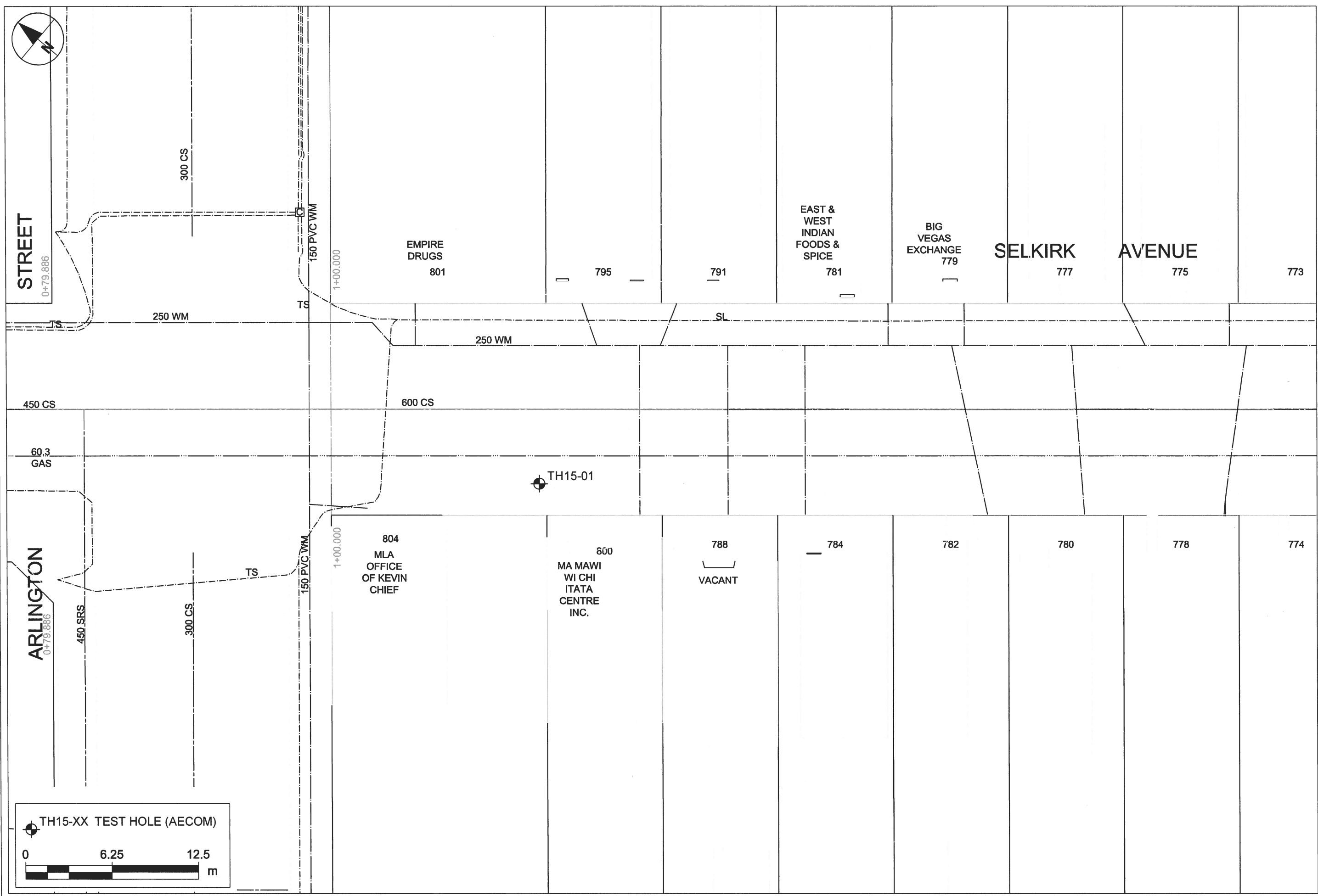


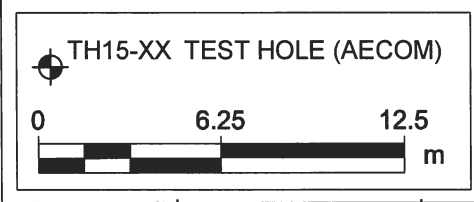
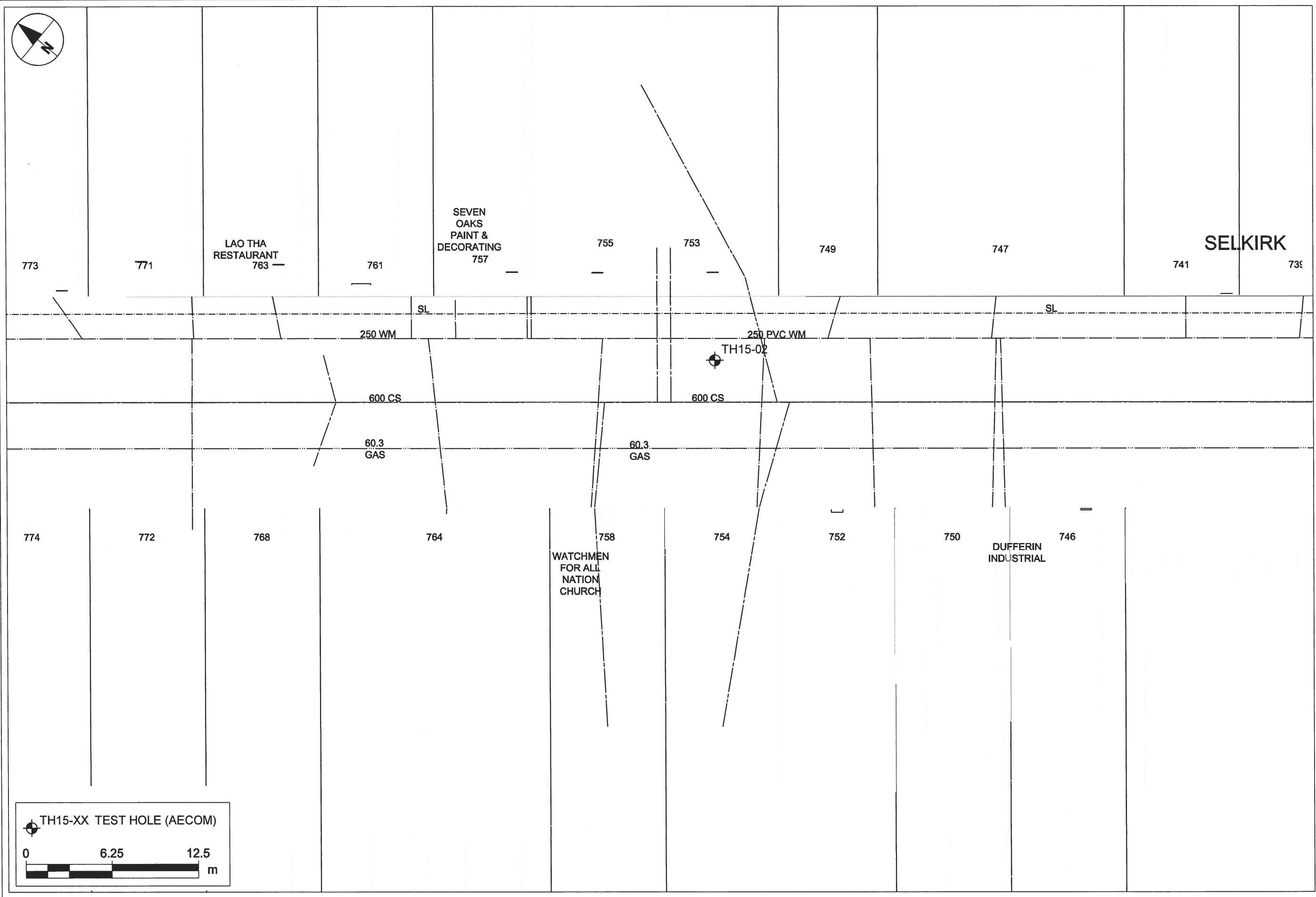
APPENDIX 'A'

