

# **APPENDIX 'B'**

# **GEOTECHNICAL REPORT**

March 23, 2022

KGS Group  
865 Waverley Street  
Winnipeg, Manitoba R3T 5P4

Attention: Mr. Craig Rowbotham, P.Eng.  
Municipal Assistant Department Head

**Re: 2022 City of Winnipeg Local and Industrial Street and Alley Renewal Program  
Report of Geotechnical Investigation and Test Results**

Dear Mr. Rowbotham

This letter summarizes KGS Group's geotechnical results for the 2022 City of Winnipeg (COW) Local and Industrial Street and Alley Renewal Program in Winnipeg, Manitoba. KGS Group's scope of services for this project was outlined in our proposal no. 21-000-1988 titled "2022 COW Local and Industrial Street and Alley Renewal Program - Geotechnical" dated January 11, 2022.

KGS Group was retained to complete subsurface investigations at the nine (9) sites that were included as part of this 2022 project. This report details the results of the investigation.

## 1.0 PAVEMENT INVESTIGATIONS

Coring, drilling, and soil sampling was completed at each of nine (9) sites in accordance with the City of Winnipeg Appendix B – COW Site Investigation Requirements. The attached Figures 1 through 9 show the test hole locations for each site and Table 1 provides location descriptions and coordinates taken at the time of drilling. Test hole coordinates were recorded in the field using a cellular phone, with an accuracy of +/- 5m.

### 1.1 Coring and Sampling

Coring was completed at each of eight (8) sites using a 150 mm diameter core barrel. Upon completion of the coring, KGS measured the base and investigated the subgrade below the pavement structure using a truck mounted drill rig. Each test location was backfilled with auger cuttings and patched at the surface with approximately 100 mm of asphalt cold patch. Table 2 attached summarizes the coring in detail. Coring test hole locations were chosen in accordance with the project requirements

## 1.2 Drilling and Sampling

Test hole drilling was only completed at Site 9 – Hudson Lane, as this was classified as a reconstruction project as per the City of Winnipeg RFP 476-2021 Appendix B – CoW Site Investigation Requirements.

Coring and sampling were completed for three (3) test holes along Hudson Lane. The 150 mm diameter cores obtained of the existing pavement measured 50 mm (2 in) thick. Upon completion of coring, KGS measured the base and investigated the subgrade below the pavement structure using a truck mounted drill rig.

Soil samples were retrieved every 0.3 m (1 ft), to a depth of 2.3 m (7.5 ft). Bulk samples were also retrieved in each test hole of the pavement subgrade material, to be used for the Proctor and CBR tests.

Test holes were backfilled with auger cuttings and patched at the surface with 100 mm of asphalt cold patch. Summary test holes logs for Hudson Lane are attached in Appendix A.

## 1.3 Laboratory Testing

Laboratory tests were completed on select soil samples from Site 9 – Hudson Lane. Testing was completed in a Winnipeg, Manitoba laboratory certified by the Canadian Council of Independent Laboratories (CCIL). The laboratory test results are summarized in Appendix B. Lab testing included 10 moisture contents, two (2) Atterberg Limits, two (2) particle size analysis, one (1) moisture-density relationship (standard Proctor) test and one (1) California Bearing Ratio (CBR) test on the subgrade soil.

# 2.0 INVESTIGATION RESULTS

## 2.1 Stratigraphy

Table 1 attached shows a summary of the coring and test hole results. Site specific summaries are explained in the following sections.

A photo log of the road surfacing cores is attached in Appendix C.

### **SITE 1: JEWETT BAY**

Four (4) cores were completed along Jewett Bay. The pavement surfacing consisted concrete ranging in thickness from 160 to 180 mm (6 to 7 in). The granular base material ranged in thickness from 100 to 300 mm (4 to 12 in). Core locations can be viewed on the attached Figure 1.

**SITE 2: ASCOT BAY**

Four (4) cores were completed along Ascot Bay. The pavement surfacing consisted of asphalt material ranging in thickness from 60 to 100 mm (2.4 to 4.0 in). Granular base material below the pavement ranged in thickness from 290 to 300 mm (11.4 to 11.8 in). Core locations can be seen on Figure 2 attached.

**SITE 3: LINTON LANE**

Two (2) cores were completed along Linton Lane. The pavement surfacing consisted of asphalt material ranging in thickness from 70 to 90 mm (2.8 to 3.5 in). Base material was 300 mm (11.8 in) thick and consisted of crushed limestone. Core locations can be viewed on Figure 3 attached.

**SITE 4: CARPATHIA ROAD**

Five (5) cores were completed along Carpathia Road. The pavement surfacing consisted of asphalt material ranging in thickness from 20 to 60 mm (1 to 2.5 in) overlying 150 to 300 mm (6.0 to 11.8 in) of concrete. Granular base material was 300 to 350 mm (11.8 to 13.8 in) thick at locations TH22-01, TH22-02 and TH22-04 and the clay subgrade was encountered immediately below the pavement at locations TH22-03 and TH22-05. Locations are shown in Figure 4 attached.

**SITE 5: RENFREW STREET**

Eight (8) cores were completed along Renfrew Street. The pavement surfacing consisted of 160 to 210 mm (6.3 to 8.3 in) of concrete. Granular base material ranged from 80 to 300 mm (3.1 to 11.8 in) thick in core holes TH22-01 to TH22-03, and clay subgrade was encountered below the pavement at locations TH22-04 to TH22-08. Core locations can be viewed in Figure 5 attached.

**SITE 6: CAMPBELL STREET**

Four (4) cores were completed along Campbell Street. The pavement surfacing consisted of 140 to 190 mm (5.5 to 7.4 in) of concrete. The granular base material ranged from 80 to 300 mm (3.1 to 11.8 in). Core locations are shown on the attached Figure 6.

**SITE 7: BROCK STREET**

Four (4) cores were completed along Brock Street. The pavement surfacing consisted of 100 to 110 mm (3.9 to 4.3 in) of asphalt with 300 mm (11.8 in) of crushed limestone base. Of the total pavement thickness, there was a notable initial layer with an overlay. Coring hole locations can be viewed in Figure 7 attached.

**SITE 8: BISCAYNE BAY**

Three (3) cores were completed along Biscayne Bay. The pavement surfacing consisted of 50 mm (2 in) of asphalt and 300 mm (11.8 in) of granular base. Core hole locations can be viewed in Figure 8 attached.

## SITE 9: HUDSON LANE

Three (3) test holes were completed along Hudson Lane to a depth of 2.3m (7.5 ft). The general stratigraphy encountered in the test holes is summarized below.

**Asphalt** – The pavement surfacing consisted of 50 mm of asphalt. The asphalt was black with 20 mm (max) diameter sub-rounded aggregate.

**Poorly Graded Gravel (GP)** – 100 to 200mm (4.0 to 7.9 in) of poorly graded gravel base was observed underlying the asphalt pavement surfacing. The gravel was brown in colour, damp, compact, frozen.

**Clay (CH)** - High plasticity clay was encountered below the gravel base and extended the full depth of explored of 2.3 m (7.5 ft). The clay was dark grey in colour, moist, frozen to depths of 1.1 to 1.2m (3½ to 4 ft) and stiff below the frost.

Undrained shear strength of the clay was estimated in the field during drilling using a handheld Torvane and ranged from 80 to 65 kPa. Two (2) Atterberg limit tests completed on clay soil samples at a depth of 0.6m (2 ft) classified the material as high plasticity clay. Grain size analysis tests completed on the same samples indicated 0 to 1% gravel, 3 to 17% sand, 59 to 61% silt and 23 to 37% clay. Moisture contents ranged from 33 to 40% and generally increased with depth.

A moisture-density relationship test (standard Proctor) was completed on the clay subgrade soil and resulted in a maximum dry density of 1410 kg/m<sup>3</sup> and an optimum moisture content of 25.5%. The CBR-value was measured to be 1.2 at 2.54 mm penetration-for the same sample. The laboratory Proctor and CBR-value test reports are attached in Appendix B, Laboratory Test Results.

## 3.0 CLOSURE

Should you have any questions regarding the enclosed information or require additional information, please contact the undersigned.

