1): Gravel: 0.0%, Sand: 15.8%, Silt: 30.1%, Clay: 54.1%	
1		SILT - clayey, some sand to sandy - light brown, soft to firm, moist - low to intermediate plasticity		G2					1
		CLAY - trace to some silt - brown, firm to stiff, dry to moist - high plasticity		G3					
		- (G4): LL = 65.4%, PL = 20.5%		G4					
2				G5					2
				G6					
		END OF TEST HOLE AT 2.30 m IN CLAY							
3		Notes: 1. No seepage observed during drilling. 2. Test hole open to 2.2 m upon removal of auger. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.							

AECOM

LOGGED BY: Tessa Christi	COMPLETION DEPTH: 2.29 m
REVIEWED BY: Alex Hill	COMPLETION DATE: 3/30/17
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

LOG OF TEST HOLE BOREHOLE LOGS TC REV1.GPJ UMA WINN.GDT 4/27/17

City of Winnipeg

Downtown Pavement Renewals, Protected Bike Lanes & Streetscaping 17-B-02 – Garry Street/Donald Street/Notre Dame Avenue

Geotechnical Investigation

Table 01- Summary of Laboratory Soil Testing

Test Hole No.	Test Hole Location	Pavement Structure		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH17-01	Garry Street 14U – 0633476 m E, 5528692 m N 5.2 m E of W curb	Asphalt	254	CLAYEY SANDY SILT	0.6	21.9							
				CLAYEY SANDY SILT	0.9	23.2	0.1	24.5	49.1	26.3	32.3	13.5	18.8
		Concrete	330	CLAYEY SANDY SILT	1.2	29.1							
				CLAYEY SANDY SILT	1.5	21.4							
				CLAYEY SANDY SILT	1.8	21.5							
TH17-02	Garry Street 14U – 0633489 m E, 5528581 m N 5.3 m E of W curb	Asphalt	165	CLAY	0.6	27.1							
				CLAY	0.9	29.7							
		Concrete	324	CLAY	1.2	28.3							
				CLAY	1.5	27.7							
				CLAY	1.8	27.8							
TH17-03	Donald Street 14U – 0633298 m E, 5528745 m N 5.5 m E of W curb	Asphalt	83	CLAY	0.7	29.5	0.0	16.4	21.4	62.3	66.7	17.9	48.8
				CLAY	0.9	29.4							
		Concrete	476	CLAY	1.2	33.8							
				CLAYEY SANDY SILT	1.5	28.5							
				CLAYEY SANDY SILT	1.8	23.1							
TH17-04	Donald Street 14U – 0633276 m E, 5528716 m N 5.5 m E of W curb	Asphalt	210	CLAY	0.6	33.7							
				CLAY	0.9	30.6							
		Concrete	114	CLAY	1.2	22.7	0.0	19.2	61.0	20.0	26.2	15.4	10.8
				CLAYEY SILT	1.5	20.5							
				CLAYEY SILT	1.8	21.5							
TH17-05	Notre Dame Avenue 14U – 0633572 m E, 5528686 m N	Asphalt	89	--	--	--							
				--	--	--							
				--	--	--							
		Concrete	191	--	--	--							
				--	--	--							
				--	--	--							
TH17-06	Notre Dame Avenue 14U – 0633493 m E, 5528680 m N 5.0 m W of E curb	Asphalt	203	CLAY	0.9	33.5							
				CLAY	1.2	29.6							
		Concrete	406	CLAY	1.5	29.2	0.1	4.8	25.7	69.4	70.8	19.9	50.9
				CLAY	1.8	27.6							

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

Test Hole No.	Test Hole Location	Pavement Structure		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH17-07	Notre Dame Avenue 14U - 0633421 m E, 5528728 m N 5.0 m W of E curb	Asphalt	114	SILTY SANDY CLAY	0.8	27.6	7.3	23.5	34.1	35.1	42.9	19.9	22.9
				SILTY SANDY CLAY	1.1	29.7							
				CLAYEY SILT	1.2	25.5							
		Concrete	470	SILTY SANDY CLAY	1.4	22.3							
				SILTY SANDY CLAY	1.7	21.3							
				CLAY	2.0	30.7							
				CLAY	2.1	41.3							
TH17-08	Donald Street 14U – 0633295 m E, 5528533 m N 4.42 m W of E curb	Asphalt	51	CLAY	0.8	31.5	0.0	15.8	30.1	54.1	73.1	19.1	54.0
				CLAYEY SILT	1.1	29.5							
				CLAY	1.4	18.3							
		Concrete	305	CLAY	1.7	30.6					65.4	20.5	44.9
				CLAY	2.0	32.9							
				CLAY	2.1	43.0							