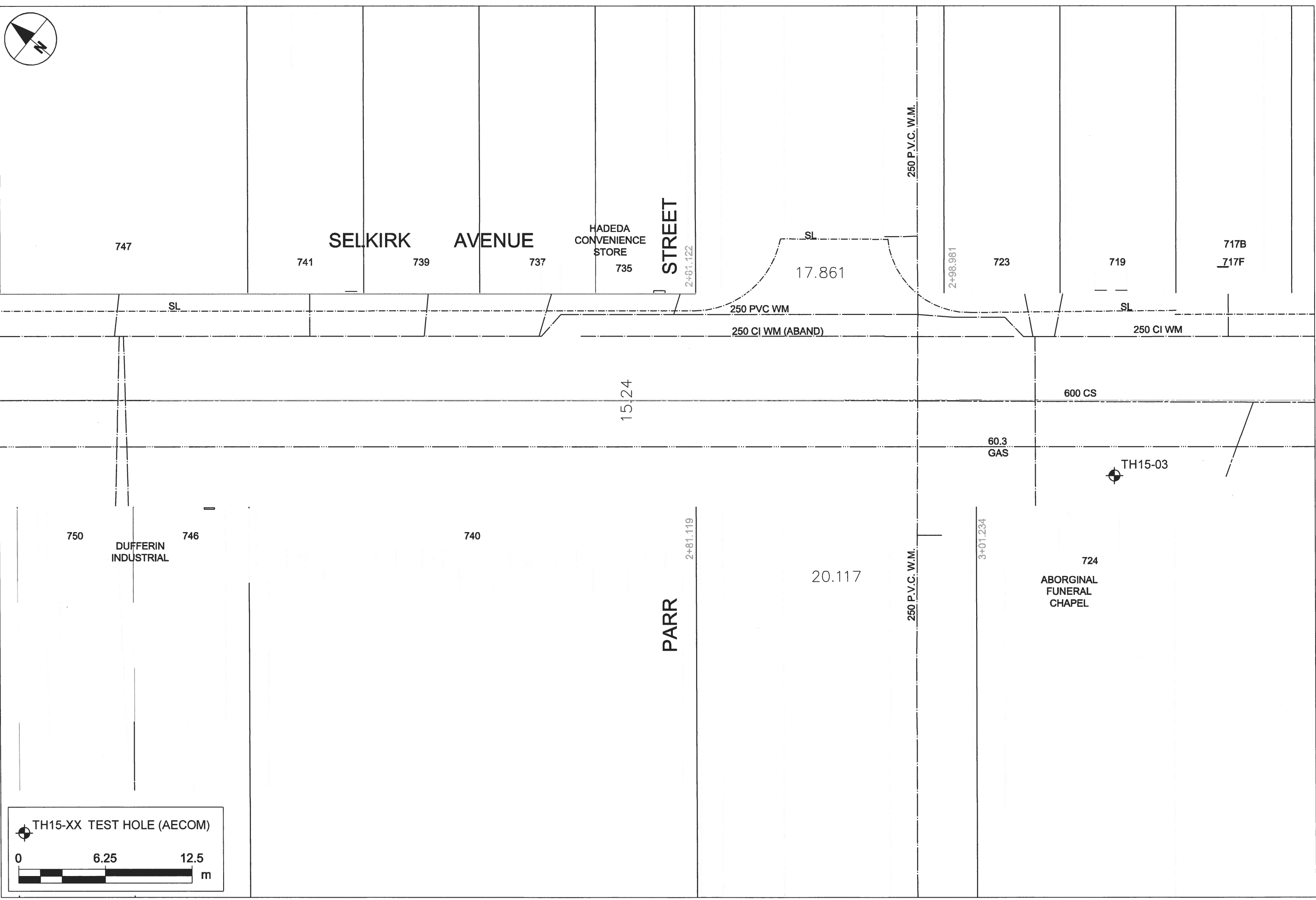
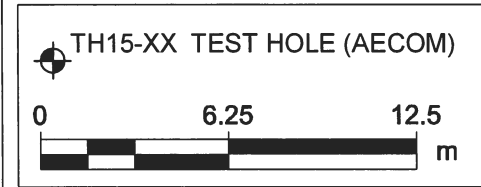
GEOTECHNICAL REPORT



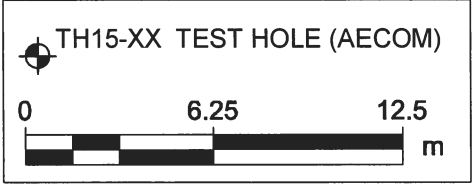
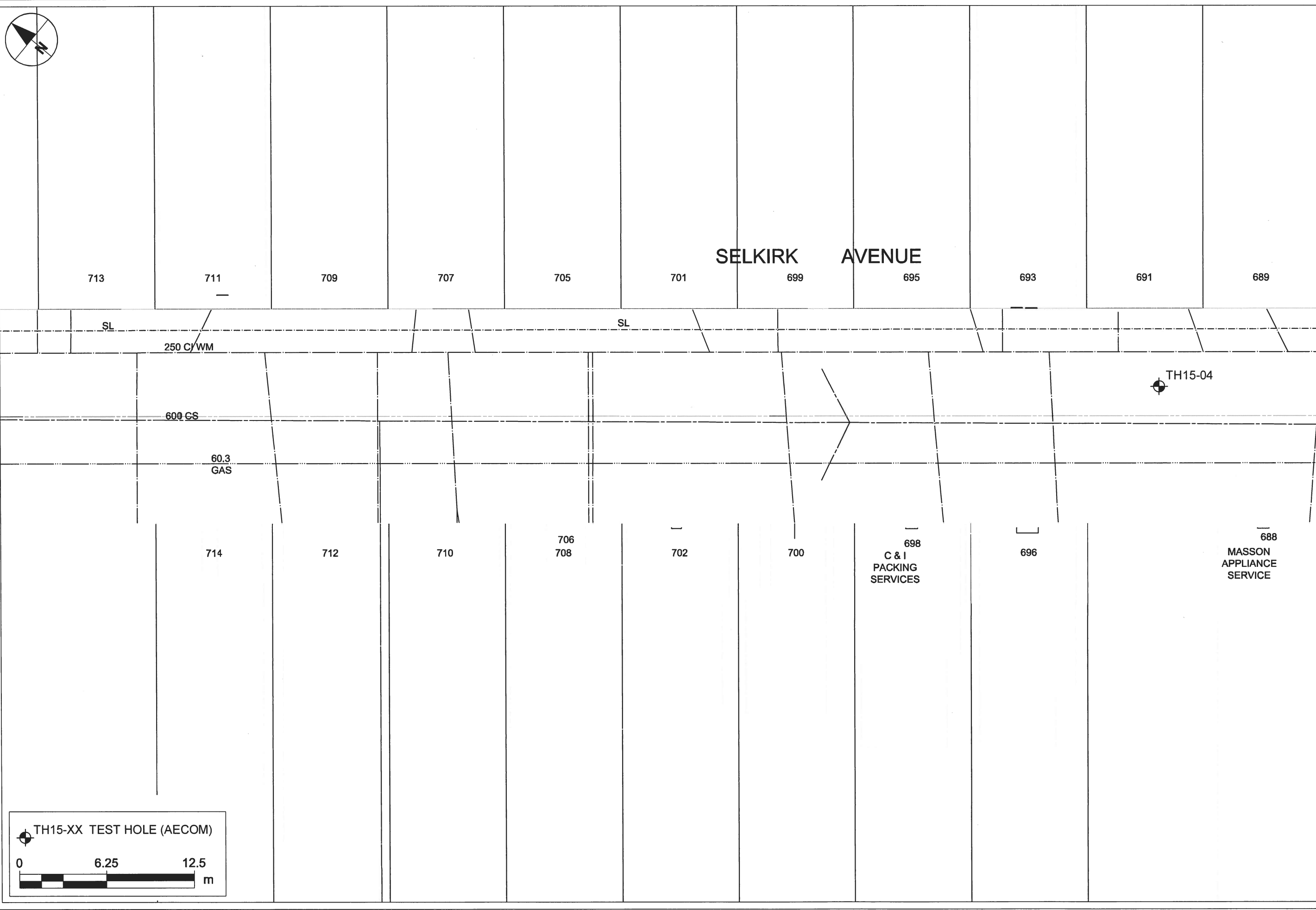
Test Hole Location Plan

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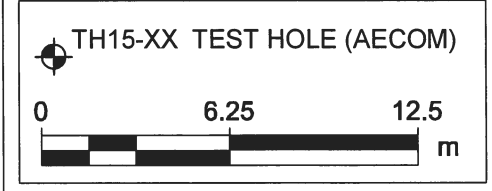