Prepared By:



Trevor Schellenberg, P.Eng.  
Geotechnical Engineer

Approved By:



Taunya Ernst, P.Eng., P.E., P.G.  
Senior Geotechnical Engineer

NB/jkb/cs  
Attached

## STATEMENT OF LIMITATIONS AND CONDITIONS

### Limitations

This report has been prepared for KGS Group in accordance with the agreement between KGS Group's Geotechnical and Municipal departments (the "Agreement"). This report represents KGS Group's professional judgment and exercising due care consistent with the preparation of similar reports. The information, data, recommendations and conclusions in this report are subject to the constraints and limitations in the Agreement and the qualifications in this report. This report must be read as a whole, and sections or parts should not be read out of context.

This report is based on information made available to KGS Group by KGS Group. Unless stated otherwise, KGS Group has not verified the accuracy, completeness or validity of such information, makes no representation regarding its accuracy and hereby disclaims any liability in connection therewith. KGS Group shall not be responsible for conditions/issues it was not authorized or able to investigate or which were beyond the scope of its work. The information and conclusions provided in this report apply only as they existed at the time of KGS Group's work.

### Third Party Use of Report

Any use a third party makes of this report or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

### Geotechnical Investigation Statement of Limitations

The geotechnical investigation findings and recommendations of this report were prepared in accordance with generally accepted professional engineering principles and practice. The findings and recommendations are based on the results of field and laboratory investigations, combined with an interpolation of soil and groundwater conditions found at and within the depth of the test holes drilled by KGS Group at the site at the time of drilling. If conditions encountered during construction appear to be different from those shown by the test holes drilled by KGS Group or if the assumptions stated herein are not in keeping with the design, KGS Group should be notified in order that the recommendations can be reviewed and modified if necessary.

# FIGURES

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Test Hole Location Plans

FIGURE 1: Test Hole Locations for Site 1 - Jewett Bay

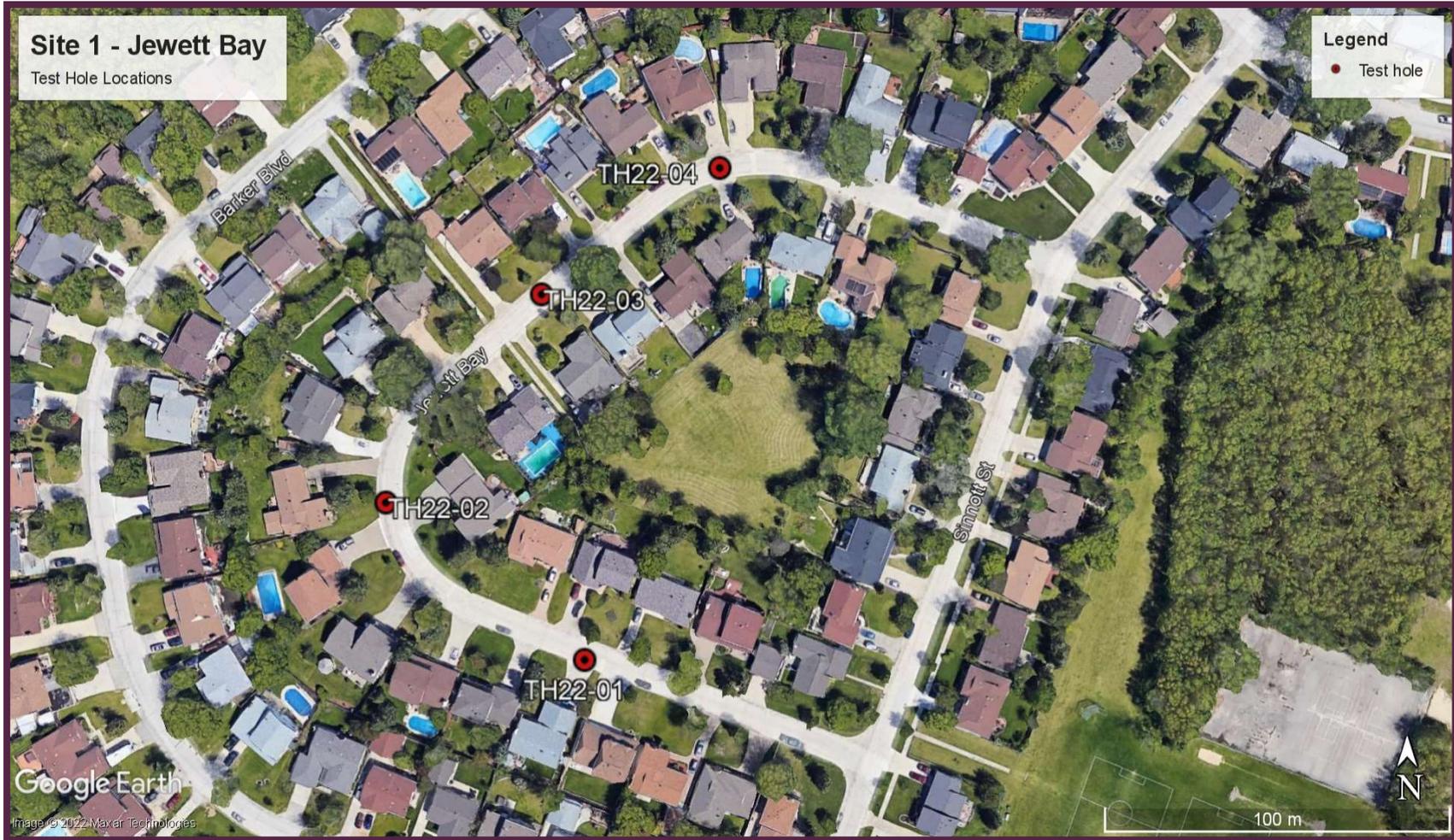
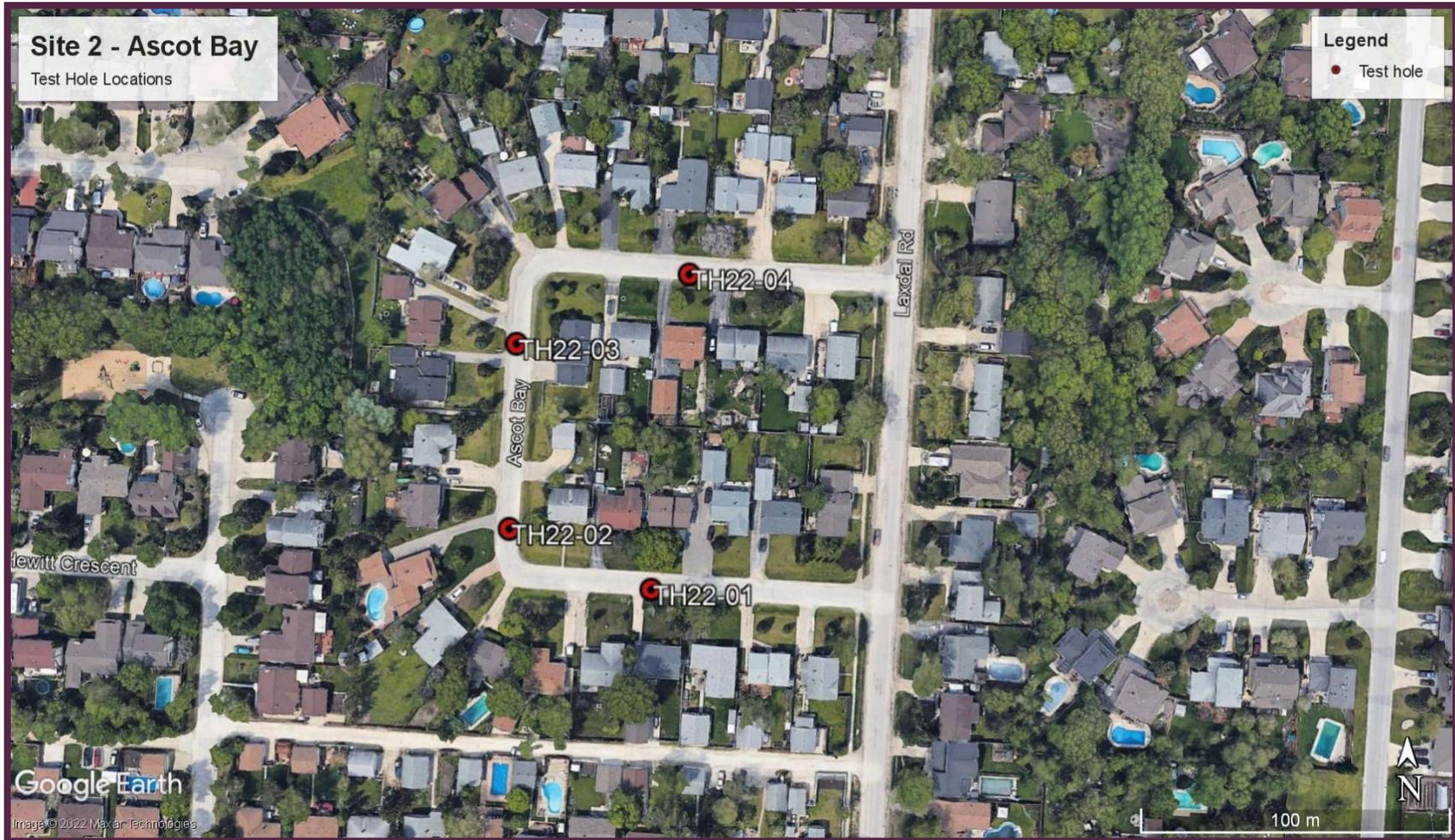