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

City of Winnipeg

Downtown Pavement Renewals, Protected Bike Lanes & Streetscaping 17-B-02

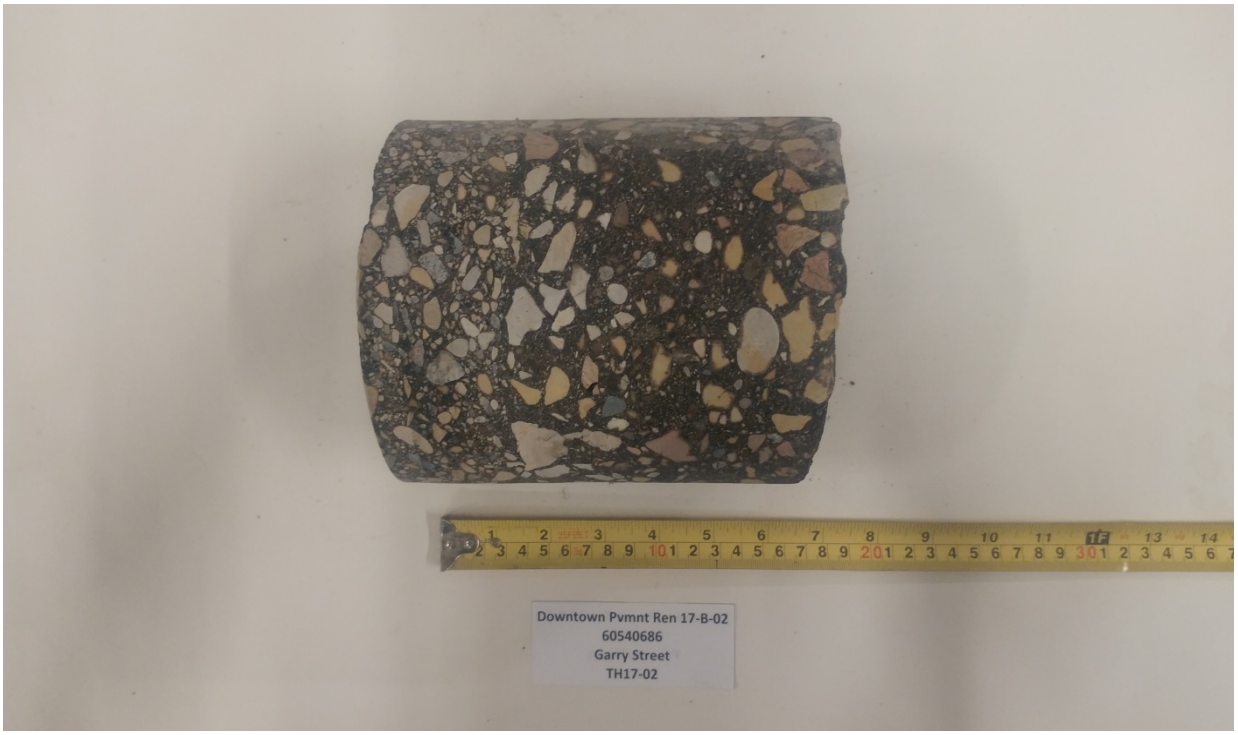
Geotechnical Investigation

Table 02 - Summary of Pavement Core Thicknesses

Test Hole No.	Test Hole Location	Pavement Structure	
		Type	Thickness (mm)
PC17-09	Princess Street William to Bannatyne 1.1 m E of W curb 14U - 0633459 m E, 5529064 m N	Asphalt	89
		Concrete	--
PC17-09B	Princess Street William to Bannatyne 1.4 m W of E curb 14U - 0633456 m E, 5529075 m N	Asphalt	191
		Concrete	127
PC17-10	Princess Street Bannatyne to McDermot 1.5 m E of W curb 14U - 0633407 m E, 5528932 m N	Asphalt	330
		Concrete	--
PC17-11	Princess Street McDermot to Notre Dame 4.7 m E of W curb 14U - 0633378 m E, 5528873 m N	Asphalt	89
		Concrete	222
PC17-12	Princess Street McDermot to Notre Dame 1.0 m E of W curb 14U - 0633342 m E, 5528839 m N	Asphalt	51
		Concrete	178
PC17-13	Arthur Street North of Notre Dame 4.7 m W of E curb 14U – 0633455 m E, 5528748 m N	Asphalt	--
		Concrete	210
PC17-14	Garry Street Portage to Graham 1.3 m E of W curb 14U – 0633536 m E, 5528491 m N	Asphalt	216
		Concrete	89
PC17-23	Garry Street Portage to Graham 4.6 m W of E curb 14U - 0633558, 5528424	Asphalt	241
		Concrete	--
PC17-15	Garry Street Graham to St. Mary 1.0 m W of E curb 14U – 0633573 m E, 5528342 m N	Asphalt	--
		Concrete	235