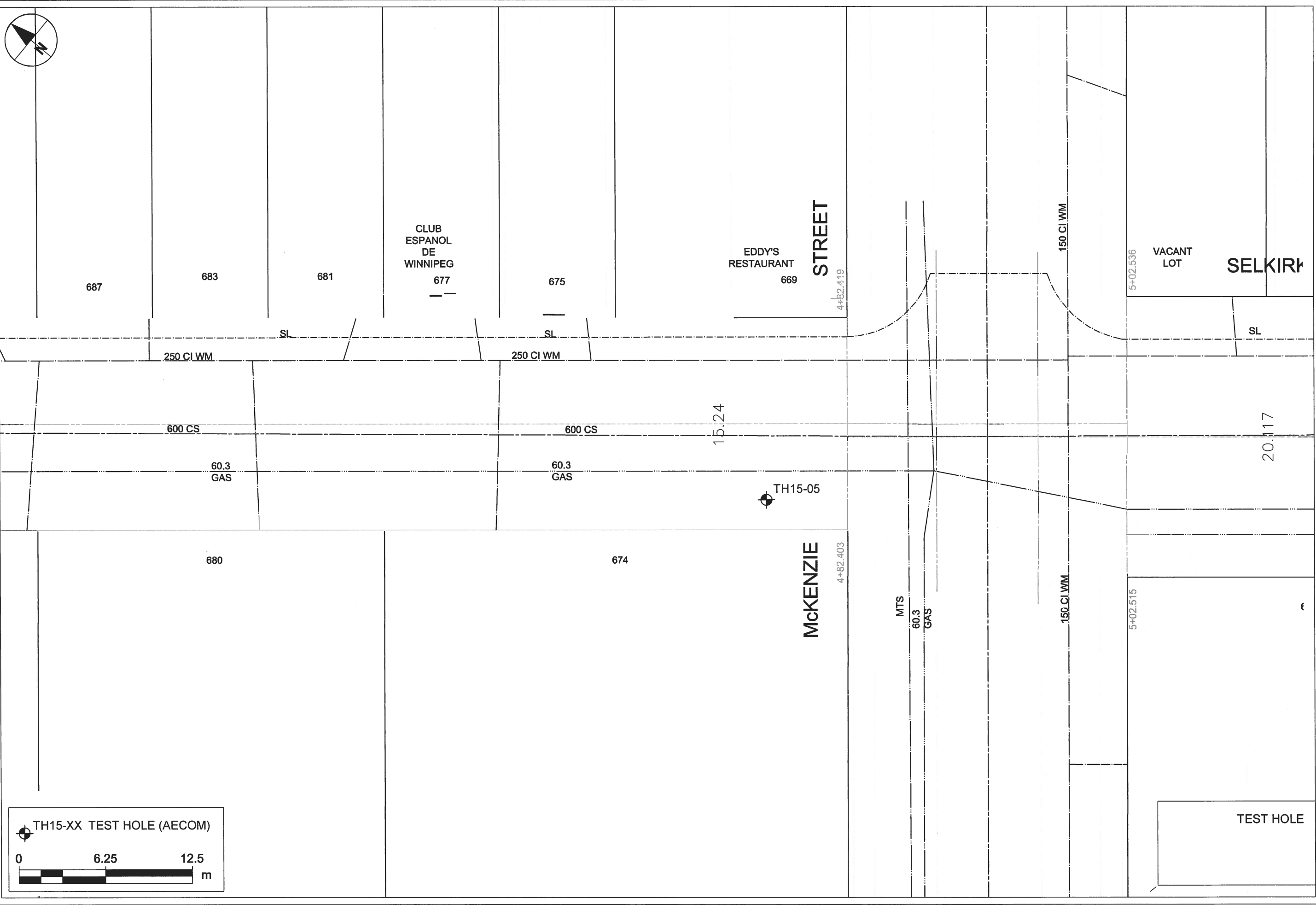
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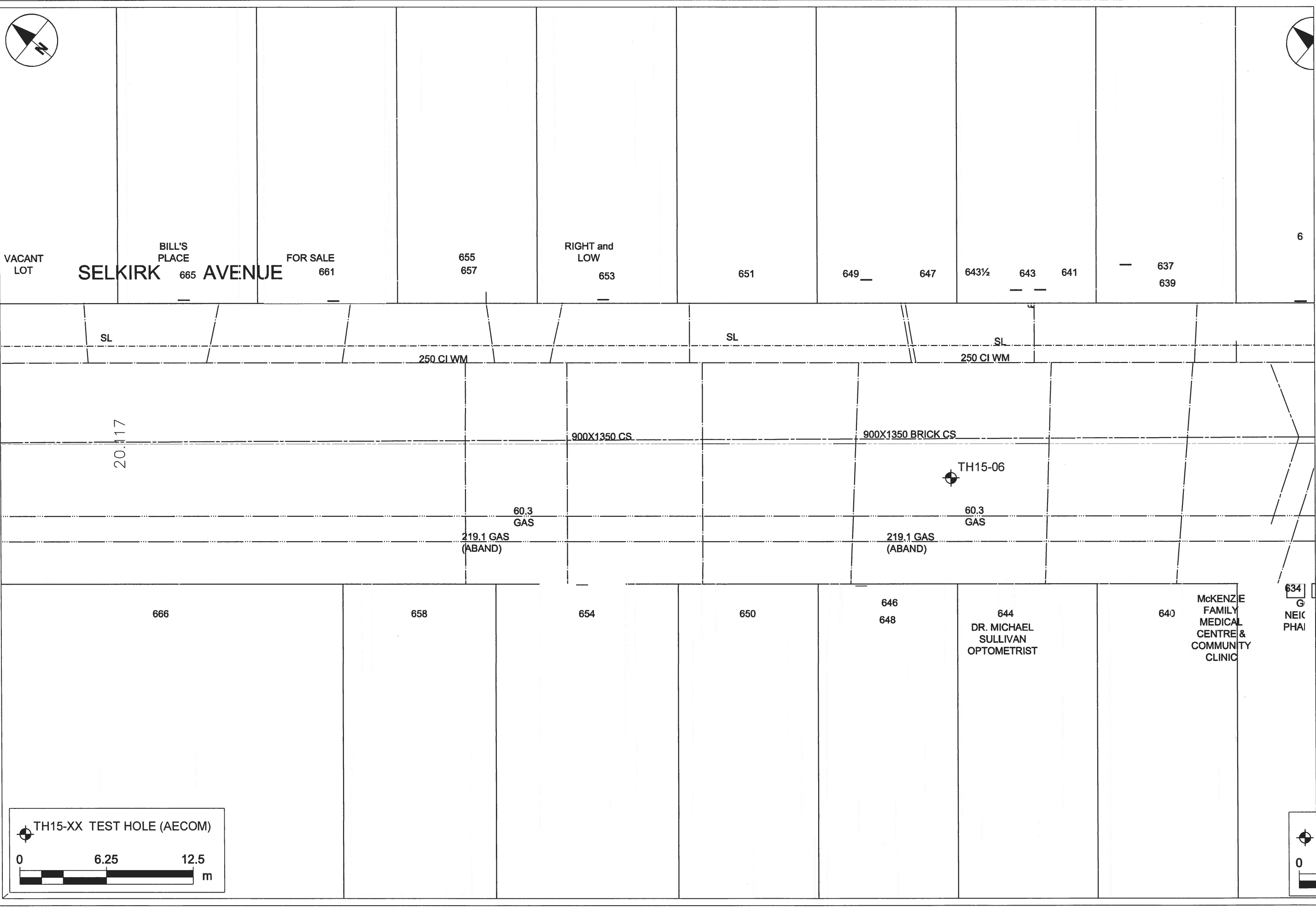
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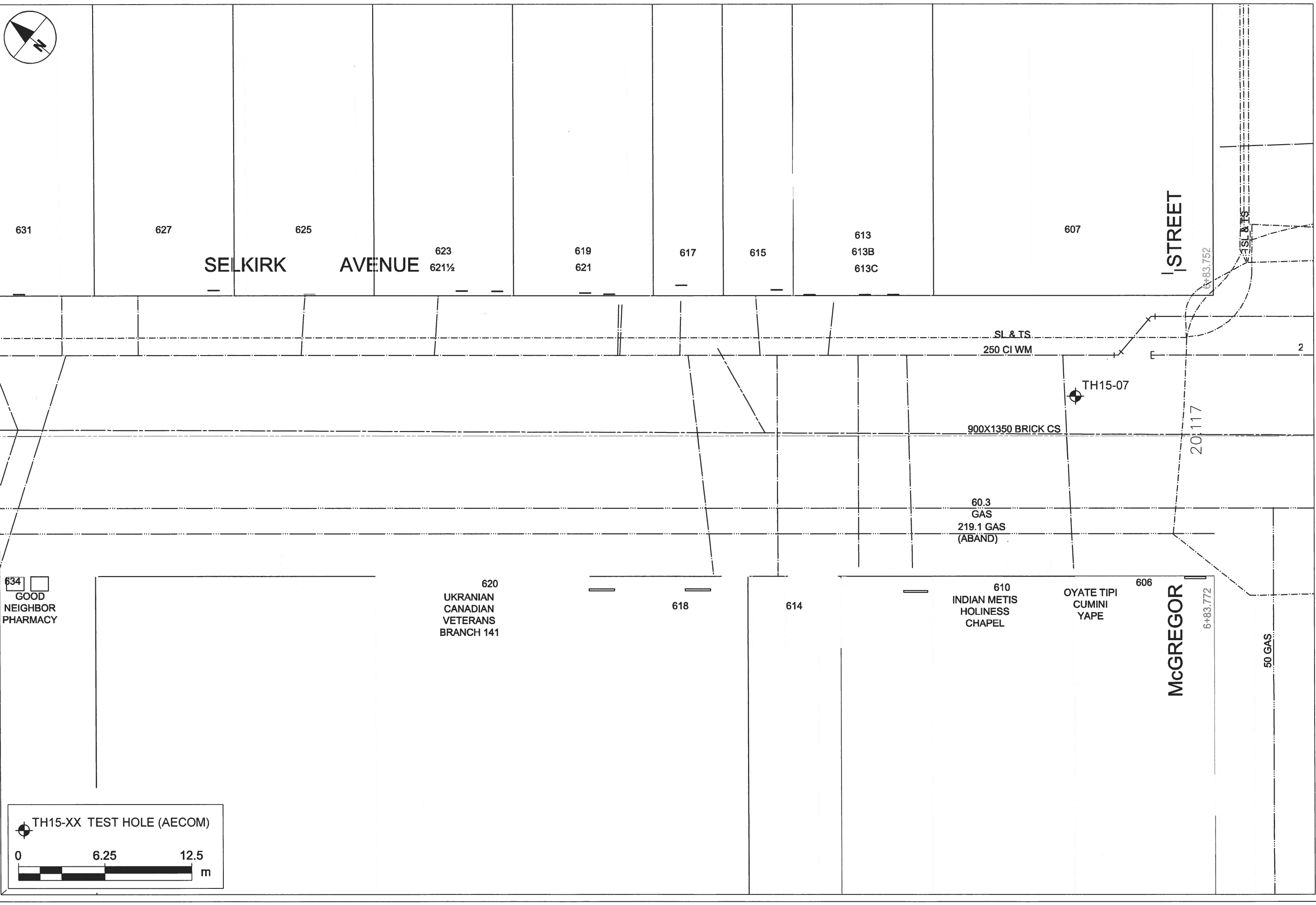
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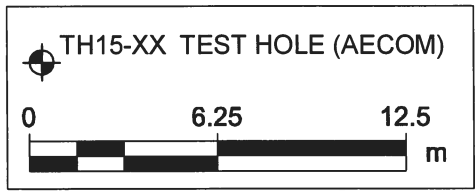
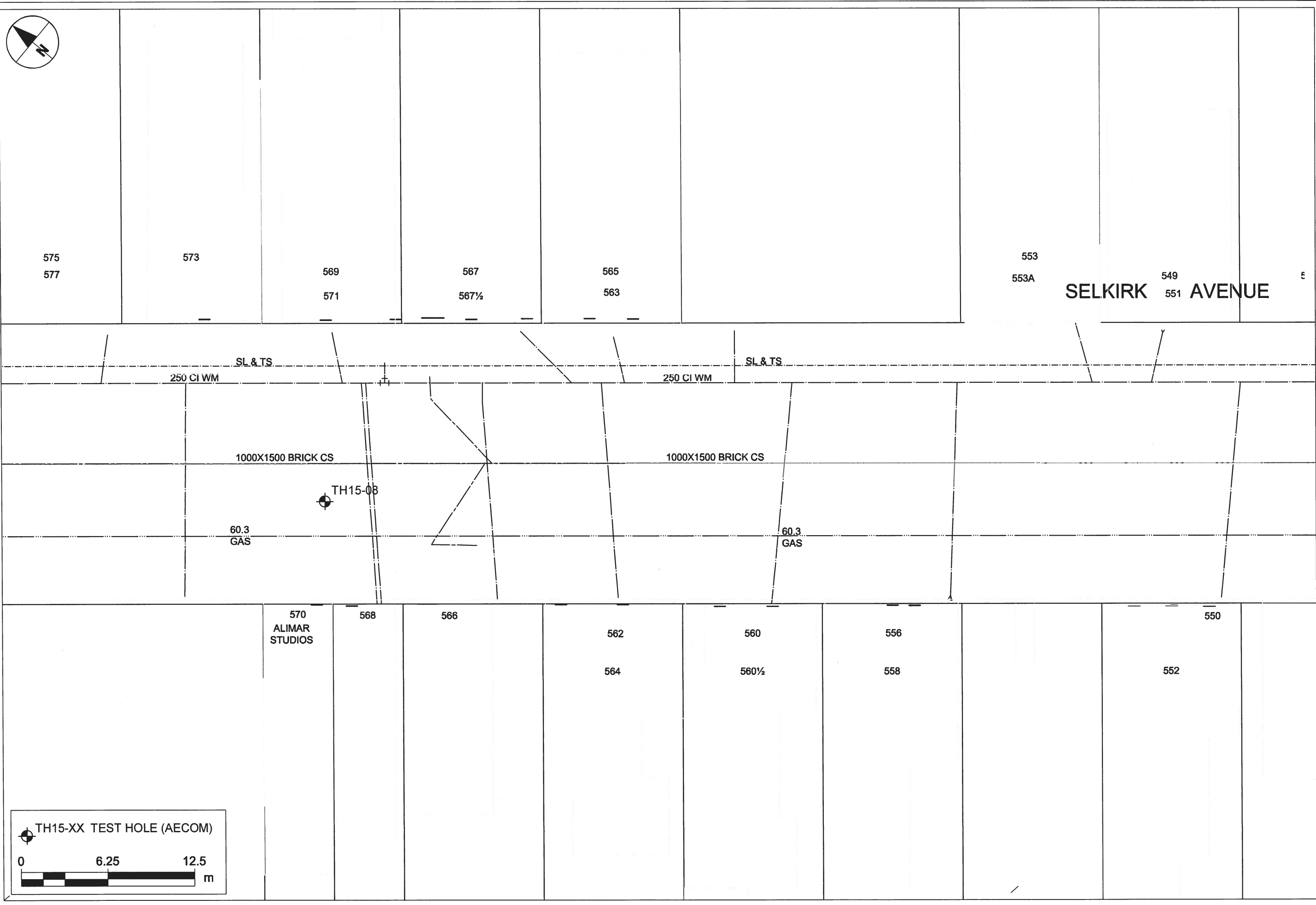
TEST HOLE