FIGURE 2: Test Hole Locations for Site 2 - Ascot Bay



## FIGURE 3: Test Hole Locations for Site 3 - Linton Lane

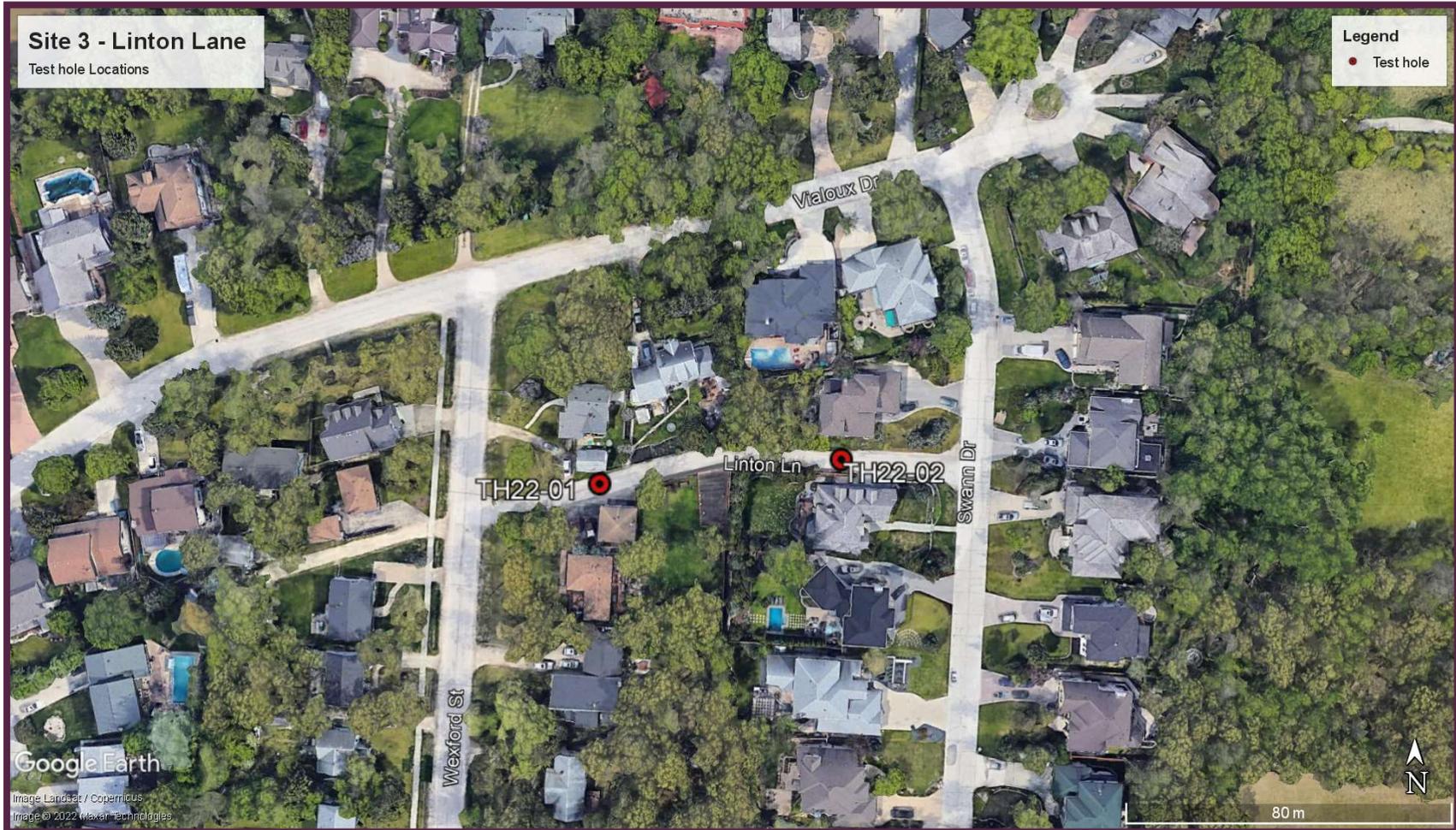


FIGURE 4: Test Hole Locations for Site 4 - Carpathia Road