Test Hole No.	Test Hole Location	Pavement Structure	
		Type	Thickness (mm)
PC17-19	Garry Street Graham to St. Mary 1.5 m W of E curb 14U - 0633620, 5528201	Asphalt	57
		Concrete	216
PC17-16	Garry Street St. Mary to York 1.2 m W of E curb 14U – 0633687 m E, 5528163 m N	Asphalt	127
		Concrete	--
PC17-20	Garry Street St. Mary to York 1.3 m W of E curb 14U - 0633703, 5528067	Asphalt	83
		Concrete	210
PC17-17	Garry Street York to Broadway 1.0 m W of E curb 14U - 0633720, 5527992	Asphalt	121
		Concrete	127
PC17-21	Garry Street Broadway to Assiniboine 1.2 m E of W curb 14U - 0633787, 5527842	Asphalt	44
		Concrete	216
PC17-18	Garry Street Broadway to Assiniboine 1.6 m E of W curb 14U - 0633829, 5527733	Asphalt	70
		Concrete	216
PC17-22	Garry Street Broadway to Assiniboine 1.2 m W of E curb 14U - 0633869, 5527561	Asphalt	51
		Concrete	235

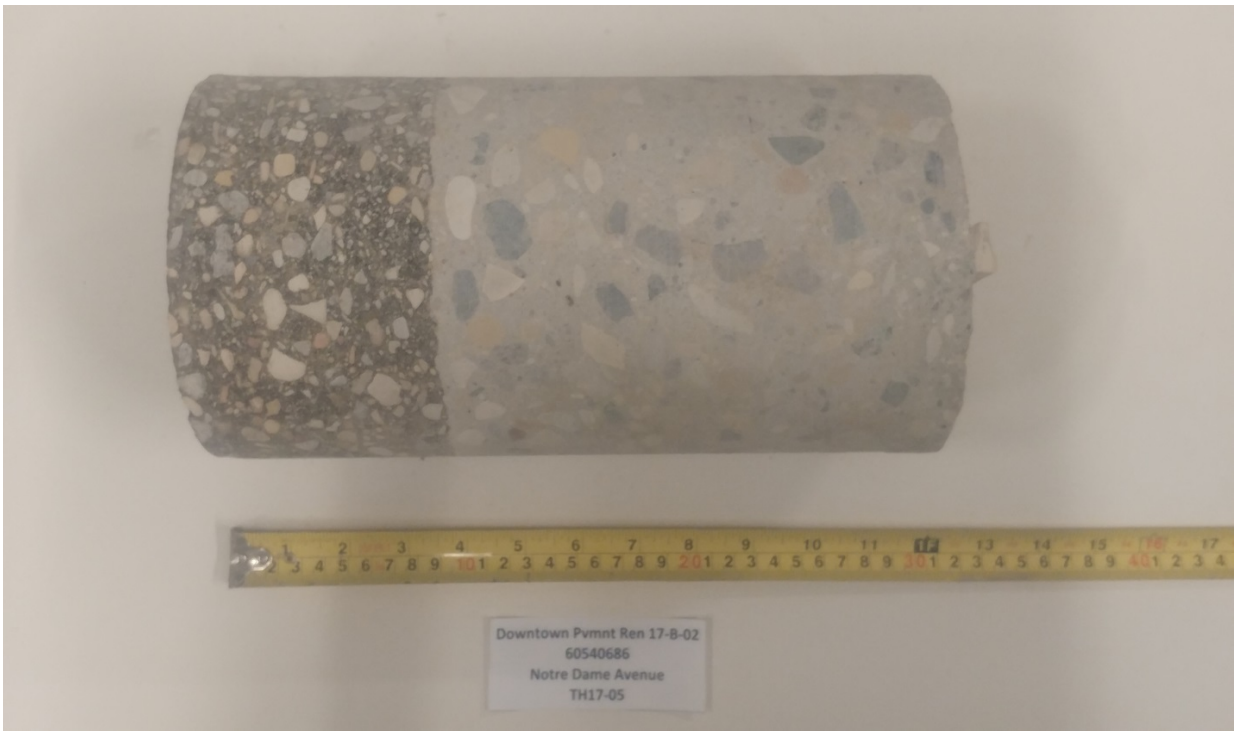
Photograph 1: Test Hole TH17-01 – Garry Street