ANSI B 279.4mm x 431.8mm
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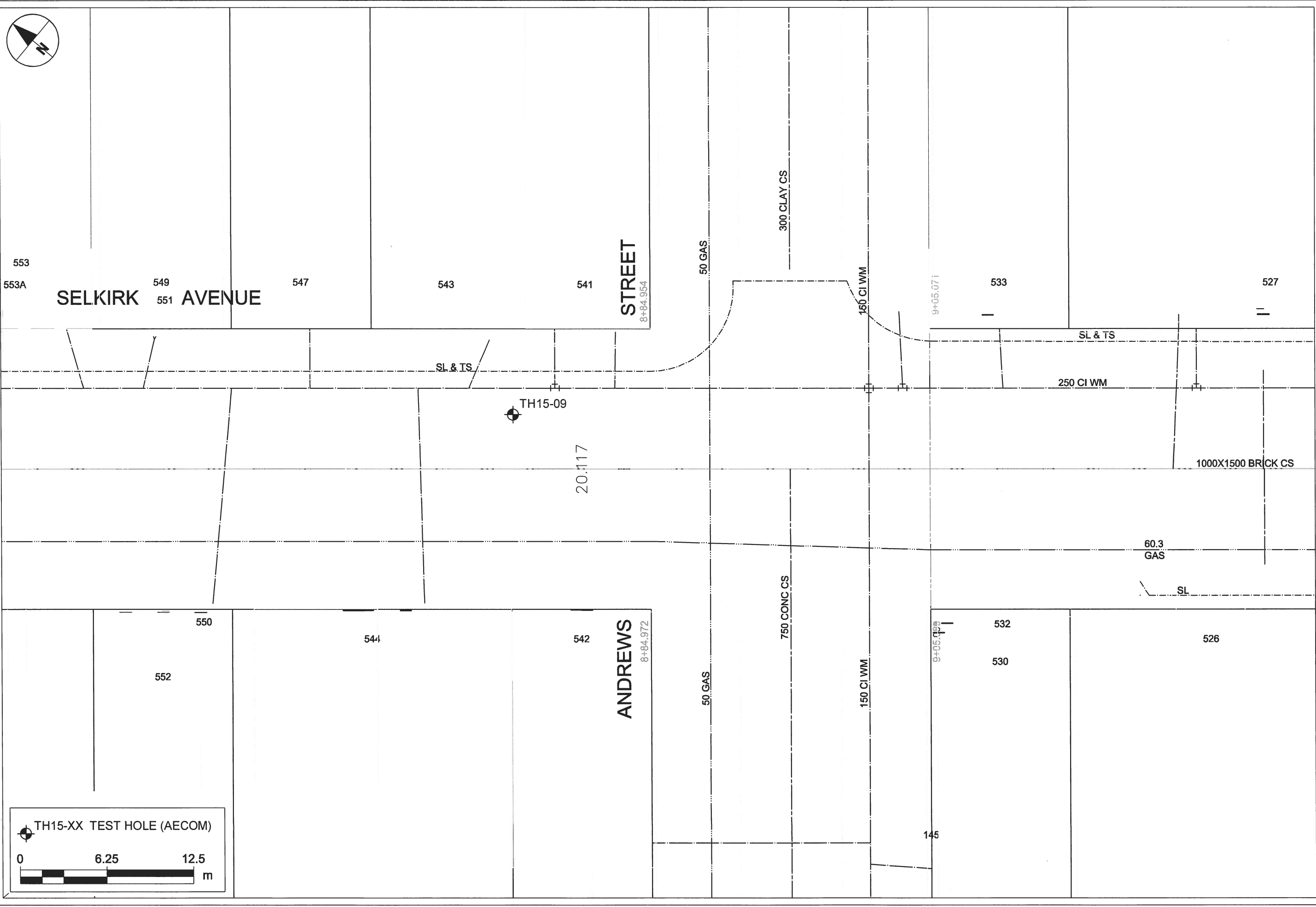