FIGURE 5: Test Hole Locations for Site 5 - Renfrew Street

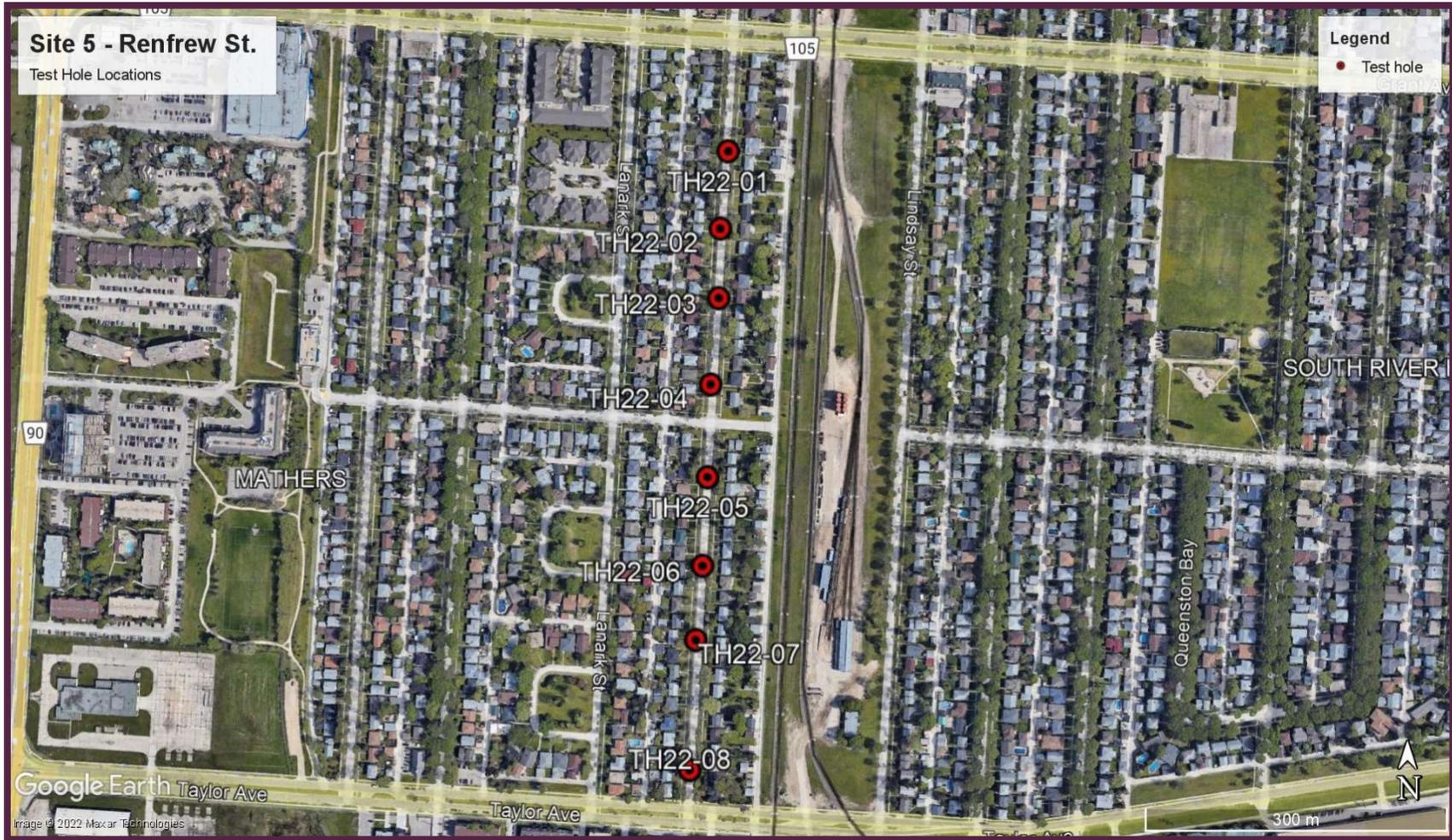


FIGURE 6: Test Hole Locations for Site 6 - Campbell Street

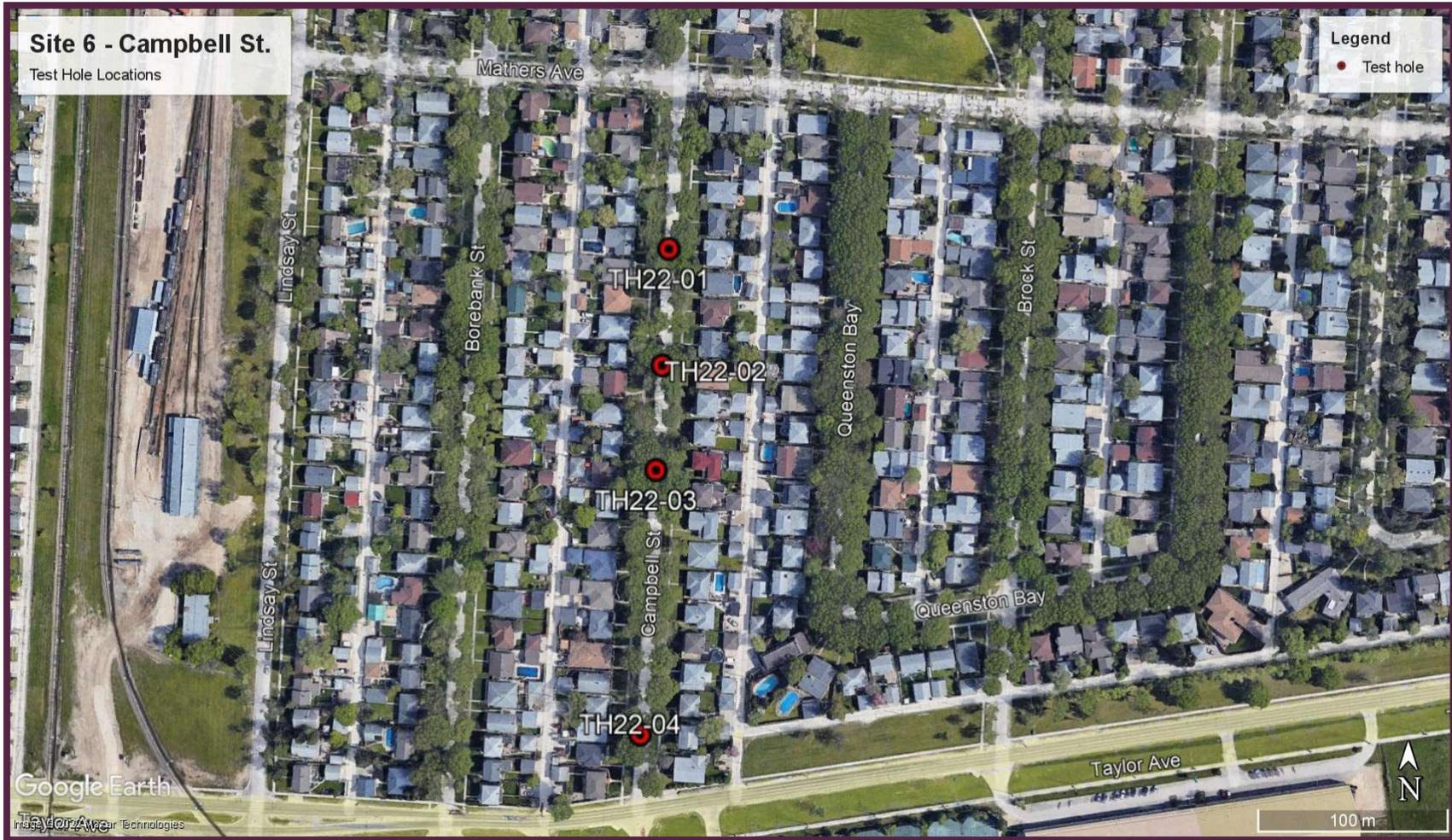
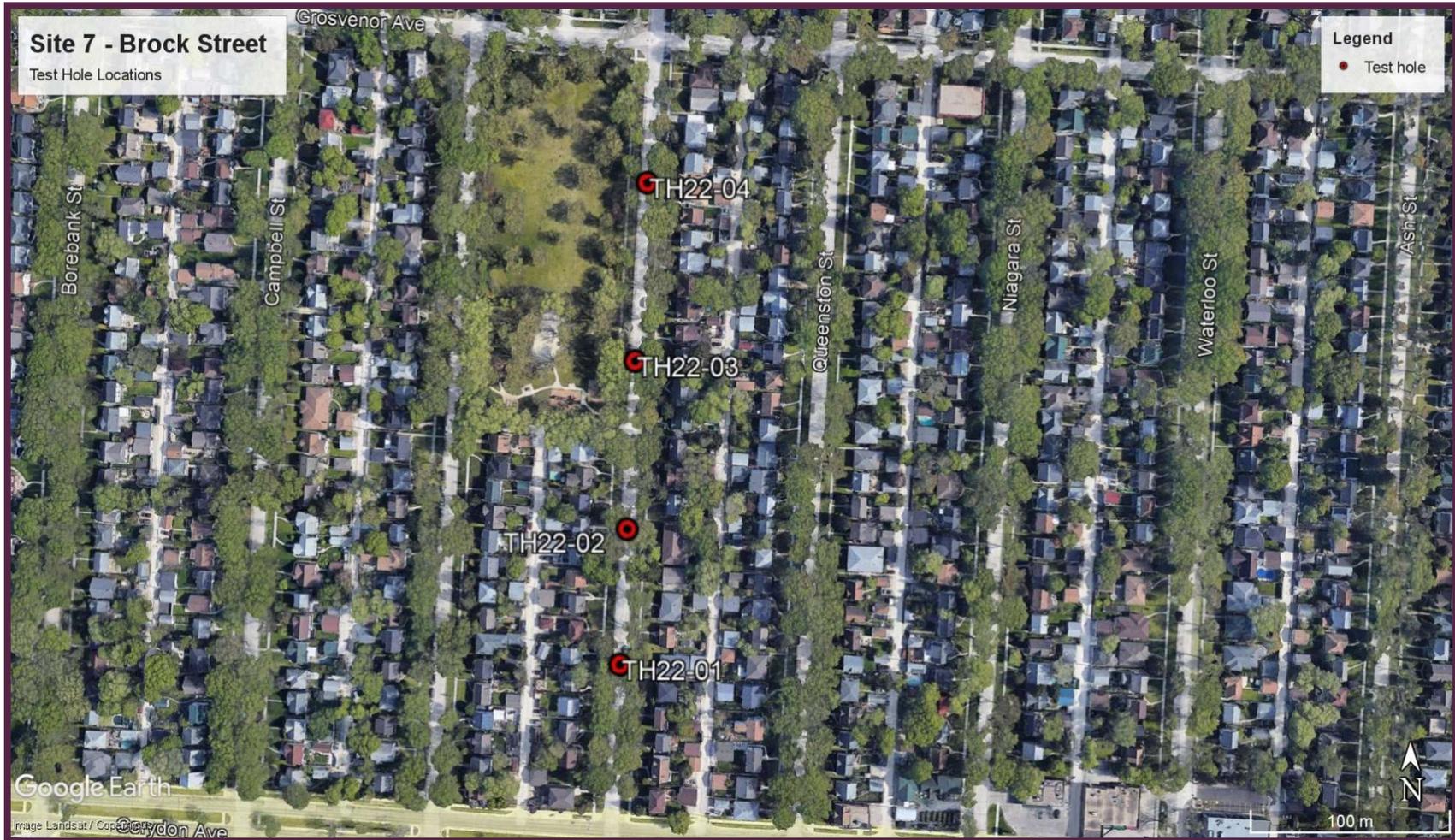