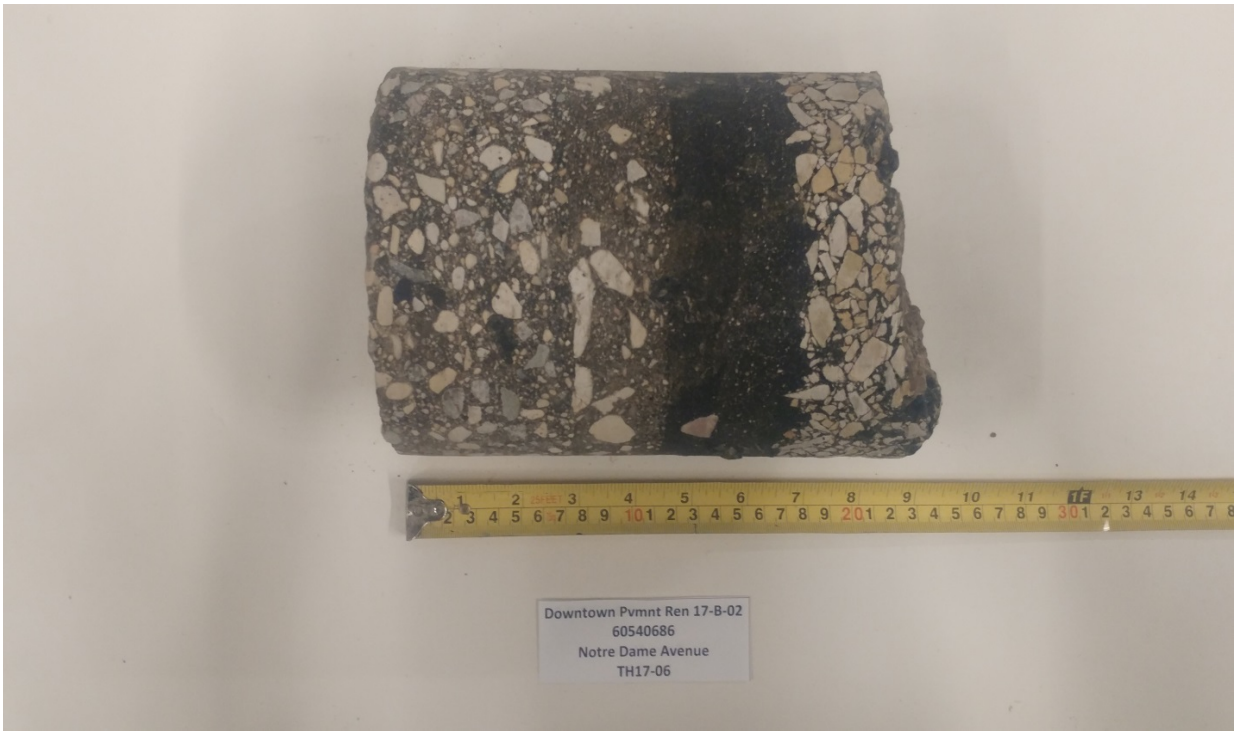
Photograph 2: Test Hole TH17-02 - Garry Street