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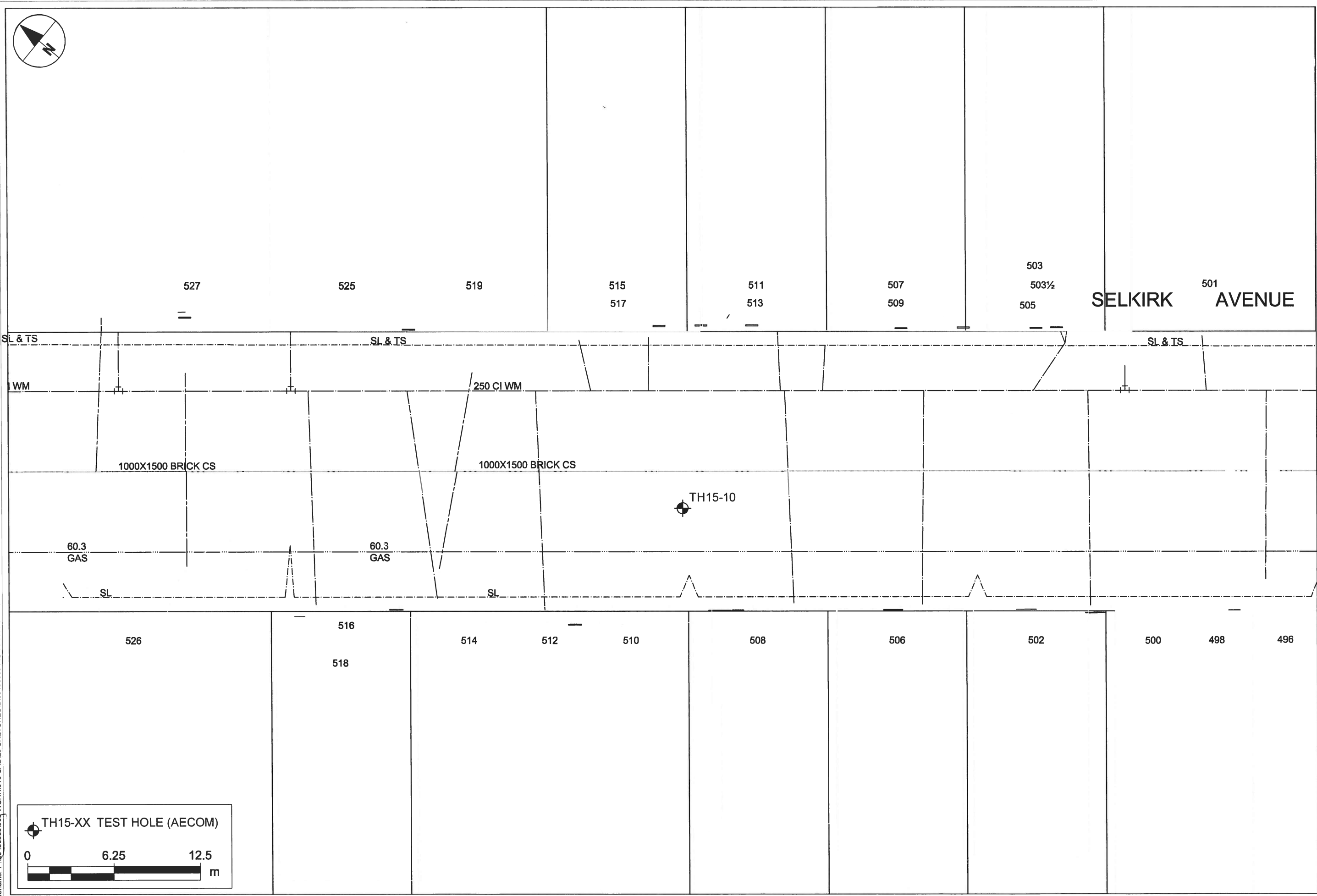
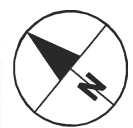
Test Hole Location Plan

Selkirk Avenue WMR & Pavement Reconstruction
Selkirk Avenue
City of Winnipeg



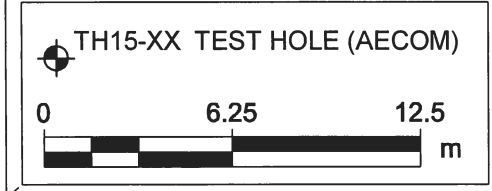
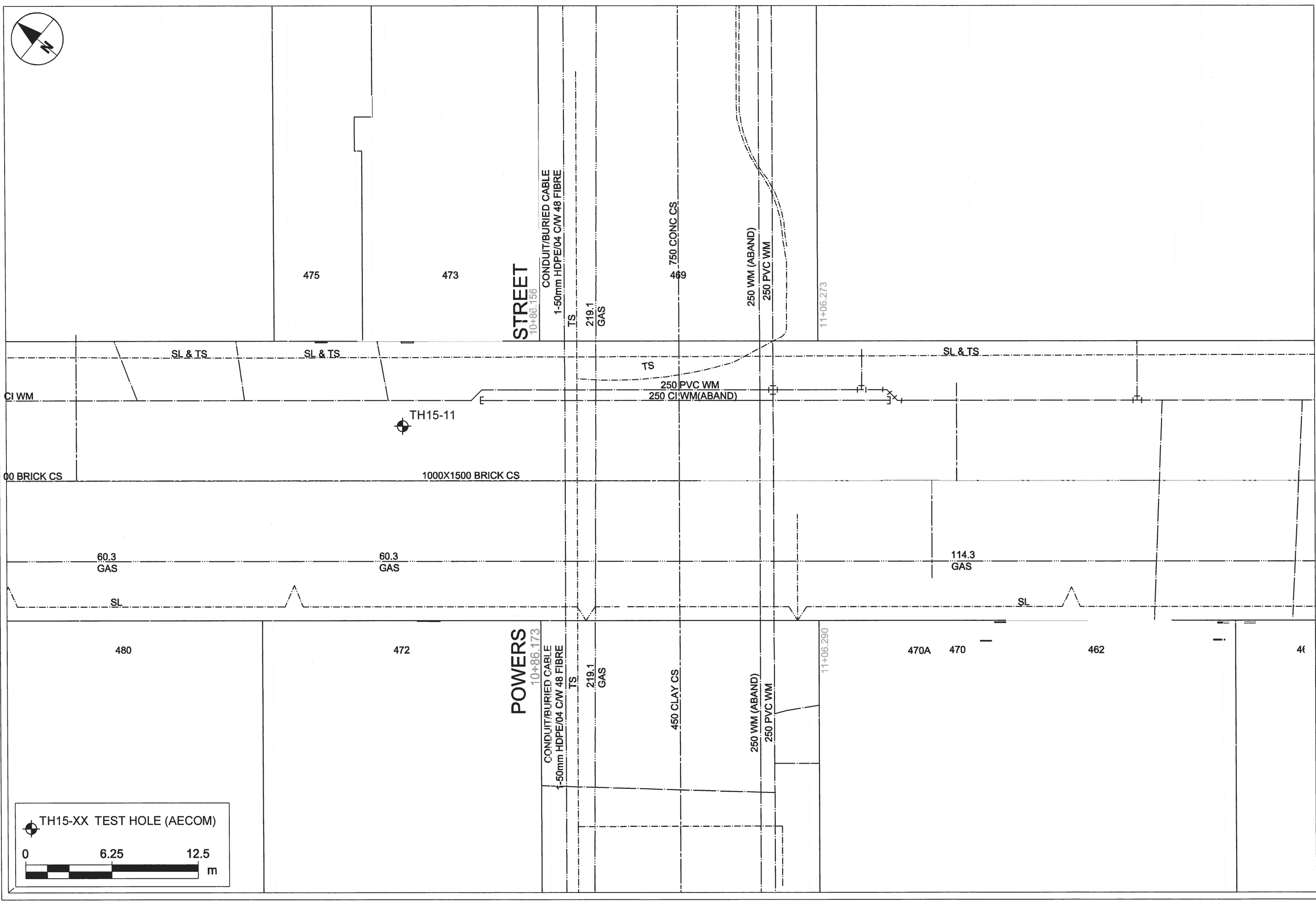
Test Hole Location Plan

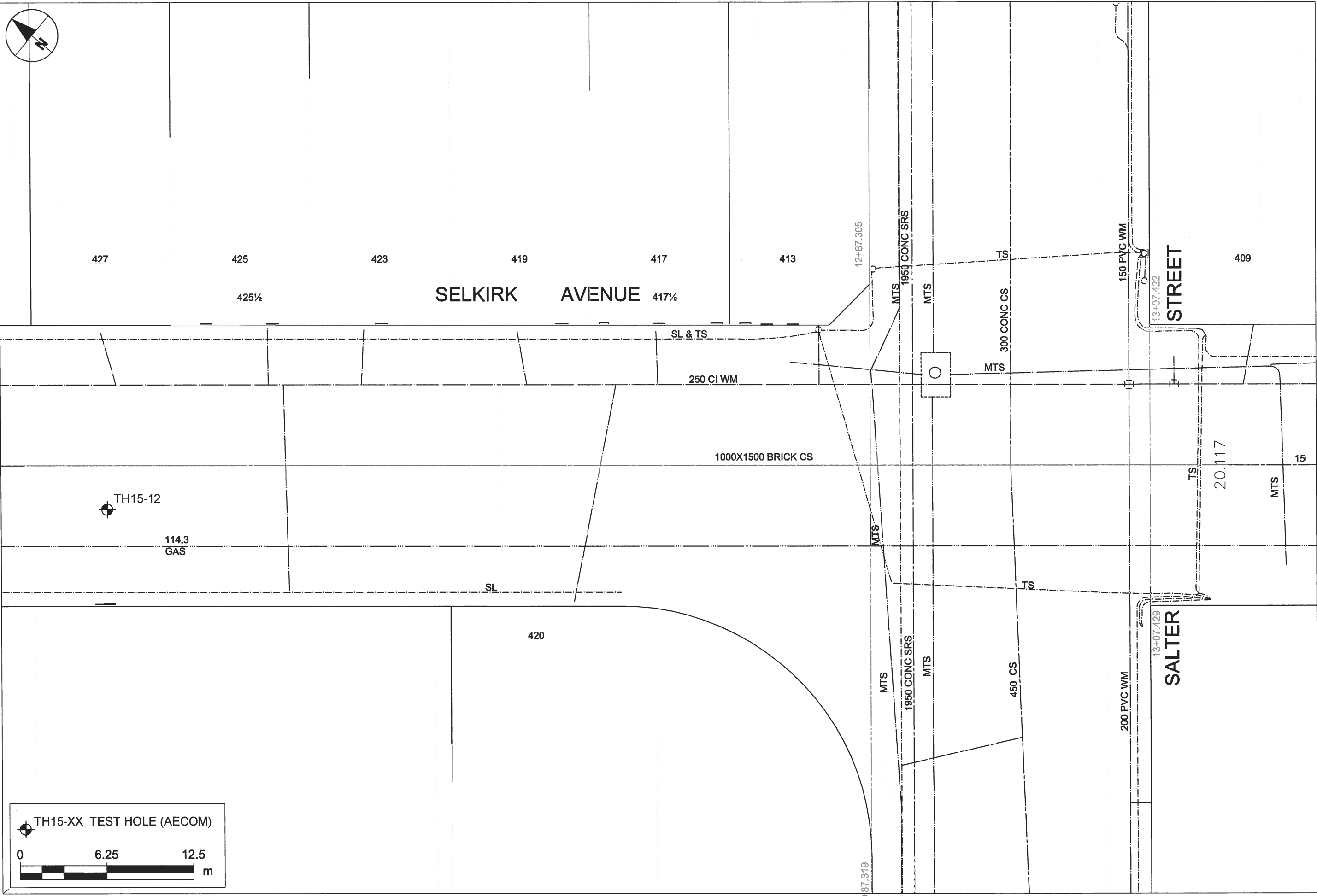
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TH15-XX TEST HOLE (AECOM)