FIGURE 7: Test Hole Locations for Site 7 - Brock Street



## FIGURE 8: Test Hole Locations for Site 8 - Biscayne Bay

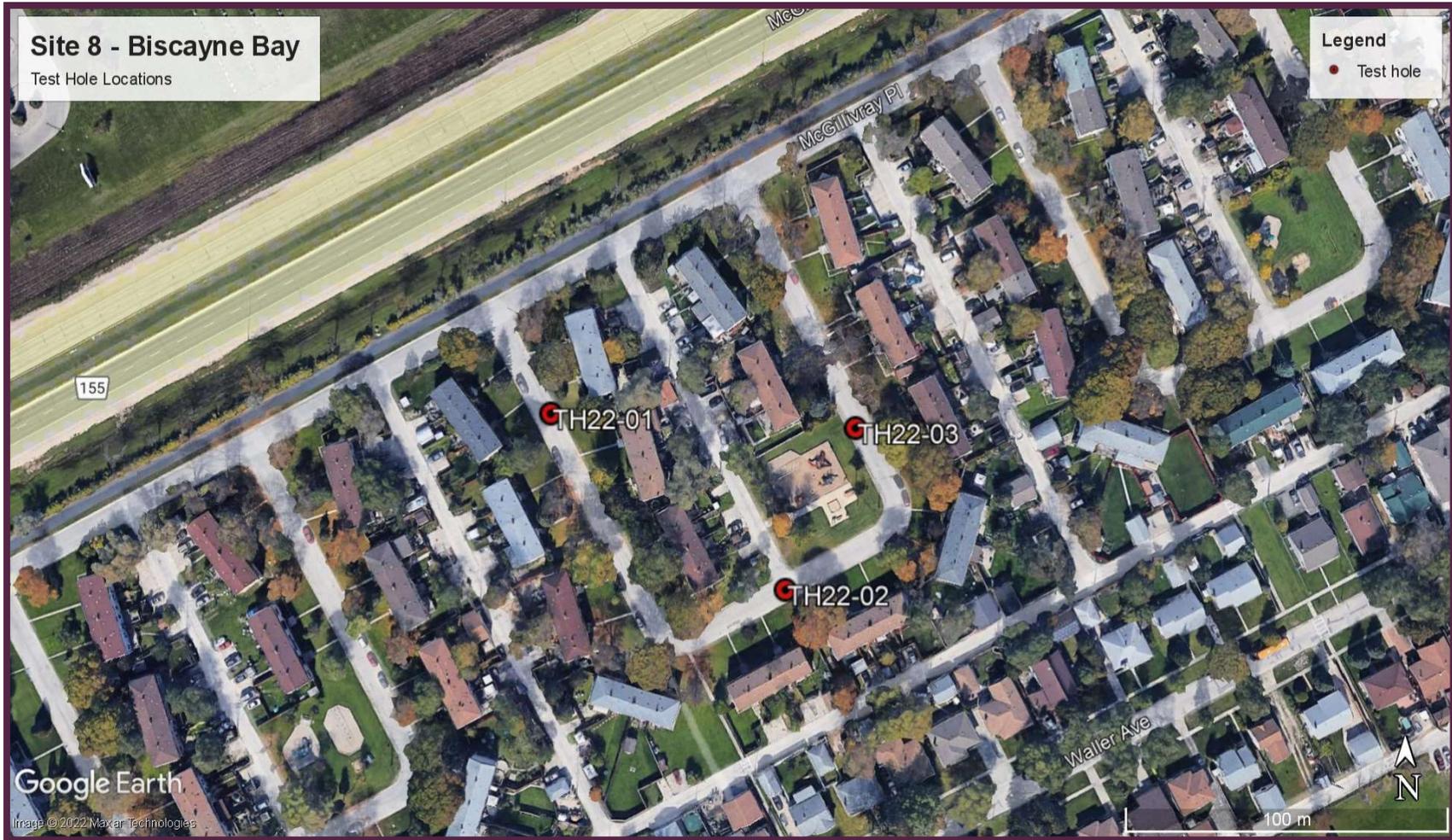
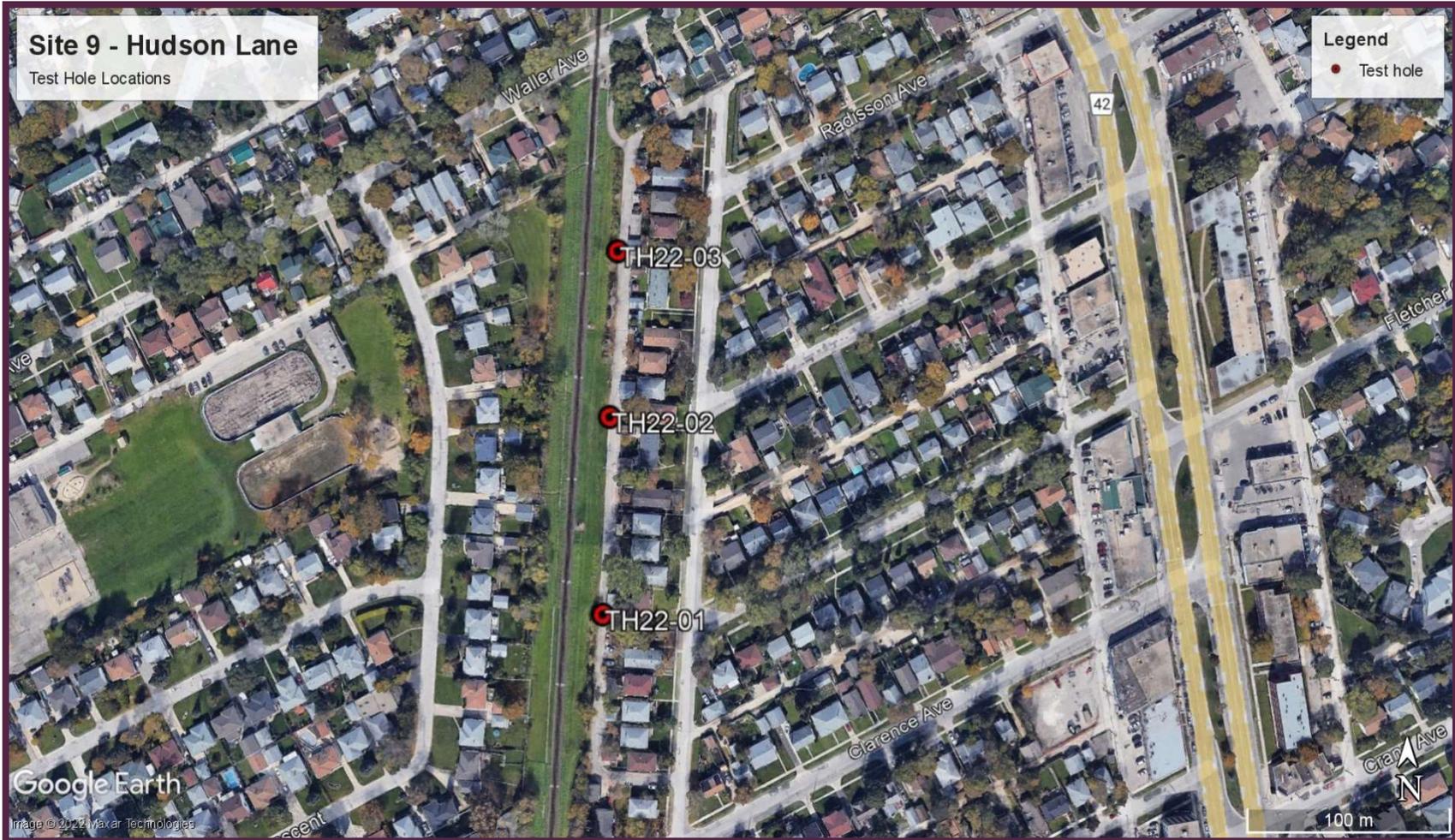