Photograph 3: Test Hole TH17-03 - Donald Street

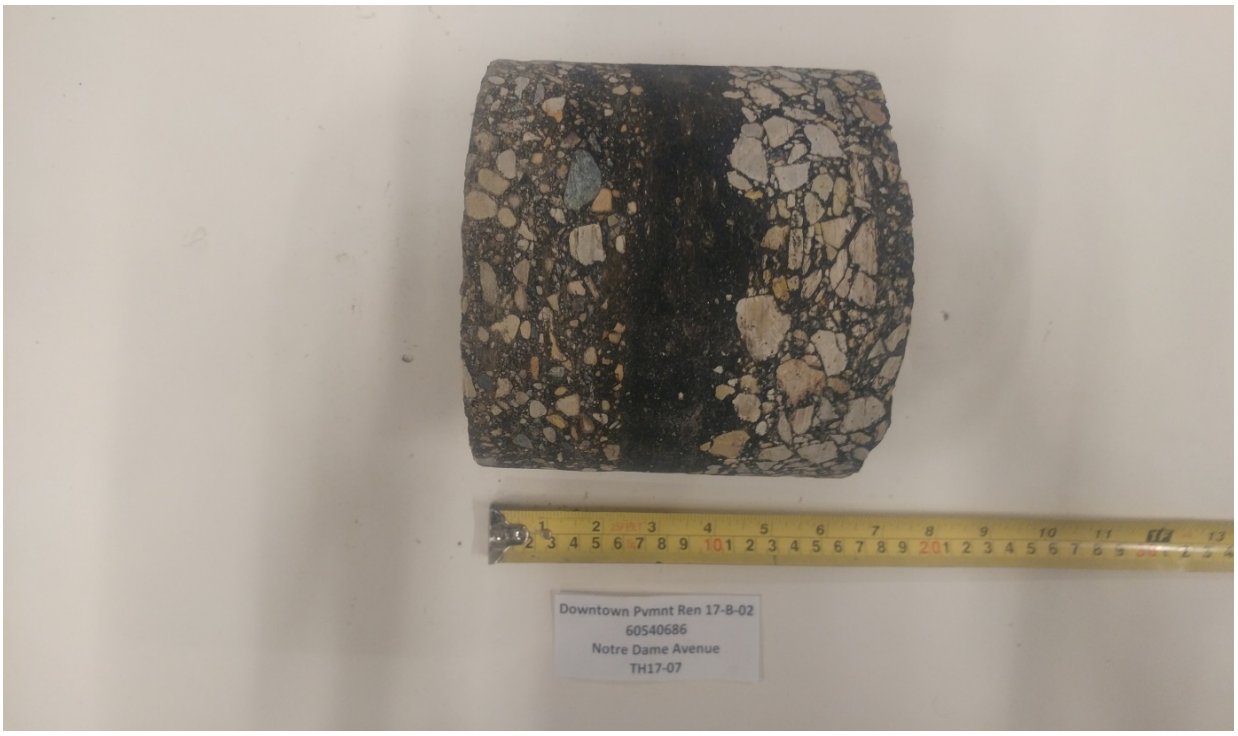
Photograph 4: Test Hole TH17-04 - Donald Street