0 6.25 12.5 m







PUBLIC WORKS DEPARTMENT • SERVICE DES TRAVAUX PUBLICS

Engineering Division • Division de l'ingénierie

GEOTECHNICAL INVESTIGATION STREET RECONSTRUCTION

Revised October 28th, 2008

Fieldwork

1. Clear all underground services at each testhole location.
2. Test holes required every **50** m with a minimum of **3** test holes per street.
3. Record location of testhole (offset from curb, distance from cross street and house number).
4. Drill 150 mm-diameter core in pavement.
5. Drill 125 mm-diameter testhole into fill materials and subgrade
6. **If a service trench backfilled with granular materials is encountered, another hole shall be drilled to define the existing sub-surface conditions.**
7. Testhole to be drilled to depth of 2 m \pm 150 mm below surface of the pavement.
8. Recover pavement core sample and representative samples of soil (fill materials, pavement structure materials and subgrade).
9. Measure and record pavement section exposed in the testhole (thickness of concrete or asphalt and different types of pavement structure materials).
10. Pavement structure materials to be identified as crushed limestone or granular fill and the maximum aggregate size of the material (20 mm, 50 mm or 150 mm).
11. Log soil profile for the subgrade.
12. Representative samples of soil must be obtained at the following depths below the bottom of the pavement structure materials - 0.1 m, 0.4 m, 0.7 m, 1.0 m, 1.3 m, 1.6 m, etc. Ensure a sample is obtained from each soil type encountered in the testhole.
13. Make note of any water seepage into the testhole.
14. Backfill testhole with native materials and additional granular fill, if required. Patch pavement surface with hot mix asphalt or high strength durable concrete mix.
15. Return core sample from the pavement and soil samples to the laboratory.

Lab Work

1. Test all soil samples for moisture content.
2. Photograph core samples recovered from the pavement surface.
3. Conduct tests for plasticity index and hydrometer analysis on selected soil samples **which are between 0.5 m and 1 m below top of pavement (this is the sub-grade on which the pavement and sub-base will be built)**. The selection will be based upon visual classification and moisture content test results, with a minimum of one sample of each soil type per street to be tested.
4. Prepare testhole logs and classify subgrade (based on hydrometer) as follows;
 - < 30% silt - classify as clay
 - 30% - 50% silt - classify as silty clay
 - 50% - 70% silt - classify as clayey silt
 - > 70% silt - classify as silt

Prepared by: The National Testing Laboratories Limited and Eng-Tech Consulting

Embrace the Spirit • Vivez l'esprit

AECOM Canada Ltd.

GENERAL STATEMENT

NORMAL VARIABILITY OF SUBSURFACE CONDITIONS

The scope of the investigation presented herein is limited to an investigation of the subsurface conditions as to suitability for the proposed project. This report has been prepared to aid in the evaluation of the site and to assist the engineer in the design of the facilities. Our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of earth work, foundations and similar. In the event of any changes in the basic design or location of the structures as outlined in this report or plan, we should be given the opportunity to review the changes and to modify or reaffirm in writing the conclusions and recommendations of this report.

The analysis and recommendations presented in this report are based on the data obtained from the borings and test pit excavations made at the locations indicated on the site plans and from other information discussed herein. This report is based on the assumption that the subsurface conditions everywhere are not significantly different from those disclosed by the borings and excavations. However, variations in soil conditions may exist between the excavations and, also, general groundwater levels and conditions may fluctuate from time to time. The nature and extent of the variations may not become evident until construction. If subsurface conditions differ from those encountered in the exploratory borings and excavations, are observed or encountered during construction, or appear to be present beneath or beyond excavations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Since it is possible for conditions to vary from those assumed in the analysis and upon which our conclusions and recommendations are based, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modification of the design and construction procedures.

In order to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated, we recommend that all construction operations dealing with earth work and the foundations be observed by an experienced soils engineer. We can be retained to provide these services for you during construction. In addition, we can be retained to review the plans and specifications that have been prepared to check for substantial conformance with the conclusions and recommendations contained in our report.

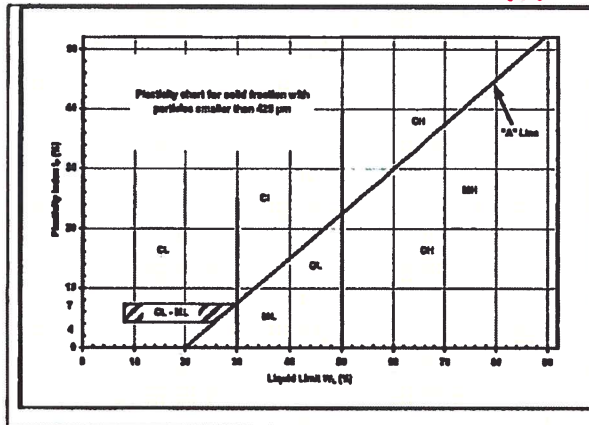
EXPLANATION OF FIELD & LABORATORY TEST DATA

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 $4 < W_p < 7$ $C_u = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$	
			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 ORGANIC SOILS	Peat and other highly organic soils		PI	Von Post Classification Limit	Strong colour or odour, and often fibrous texture			
	Asphalt		Till			AECOM			
	Concrete		Bedrock (Undifferentiated)						
	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. Reference to city of Winnipeg Specs for Geotechnical Investigation street reconstruction (Oct. 2008).

NOT USED TO CLASSIFY SUBGRADE. REFER TO CITY OF WINNIPEG SPECS FOR GEOTECHNICAL INVESTIGATION STREET RECONSTRUCTION (OCT. 2008)



FRACTION	SEIVE SIZE (mm)		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS	
	Passing	Retained	Percent	Identifier
Gravel	Coarse	75	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	
Silt (non-plastic) or Clay (plastic)	< 0.075 mm		10-20	some
			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/m³).
- 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: Selkirk Avenue WMR & Pavement Reconstruction	CLIENT: City of Winnipeg	TESTHOLE NO: TH15-01
LOCATION: 804 Selkirk Avenue, 0.75 m N of S curb, 25 m E of Arlington St.		PROJECT NO.: 60430638
CONTRACTOR: Maple Leaf drilling Ltd.	METHOD: 125 mm SSA with 200 mm Coring	ELEVATION (m):
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input checked="" type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS	UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		ASPHALT (150 mm)						
		CONCRETE (150 mm)						
		GRAVEL and SAND (Fill) - some silt, trace clay - brown, dry, loose		G65	●			
		CLAY (Fill) - trace sand - dark brown to grey, moist, firm - high plasticity						
		SILT - trace sand - light brown, moist, soft - low plasticity		G66	●			
1				G67	●			1
		CLAY - - grey mottled brown, moist, firm to stiff - high plasticity		G68	●			
				G69	●			
2		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.						2
3								3

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WMIN.GDT 8/11/15



LOGGED BY: Saba Ibrahim	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Faris Khalil	COMPLETION DATE: 7/5/15
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction CLIENT: City of Winnipeg TESTHOLE NO: TH15-02
 LOCATION: 753 Selkirk Avenue, 3.7 m S of N curb, 75 m W of Parr St. PROJECT NO.: 60430638
 CONTRACTOR: Maple Leaf drilling Ltd. METHOD: 125 mm SSA with 200 mm Coring ELEVATION (m):
 SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
					* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt ■ (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ● Field Vane ● (kPa)				
0		ASPHALT (150 mm)								
		CONCRETE (300 mm)								
		CLAY (Fill) - trace sand - brown, moist, firm - high plasticity		G60	●				Gravel:0.3%, Sand:7.7%, Silt:23.6%, Clay:68.4%	
		SILT - trace sand - brown, moist, soft to firm - low plasticity - soft below 1 m		G61	●					
				G62	●					
		CLAY - - grey mottled brown, moist, firm to stiff - high plasticity		G63	●					
				G64	●					
2.1		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.								