FIGURE 9: Test Hole Locations for Site 9 - Hudson Lane



# **TABLES**

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Location Descriptions and Coordinates  
Summary of Core Results

**TABLE 1: LOCATION DESCRIPTIONS AND COORDINATES**

Site No.	Location	ID	Location	Approximate UTM Coordinates	
				Northing (m)	Easting (m)
1	Jewett Bay	TH22-01	Jewett Bay - 85m W of Sinnott St.	5,525,153	620,626
		TH22-02	Jewett Bay - 150m W of Sinnott St.	5,525,196	620,567
		TH22-03	Jewett Bay - 140m W of Sinnott St.	5,525,256	620,611
		TH22-04	Jewett Bay - 100m W of Sinnott St.	5,525,293	620,662
2	Ascot Bay	TH22-01	Ascot Bay - 75m W of Laxdal Rd.	5,523,786	624,966
		TH22-02	Ascot Bay - 120m W of Laxdal Rd.	5,523,804	624,920
		TH22-03	Ascot Bay - 120m W of Laxdal Rd.	5,523,862	624,921
		TH22-04	Ascot Bay - 70m W of Laxdal Rd.	5,523,885	624,976
3	Linton Lane	TH22-01	Linton Ln. - 30m E of Wexford St.	5,525,862	625,641
		TH22-02	Linton Ln. - 85m E of Wexford St.	5,525,869	625,698
4	Carpathia Road	TH22-01	Carpathia Rd.- 90m from Kenaston Blvd.	5,524,686	629,013
		TH22-02	Carpathia Rd.- 135m from Kenaston Blvd.	5,524,726	629,025
		TH22-03	Carpathia Rd.- 180m from Kenaston Blvd.	5,524,777	529,029
		TH22-04	Carpathia Rd.- 190m S of Corydon Ave.	5,524,868	629,031
		TH22-05	Carpathia Rd.- 95m S of Corydon Ave.	5,524,960	629,033
5	Renfrew Street	TH22-01	Renfrew St. - 650m North of Taylor Ave.	5,524,162	629,582
		TH22-02	Renfrew St. - 570m North of Taylor Ave.	5,524,086	629,576
		TH22-03	Renfrew St. - 500m North of Taylor Ave.	5,524,018	629,576
		TH22-04	Renfrew St. - 420m North of Taylor Ave.	5,523,933	629,570
		TH22-05	Renfrew St. - 325m North of Taylor Ave.	5,523,842	629,569
		TH22-06	Renfrew St. - 240m North of Taylor Ave.	5,523,755	629,566
		TH22-07	Renfrew St. - 160m North of Taylor Ave.	5,523,682	629,561
		TH22-08	Renfrew St. - 40m North of Taylor Ave.	5,523,555	629,558
6	Campbell Street	TH22-01	Campbell St. - 280m N of Taylor Ave.	5,523,796	629,957
		TH22-02	Campbell St. - 220m N of Taylor Ave.	5,523,737	629,957
		TH22-03	Campbell St. - 170m N of Taylor Ave.	5,523,684	629,953
		TH22-04	Campbell St. - 40m N of Taylor Ave.	5,523,550	629,948
7	Brock Street	TH22-01	Brock St. - 75m N of Corydon Ave.	5,525,113	630,186
		TH22-02	Brock St. - 140m N of Corydon Ave.	5,525,179	630,188
		TH22-03	Brock St. - 225m N of Corydon Ave.	5,525,261	630,190
		TH22-04	Brock St. - 310m N of Corydon Ave.	5,525,348	630,194
8	Biscayne Bay	TH22-01	Biscayne Bay - 30m SE of McGillivray Pl.	5,522,269	632,209
		TH22-02	Biscayne Bay - 80m SE of McGillivray Pl.	5,522,219	632,281
		TH22-03	Biscayne Bay - 110m SE of McGillivray Pl.	5,522,267	632,301
9	Hudson Lane	TH22-01	Hudson Ln. - 120m N of Hudson St.	5,522,072	632,683
		TH22-02	Hudson Ln. - 210m N of Hudson St.	5,522,166	632,684
		TH22-03	Hudson Ln. - 290m N of Hudson St.	5,522,245	632,686

Notes: 1. Test hole coordinates were located in the field using a cellular phone.

**TABLE 2: SUMMARY OF CORE RESULTS**

Site No.	Location	ID	Pavement Type	Core Thickness (mm)	Base Material	Base Thickness (mm)
1	Jewett Bay	TH22-01	Concrete	160	Granular Base	300
		TH22-02		180		300
		TH22-03		160		100
		TH22-04		160		220
2	Ascot Bay	TH22-01	Asphalt	60	Granular Base	290
		TH22-02		90		300
		TH22-03		60		290
		TH22-04		100		300
3	Linton Lane	TH22-01	Asphalt	90	Crushed Limestone	300
		TH22-02		70		300
4	Carpathia Road	TH22-01	Asphalt/ Concrete	20/210	Granular Base	300
		TH22-02		50/100		300
		TH22-03		40/200	Clay Fill <sup>1</sup>	-
		TH22-04		50/120	Granular Base	350
		TH22-05		60/190	Clay Fill <sup>1</sup>	-
5	Renfrew Street	TH22-01	Concrete	160	Granular Base	80
		TH22-02		180		300
		TH22-03		200		130
		TH22-04		160	Clay Fill <sup>1</sup>	-
		TH22-05		170		-
		TH22-06		210		-
		TH22-07		180		-
		TH22-08		170		-
6	Campbell Street	TH22-01	Concrete	140	Granular Base	300
		TH22-02		170		120
		TH22-03		180		80
		TH22-04		190		80
7	Brock Street	TH22-01	Asphalt	100	Crushed Limestone	300
		TH22-02		110		300
		TH22-03		110		300
		TH22-04		110		300
8	Biscayne Bay	TH22-01	Asphalt	50	Granular Base	300
		TH22-02		50		300
		TH22-03		50		300
9	Hudson Lane	TH22-01	Asphalt	50	Granular Base	100
		TH22-02		50		200
		TH22-03		50		100

Notes: 1. Clay fill subgrade material contained trace coarse-grained gravel, trace fine- to coarse-grained sand.