Photograph 5: Test Hole TH17-05 – Notre Dame Avenue

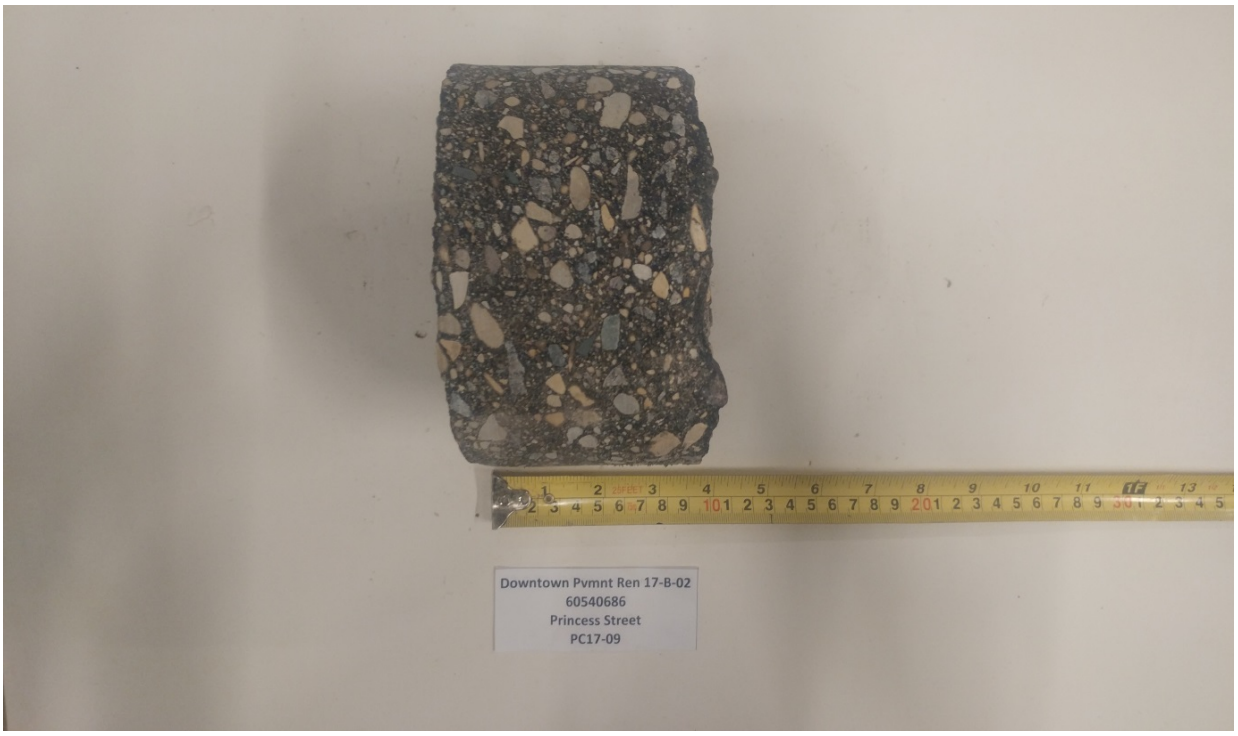


Photograph 6: Test Hole TH17-06 – Notre Dame Avenue



Photograph 7: Test Hole TH17-07 – Notre Dame Avenue

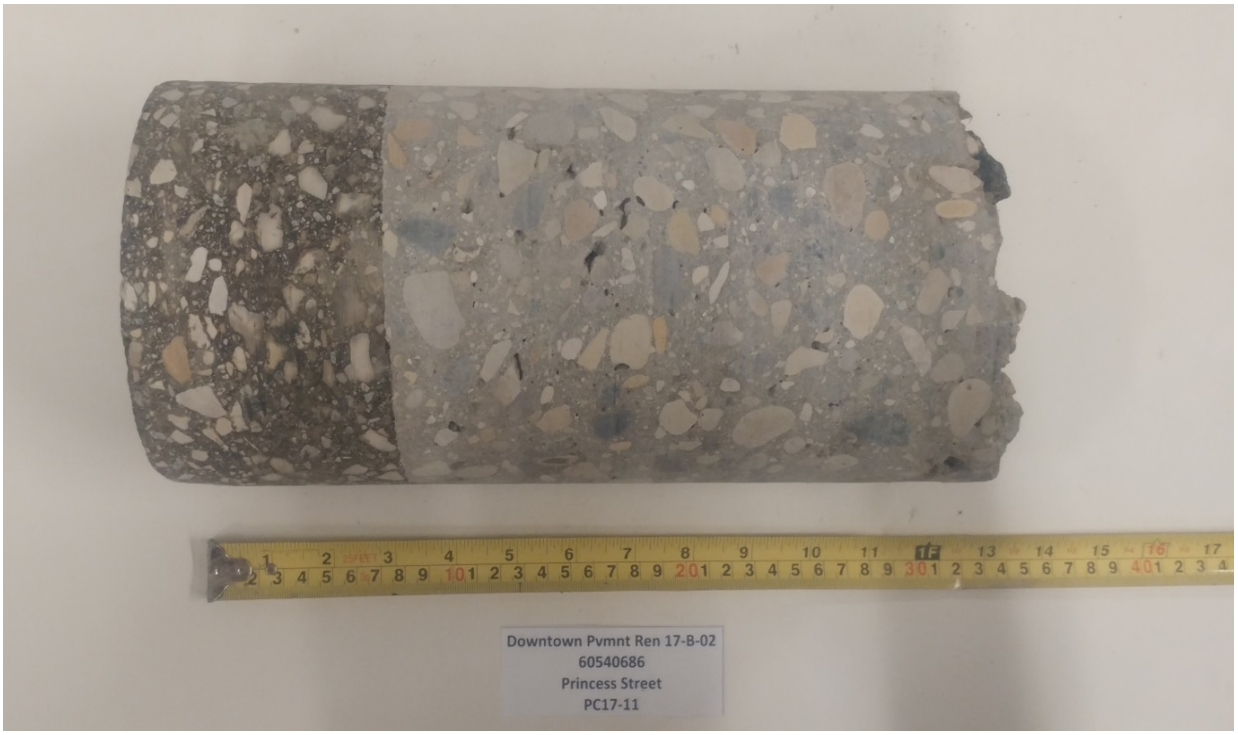
Photograph 8: Test Hole TH17-08 – Donald Street