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WINNI GDT_ 8/11/15



LOGGED BY: Saba Ibrahim COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Faris Khalil COMPLETION DATE: 7/5/15
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction	CLIENT: City of Winnipeg	TESTHOLE NO: TH15-03
LOCATION: 724 Selkirk Avenue, 0.7 m N of S curb, 20 m E of Parr St.		PROJECT NO.: 60430638
CONTRACTOR: Maple Leaf drilling Ltd.	METHOD: 125 mm SSA with 200 mm Coring	ELEVATION (m):
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
					* 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	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa) 50 100 150 200				
0		ASPHALT (75 mm)								
	▲	GRAVEL (Fill) - sandy - brown, dry, loose	■	G53	●					
		CONCRETE (140 mm)								
	▲	GRAVEL (Fill) - sandy to some sand - brown, dry, loose	■	G54	●					
	▨	CLAY (Fill) - trace sand - dark brown to grey, moist, firm - high plasticity	■	G55	●					
1	▨	CLAY - - brown, moist, firm to stiff - high plasticity	■	G56	●					1
	▨	SILT - trace sand - light brown, moist, soft - low plasticity	■	G57	●					
	▨		■	G58	●					
2	▨	CLAY - - grey mottled brown, moist, firm to stiff - high plasticity	■	G59	●					2
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.								
3										

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WINNI GDT_8/11/15



LOGGED BY: Saba Ibrahim	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Faris Khalil	COMPLETION DATE: 7/5/15
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction CLIENT: City of Winnipeg TESTHOLE NO: TH15-04
 LOCATION: 691 Selkirk Avenue, 4 m S of N curb, 80 m W of McKenzie St. PROJECT NO.: 60430638
 CONTRACTOR: Maple Leaf drilling Ltd. METHOD: 125 mm SSA with 200 mm Coring ELEVATION (m):

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
					* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊗ Field Vane ⊗ (kPa)				
0		ASPHALT (150 mm)								
		WOOD								
		GRAVEL (Fill) - sandy - brown, dry, loose	<input checked="" type="checkbox"/>	G47	●					
		CONCRETE (150 mm)								
		GRAVEL and SAND (Fill) - clayey, silty - light brown, dry, loose	<input checked="" type="checkbox"/>	G48	●					
		CLAY (Fill) - trace sand - dark brown to grey, moist, firm - high plasticity	<input checked="" type="checkbox"/>							
		SILT - trace sand - brown, moist, soft - low plasticity	<input checked="" type="checkbox"/>	G49	●					
1		CLAY - - grey mottled brown, moist, firm to stiff - high plasticity	<input checked="" type="checkbox"/>	G50	●					
			<input checked="" type="checkbox"/>	G51	●					
2			<input checked="" type="checkbox"/>	G52	●					
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.								
3										

Gravel: 0.0%,
Sand: 8.2%, Silt: 72.1%,
Clay: 19.7%

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WINNI GDT_ 8/11/15



LOGGED BY: Saba Ibrahim COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Faris Khalil COMPLETION DATE: 7/5/15
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction	CLIENT: City of Winnipeg	TESTHOLE NO: TH15-05
LOCATION: 674 Selkirk Avenue, 0.7 m N of S curb, 16 m W of McKenzie St.		PROJECT NO.: 60430638
CONTRACTOR: Maple Leaf drilling Ltd.	METHOD: 125 mm SSA with 200 mm Coring	ELEVATION (m):
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
					SPT (Standard Pen Test) (Blows/300mm)	Total Unit Wt (kN/m ³)	+ Torvane +	× QU/2 ×		
0		ASPHALT (100 mm)								
		GRAVEL (FILL)- sandy, some silt, trace clay - light brown, loose, dry								
		CLAY (Fill) - trace sand - grey to dark grey, moist, firm - intermediate plasticity		G35						
		SILT - trace sand - brown, moist, soft - low plasticity		G36						
				G37						
		CLAY - - grey, moist, firm to stiff - high plasticity		G38						
				G39						
		- grey mottled brown below 1.8		G40						
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.								

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WMIN.GDT_8/11/15



LOGGED BY: Saba Ibrahim	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Faris Khalil	COMPLETION DATE: 7/4/15
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction CLIENT: City of Winnipeg TESTHOLE NO: TH15-06
 LOCATION: 644 Selkirk Avenue, 3.6 m N of S curb, 80 m E of McKenzie St. PROJECT NO.: 60430638
 CONTRACTOR: Maple Leaf drilling Ltd. METHOD: 125 mm SSA with 200 mm Coring ELEVATION (m):
 SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
					* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊗ Field Vane ⊗ (kPa)				
0		ASPHALT (75 mm)								
		CONCRETE (225 mm)								
		GRAVEL and SAND (Fill)- clayey - light brown, loose, moist		G41	●					
		CLAY (Fill) -trace sand - grey to dark grey, moist, firm to stiff - high plasticity		G42	●	—				
		SILT - trace sand - brown, moist, soft - low plasticity		G43	●					
				G44	●					
		CLAY - - grey mottled brown, moist, firm to stiff - high plasticity		G45	●					
				G46	●					
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.								
									Gravel:0.3%, Sand:5.4%, Silt:22.6%, Clay:71.7%	

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WINNI GDT_ 8/11/15



LOGGED BY: Saba Ibrahim COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Faris Khalil COMPLETION DATE: 7/5/15
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction CLIENT: City of Winnipeg TESTHOLE NO: TH15-07
 LOCATION: 607 Selkirk Avenue, 3.6 m S of N curb, 20 m W of McGregor St. PROJECT NO.: 60430638
 CONTRACTOR: Maple Leaf drilling Ltd. METHOD: 125 mm SSA with 200 mm Coring ELEVATION (m):
 SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH			COMMENTS	DEPTH
					SPT (Standard Pen Test) (Blows/300mm)		Torvane (kPa)				
0		ASPHALT (50 mm) WOOD			0						
		GRAVEL and SAND (Fill)- trace silt - light brown, moist, loose			16						
		CLAY - trace sand - grey, moist, firm to stiff - high plasticity		G29	40						
		SILT- trace sand - brown, moist, soft to very soft - Low plasticity		G30	60						
1		CLAY - trace sand - brown, moist, firm to stiff - high plasticity - trace silt inclusions <6mm in dia.		G31	80						
				G32	100						
				G33	120						
2				G34	140						
3		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.									

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WNN.GDT 8/11/15



LOGGED BY: Saba Ibrahim COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Faris Khalil COMPLETION DATE: 7/4/15
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction CLIENT: City of Winnipeg TESTHOLE NO: TH15-08
 LOCATION: 570 Selkirk Avenue, 3.4 m N of S curb, 95 m E of McGregor St. PROJECT NO.: 60430638
 CONTRACTOR: Maple Leaf drilling Ltd. METHOD: 125 mm SSA with 200 mm Coring ELEVATION (m):
 SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
					SPT (Standard Pen Test) (Blows/300mm)	Total Unit Wt (kN/m ³)	+	×		
0		ASPHALT (150 mm)								
		WOOD								
		CONCRETE (175 mm)								
		GRAVEL (Fill) - sandy, some silt - light brown, dry, loose		G18	●					
		CLAY (Fill) - trace sand - grey, moist, firm - high plasticity		G19	●	—				
		CLAY - - grey, moist, firm to stiff - high plasticity		G20	●					
				G21	●					
				G22	●					
		- brown, trace oxidation below 1.8 m		G23	●					
		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.							Gravel:0.2%, Sand:8.8%, Silt:20.6%, Clay:70.4%	

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WINN.GDT 8/11/15



LOGGED BY: Saba Ibrahim COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Faris Khalil COMPLETION DATE: 7/4/15
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction	CLIENT: City of Winnipeg	TESTHOLE NO: TH15-09
LOCATION: 541 Selkirk Avenue, 2.5 m S of N curb, 20 m W of Andrews St.		PROJECT NO.: 60430638
CONTRACTOR: Maple Leaf drilling Ltd.	METHOD: 125 mm SSA with 200 mm Coring	ELEVATION (m):
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH			COMMENTS	DEPTH
					* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) Total Unit Wt (kN/m³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)					
0		ASPHALT (150 mm)									
		CONCRETE (150 mm)									
		GRAVEL (Fill)- sandy - brown, moist, loose CLAY (Fill) - trace sand - grey, moist, firm to stiff - high plasticity		G12							
				G13	●						
				G14	●						
1		SILT - trace sand - brown, moist, soft - low plasticity		G15	●						
				G16	●						
		CLAY - - brown, moist, firm to stiff - high plasticity		G17	●						
2		END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.									
3											

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WINN.GDT 8/11/15



LOGGED BY: Saba Ibrahim	COMPLETION DEPTH: 2.13 m
REVIEWED BY: Faris Khalil	COMPLETION DATE: 7/4/15
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction CLIENT: City of Winnipeg TESTHOLE NO: TH15-10
 LOCATION: 510 Selkirk Avenue, 4.6 m N of S curb, 70 m E of Andrews St. PROJECT NO.: 60430638
 CONTRACTOR: Maple Leaf drilling Ltd. METHOD: 125 mm SSA with 200 mm Coring ELEVATION (m):

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
					* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) Total Unit Wt (kN/m³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊗ Field Vane ⊗ (kPa)				
0		ASPHALT (250 mm)								
		WOOD								
		CONCRETE (300 mm)								
		CLAY - - grey, moist, firm to stiff - high plasticity		G24	●					
				G25	●					
				G26	●					
				G27	●					
				G28	●					
2		- dark brown below 1.9 m								
		END OF TEST HOLE AT 2.1m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.								