# APPENDIX A

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Test Hole Logs



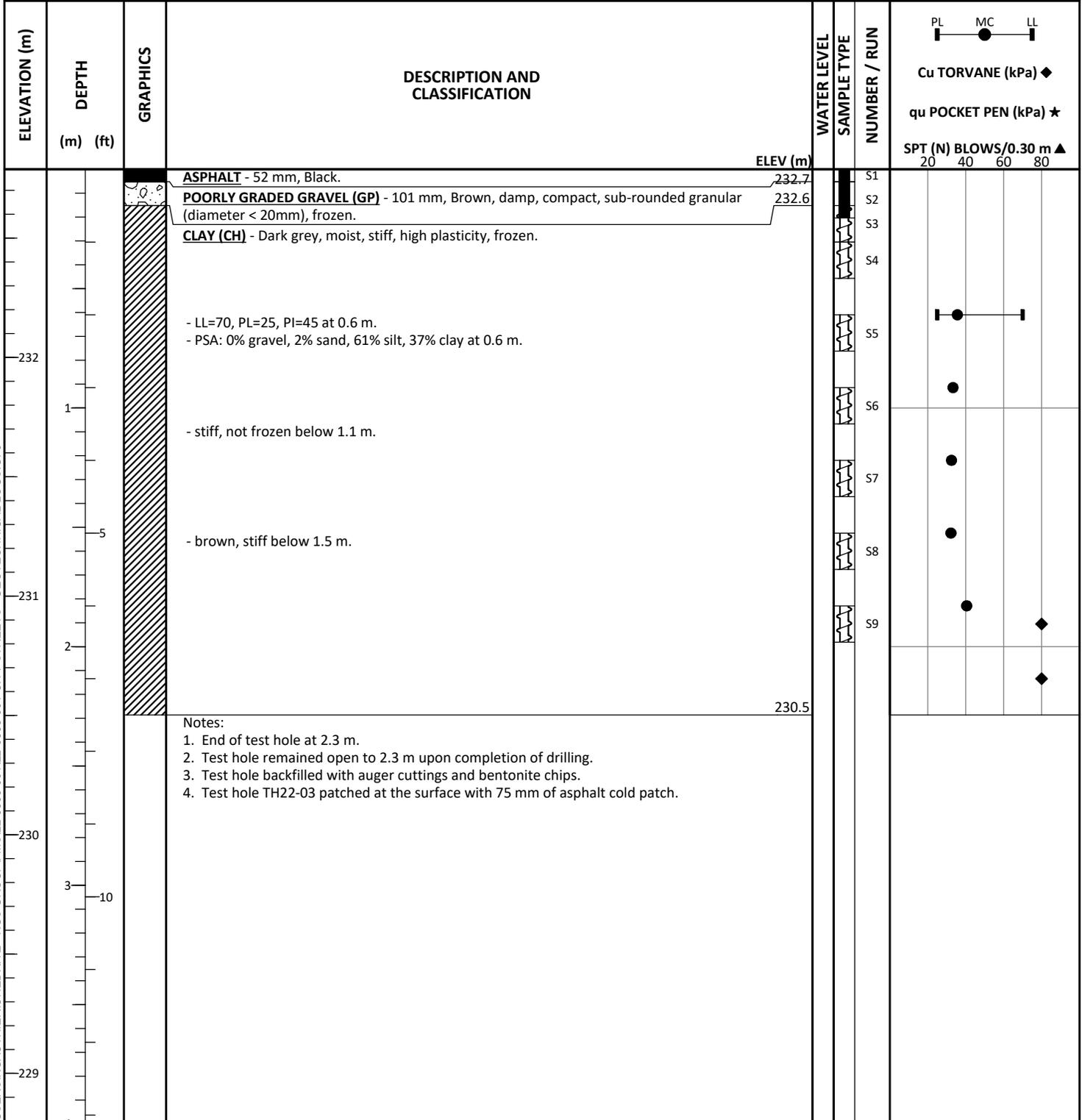
<b>CLIENT</b>	<b>KGS GROUP</b>	<b>PROJECT NO.</b>	22-0535-001
<b>PROJECT</b>	<b>2022 COW Local and Industrial Street and Alleys</b>	<b>SURFACE ELEV.</b>	232.89 m
<b>LOCATION</b>	Winnipeg, Manitoba	<b>DATE DRILLED</b>	1-25-2022
<b>DESCRIPTION</b>	Hudson Lane - 210 m N of Hudson St.	<b>UTM (m)</b>	N 5,522,166
<b>DRILL RIG / HAMMER</b>	B40 Truck Mounted Drill Rig with Auto-Hammer		E 632,684
<b>METHOD(S)</b>	0.0 m to 0.1 m: Roadway coring 0.1 m to 2.3 m: 125 mm $\phi$ SSA		

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	WATER LEVEL	SAMPLE TYPE	NUMBER / RUN	SPT (N) BLOWS/0.30 m ▲			
							20	40	60	80
			<p><b>ASPHALT</b> - 52 mm, Black. <span style="float: right;">ELEV (m) 232.8</span></p> <p><b>POORLY GRADED GRAVEL (GP)</b> - 253 mm, Brown, damp, compact, sub-rounded granular (diameter &lt; 20mm), frozen. <span style="float: right;">232.6</span></p> <p><b>CLAY (CH)</b> - Dark grey, moist, stiff, high plasticity, frozen.</p>			S1				
						S2				
						S3				
232	1					S4				
			- stiff, not frozen, some silt inclusions below 1.2 m.			S5				◆
	5					S6				
						S7				◆
231	2		- brown, stiff, trace silt below 2.1 m. <span style="float: right;">230.6</span>							
			Notes: 1. End of test hole at 2.3 m. 2. Test hole remained open to 2.3 m upon completion of drilling. 3. Test hole backfilled with auger cuttings and bentonite chips. 4. Test hole TH22-02 patched at the surface with 75 mm of asphalt cold patch.							
230	3									
	10									
229										

<b>WATER LEVELS</b>	▼ Upon Completion on 1-25-2022 Dry	<b>CONTRACTOR</b> Maple Leaf Drilling Ltd.	<b>INSPECTOR</b> K. GAUTHIER
		<b>APPROVED</b> T. ERNST	<b>DATE</b> 3-17-2022

KGS\_LOG\_C:\USERS\KGAUTHIER\DRIVE - KGS GROUP\FMS\22-0535-001\CITY STREETS - GEOTECHNICAL LOGS.GPJ

<b>CLIENT</b>	<b>KGS GROUP</b>	<b>PROJECT NO.</b>	22-0535-001
<b>PROJECT</b>	<b>2022 COW Local and Industrial Street and Alleys</b>	<b>SURFACE ELEV.</b>	232.79 m
<b>LOCATION</b>	Winnipeg, Manitoba	<b>DATE DRILLED</b>	1-25-2022
<b>DESCRIPTION</b>	Hudson Lane - 290 m N of Hudson St.	<b>UTM (m)</b>	N 5,522,245
<b>DRILL RIG / HAMMER</b>	B40 Truck Mounted Drill Rig with Auto-Hammer		E 632,686
<b>METHOD(S)</b>	0.0 m to 0.1 m: Roadway coring 0.1 m to 2.3 m: 125 mm $\phi$ SSA		



KGS\_LOG\_C:\USERS\KGAUTHIER\DRIVE - KGS GROUP\FMS\22-0535-001\22-0535-001 CITY STREETS - GEOTECHNICAL LOGS.GPJ

<b>WATER LEVELS</b>	▼ Upon Completion on 1-25-2022 Dry	<b>CONTRACTOR</b> Maple Leaf Drilling Ltd.	<b>INSPECTOR</b> K. GAUTHIER
		<b>APPROVED</b> T. ERNST	<b>DATE</b> 3-17-2022

# KEY TO SYMBOLS

## LITHOLOGIC SYMBOLS

-  Asphalt
-  Clay (CH, high plasticity)
-  Poorly Graded Gravel (GP)

## SAMPLER SYMBOLS

-  Auger Grab
-  Core Barrel

## WELL CONSTRUCTION SYMBOLS

## ABBREVIATIONS

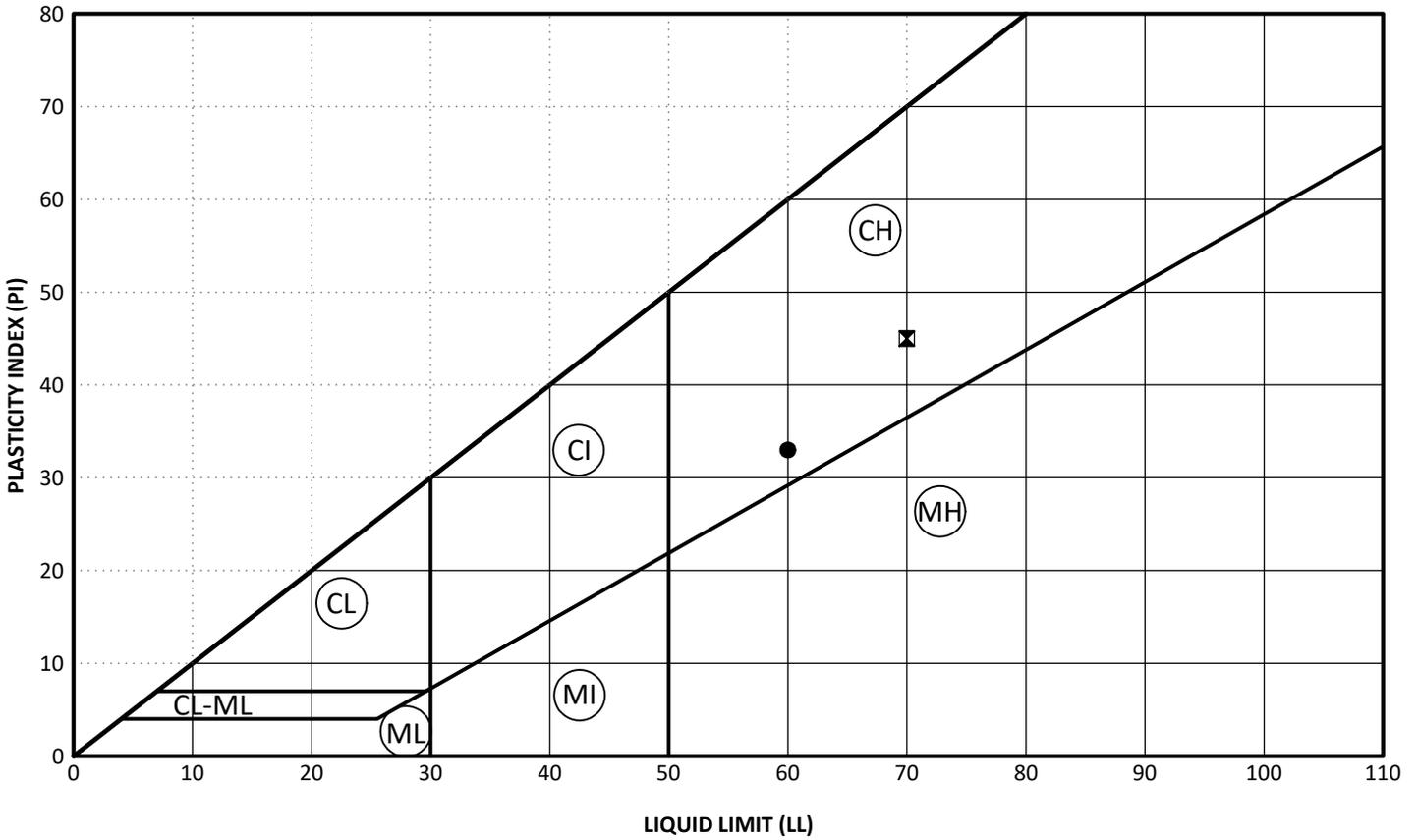
- |                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>LL - Liquid Limit</li> <li>PL - Plastic Limit</li> <li>PI - Plastic Index</li> <li>MC - Moisture Content</li> <li>DD - Dry Density</li> <li>NP - Non-Plastic</li> <li>-200 - Percent Passing No. 200 Sieve</li> <li>TV - Torvane (kPa)</li> <li>PP - Pocket Penetrometer (kPa)</li> <li>PSA - Particle Size Analysis</li> <li>TOC - Top Of Casing</li> </ul> | <ul style="list-style-type: none"> <li>PN - Pneumatic Piezometer</li> <li>VW - Vibrating Wire Piezometer</li> <li>PID - Photoionization Detector</li> <li>ppm - Parts Per Million</li> <li>∇ - Water Level During Drilling</li> <li>▼ - Water Level Upon Completion of Drilling</li> <li>◄ - Water Level Remeasured/Static</li> </ul> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