Photograph 9: Pavement Core PC17-09 – Princess Street

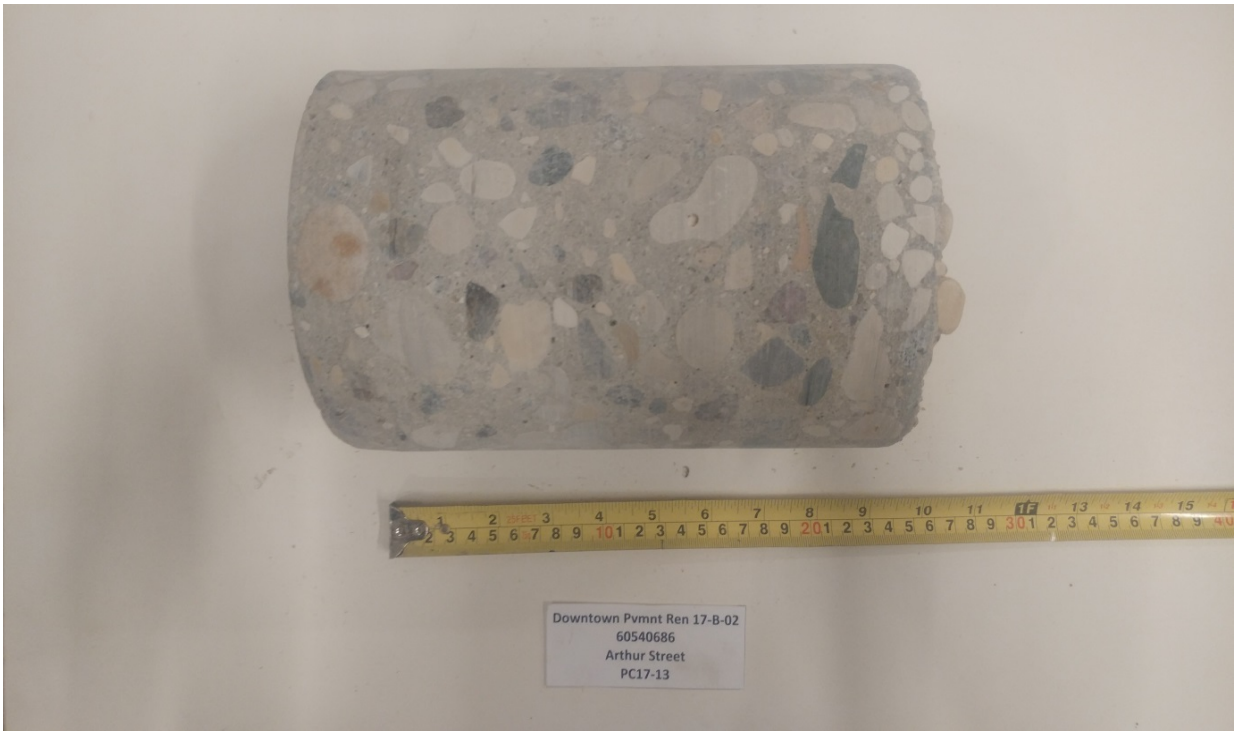
Photograph 10: Pavement Core PC17-09B – Princess Street