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WINN GDT 8/11/15



LOGGED BY: Saba Ibrahim COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Faris Khalil COMPLETION DATE: 7/4/15
 PROJECT ENGINEER: Kevin Rae

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction CLIENT: City of Winnipeg TESTHOLE NO: TH15-11
 LOCATION: 475 Selkirk Avenue, 3.2 m S of N curb, 20 m W of Powers St. PROJECT NO.: 60430638
 CONTRACTOR: Maple Leaf drilling Ltd. METHOD: 125 mm SSA with 200 mm Coring ELEVATION (m):

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
					* Becker * ◊ Dynamic Cone ◊ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)				
0		ASPHALT (150 mm)								
		CONCRETE (150 mm)								
		SAND and GRAVEL (Fill) -								
		CLAY (Fill) - trace sand - brown, moist, firm to stiff - high plasticity - black below 0.6 m		G6	●				Gravel:0.4%, Sand:5.2%, Silt:24.4%, Clay:70.0%	
				G7	●	—				
				G8	●					
				G9	●					
		SILT - trace sand - light brown, moist, soft - low plasticity		G10	●					
		CLAY - - brown, moist, firm to stiff - high plasticity		G11	●					
		END OF TEST HOLE AT 2.1m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.								

LOG OF TEST HOLE - TEST HOLE LOGS.GPJ UMA WNNN.GDT 8/11/15



LOGGED BY: Saba Ibrahim COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Faris Khalil COMPLETION DATE: 7/4/15
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: Selkirk Avenue WMR & Pavement Reconstruction	CLIENT: City of Winnipeg	TESTHOLE NO: TH15-12
LOCATION: 430 Selkirk Avenue, 4 m N of S curb, 65 m W of Salter St.		PROJECT NO.: 60430638
CONTRACTOR: Maple Leaf drilling Ltd.	METHOD: 125 mm SSA with 200 mm Coring	ELEVATION (m):
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
					* 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	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ● Field Vane ● (kPa) 50 100 150 200				
0		ASPHALT (200 mm)								
		CONCRETE (125 mm)								
		WOOD								
		SAND (Fill)- gravelly, some silt - brown, dry, loose		G1	●					
		CLAYEY SILT- trace sand - brown, moist, soft to very soft - Low plasticity		G2	●					
1		CLAY - - grey, moist, firm to stiff - high plasticity		G3	●					
				G4	●					
				G5	●					
2		END OF TEST HOLE AT 1.8 m IN CLAY. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings and 150 mm asphalt cold patch at surface.								
3									Gravel:0.0%, Sand:5.9%, Silt:68.3%, Clay:25.8%	

LOG OF TEST HOLE TEST HOLE LOGS.GPJ UMA WINN.GDT. 8/11/15



LOGGED BY: Saba Ibrahim	COMPLETION DEPTH: 1.83 m
REVIEWED BY: Faris Khalil	COMPLETION DATE: 7/4/15
PROJECT ENGINEER: Kevin Rae	

City of Winnipeg

Selkirk Avenue

Geotechnical Investigation

Table 01- Summary of Laboratory Soil Testing

Test Hole No.	Testhole Location	Pavement Surface		Pavement Structure Material		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH15-01	804 Selkirk Avenue, 0.75 m N of S curb, 25 m E of Arlington St.	Asphalt	150	Gravel - Sand	150	CLAY(Fill)	0.75	20.8							
						SILT	1.1	33.3							
		CLAY	1.5			40.0									
		CLAY	1.85			45.3									
TH15-02	753 Selkirk Avenue, 3.7 m S of N curb, 75 m W of Parr St.	Asphalt	150	None	n/a	CLAY(Fill)	0.6	29.0	0.3	7.7	23.6	68.4	75.6	20.5	55.1
						SILT	1.1	20.0							
		Concrete	300			SILT	1.35	20.2							
						CLAY	1.7	37.2							
TH15-03	724 Selkirk Avenue, 0.7 m N of S curb, 20 m E of Parr St.	Asphalt	75	Gravel-sandy	75	CLAY(Fill)	0.75	32.9							
						CLAY	1.1	31.2							
		Concrete	140	Gravel-sandy	150	SILT	1.4	23.5							
						SILT	1.7	23.4							
TH15-04	691 Selkirk Avenue, 4 m S of N curb, 80 m W of McKenzie St.	Asphalt	150	Wood	50	SILT	0.8	22.7	0.0	8.2	72.1	19.7	28.8	14.9	13.9
						SILT	1.3	28.3							
		Concrete	150	Gravel-sandy	80	CLAY	1.6	45.6							
				Gravel-Sand	150	CLAY	1.9	49.5							
TH15-05	674 Selkirk Avenue, 0.7 m N of S curb, 16 m W of McKenzie St.	Asphalt	100	Gravel	350	CLAY(Fill)	0.6	25.0							
						SILT	0.8	19.9							
		None	n/a			CLAY	1.1	48.0							
						CLAY	1.6	51.1							
TH15-06	644 Selkirk Avenue, 3.6 m N of S curb, 80 m E of McKenzie St.	Asphalt	75	Gravel-Sand	150	CLAY(Fill)	0.7	29.3	0.3	5.4	22.6	71.7	73.1	19.9	53.2
						SILT	1.0	20.9							
		Concrete	225			SILT	1.2	20.9							
						CLAY	1.6	31.7							
				CLAY	1.9	38.5									

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Street Reconstruction (October 2008)

Test Hole No.	Testhole Location	Pavement Surface		Pavement Structure Material		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits			
		Type	Thickness (mm)	Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index	
TH15-07	607 Selkirk Avenue, 3.6 m S of N curb, 20 m W of McGregor St.	Asphalt	50	Wood	50	CLAY	0.75	29.4								
						SILT	1.0	24.5								
		None	n/a	Gravel-Sand	650	SILT	1.4	21.4								
						CLAY	1.7	32.5								
TH15-08	570 Selkirk Avenue, 3.4 m N of S curb, 95 m E of McGregor St.	Asphalt	150	Wood	100	CLAY(Fill)	0.6	28.3	0.2	8.8	20.6	70.4	65.9	19.3	46.6	
						CLAY	0.8	32.0								
		Concrete	175	Gravel	175	CLAY	1.1	33.8								
						CLAY	1.6	44.5								
TH15-09	541 Selkirk Avenue, 2.5 m S of N curb, 20 m W of Andrews St.	Asphalt	150	Gravel	75	CLAY(Fill)	0.5	32.3								
						CLAY(Fill)	0.8	30.5								
						SILT	1.0	28.2								
		Concrete	150			SILT	1.4	21.8								
						CLAY	1.7	37.1								
TH15-10	510 Selkirk Avenue, 4.6 m N of S curb, 70 m E of Andrews St.	Asphalt	250	Wood	50	CLAY	0.6	25.8								
						CLAY	0.9	26.9								
						CLAY	1.2	27.1								
		Concrete	300			CLAY	1.6	31.4								
						CLAY	1.9	37.1								
TH15-11	475 Selkirk Avenue, 3.2 m S of N curb, 20 m W of Powers St.	Asphalt	150	Gravel-Sand	75	CLAY(Fill)	0.4	23.9								
						CLAY(Fill)	0.6	31.3	0.4	5.2	24.4	70.0	66.4	19.6	46.8	
						CLAY(Fill)	0.9	31.6								
		Concrete	150			SILT	1.3	29.5								
						CLAY	1.6	33.6								
						CLAY	1.9	42.1								
TH15-12	430 Selkirk Avenue, 4 m N of S curb, 65 m W of Salter St.	Asphalt	200	Wood	50	CLAYEY SILT	0.6	24.1	0.0	5.9	68.3	25.8	29.2	15.4	13.8	
						CLAYEY SILT	0.9	27.0								
		Concrete	125	Sand-gravelly	150	CLAY	1.3	29.5								
						CLAY	1.6	38.9								

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Street Reconstruction (October 2008)



Photograph 1. Selkirk Avenue – TH15-01



Photograph 2. Selkirk Avenue – TH15-02



Photograph 3. Selkirk Avenue – TH15-03



Photograph 4. Selkirk Avenue – TH15-04



Photograph 5. Selkirk Avenue – TH15-05



Photograph 6. Selkirk Avenue – TH15-06



Photograph 7. Selkirk Avenue – TH15-07



Photograph 8. Selkirk Avenue – TH15-08



Photograph 9. Selkirk Avenue – TH15-09



Photograph 10. Selkirk Avenue – TH15-10



Photograph 11. Selkirk Avenue – TH15-11



Photograph 12. Selkirk Avenue – TH15-12