Photograph 11: Pavement Core PC17-10 – Princess Street

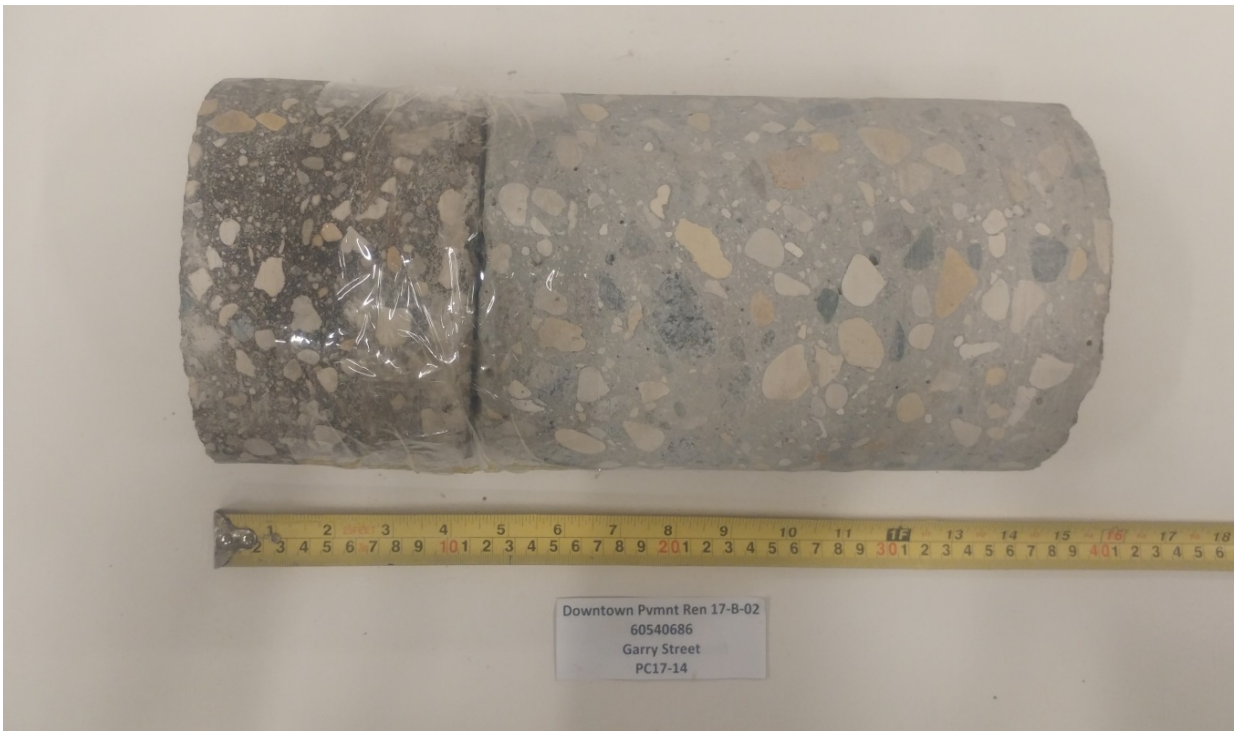


Photograph 12: Pavement Core PC17-11 – Princess Street

Photograph 13: Pavement Core PC17-12 – Princess Street



Photograph 14: Pavement Core PC17-13 – Arthur Street



Photograph 15: Pavement Core PC17-14 – Garry Street

Photograph 16: Pavement Core PC17-15 – Garry Street

Photograph 17: Pavement Core PC17-16 – Garry Street

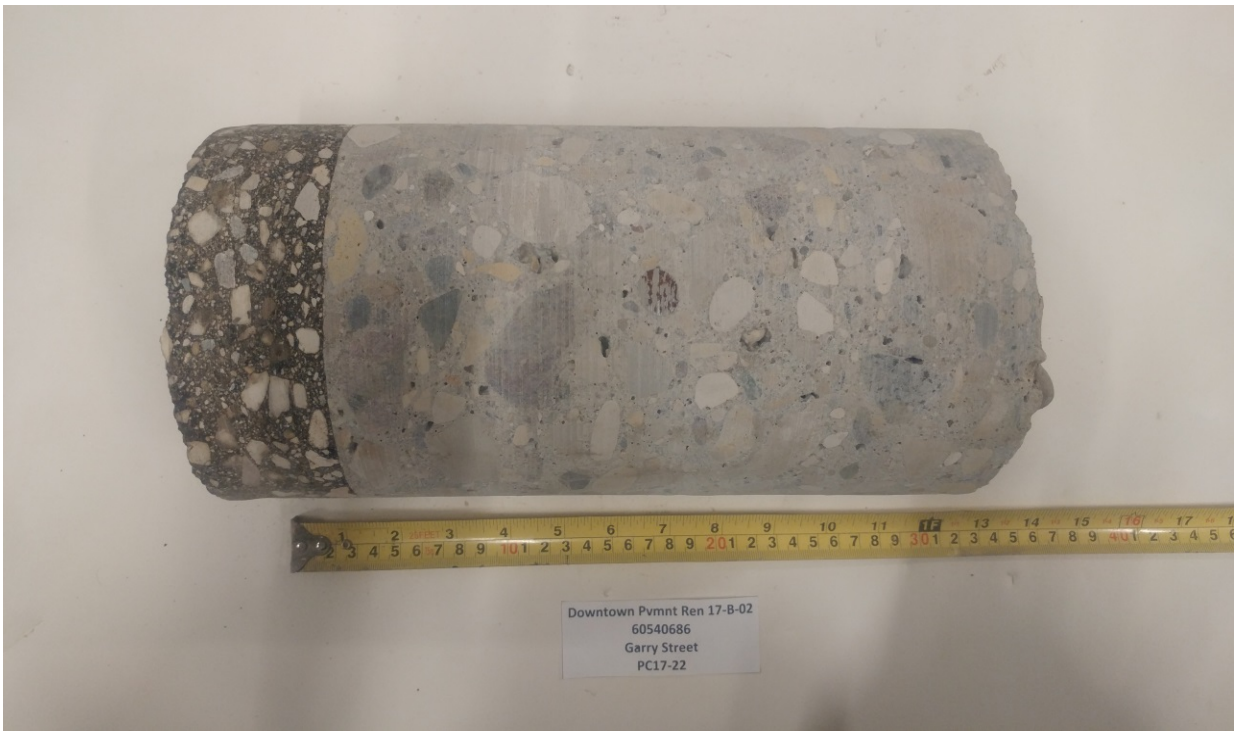
Photograph 18: Pavement Core PC17-17 – Garry Street

Photograph 19: Pavement Core PC17-18 – Garry Street

Photograph 20: Pavement Core PC17-19 – Garry Street

Photograph 21: Pavement Core PC17-20 – Garry Street

Photograph 22: Pavement Core PC17-21 – Garry Street



Photograph 23: Pavement Core PC17-22 – Garry Street

Photograph 24: Pavement Core PC17-23 – Garry Street