# APPENDIX B

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Laboratory Test Results

# ATTERBERG LIMITS



HOLE	DEPTH (m)	SAMPLE #	LL	PL	PI	SAND (%)	SILT (%)	CLAY (%)	SILT & CLAY (%)	MC (%)	CLASSIFICATION
● TH22-01	0.6	S3	60	27	33	17	59	23	82	33	CH
✕ TH22-03	0.6	S5	70	25	45	3	61	37	97	36	CH

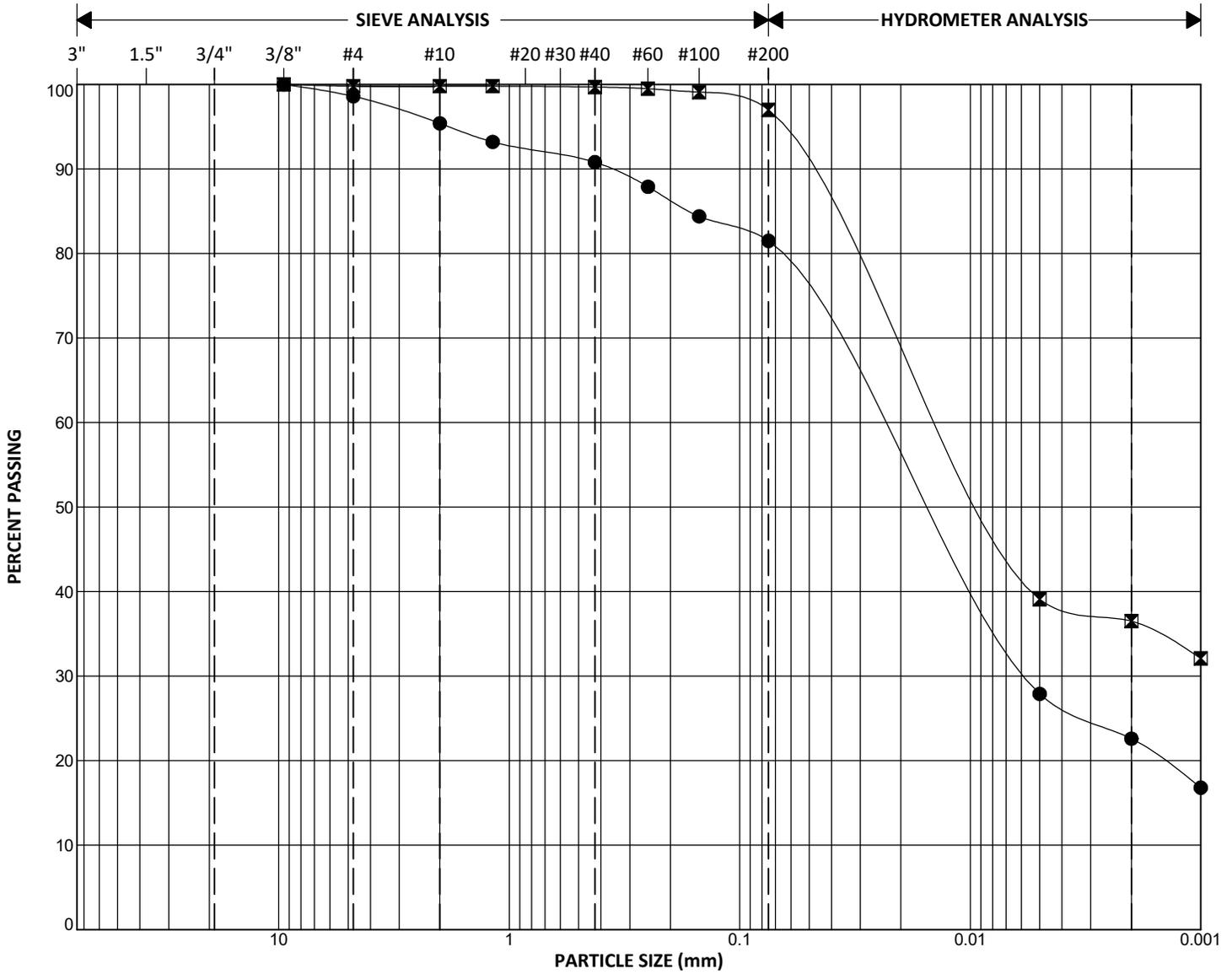
A:\LINE PLOT C:\USERS\KGAUTH\HIERIONEDRIVE - KGS GROUP\FMS\22-0535-001\22-0535-001 CITY STREETS - GEOTECHNICAL LOGS.GPJ



**CLIENT** KGS GROUP  
**PROJECT NAME** 2022 COW Local and Industrial Street and Alleys  
**TESTED BY** Stantec

**PROJECT NO.** 22-0535-001  
**LOCATION** Winnipeg, Manitoba  
**DATE TESTED** February 2022

# GRAIN SIZE DISTRIBUTION



GRAVEL		SAND			SILT	CLAY
coarse	fine	coarse	medium	fine		

	HOLE	DEPTH (m)	SAMPLE #	GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)	SILT & CLAY (%)	Cu	Cc	CLASSIFICATION
●	TH22-01	0.6	S3	1	17	59	23	82			CH
⊠	TH22-03	0.6	S5	0	3	61	37	97			CH

SIEVE ANALYSIS C:\USERS\KGAUTHIER\DRIVE - KGS GROUP\FMS\22-0535-001\22-0535-001 CITY STREETS - GEOTECHNICAL LOGS.GPJ



**CLIENT** KGS GROUP  
**PROJECT NAME** 2022 COW Local and Industrial Street and Alleys  
**TESTED BY** Stantec

**PROJECT NO.** 22-0535-001  
**LOCATION** Winnipeg, Manitoba  
**DATE TESTED** February 2022

# PROCTOR TEST REPORT

TO KGS Group Inc.  
3rd Floor - 865 Waverley St  
Winnipeg, MB  
R3T 5P4

CLIENT KGS Group Inc.  
C.C. KGS Group Inc.

ATTN: Kayden Gauthier

PROJECT City Streets

PROJECT NO. 123315885

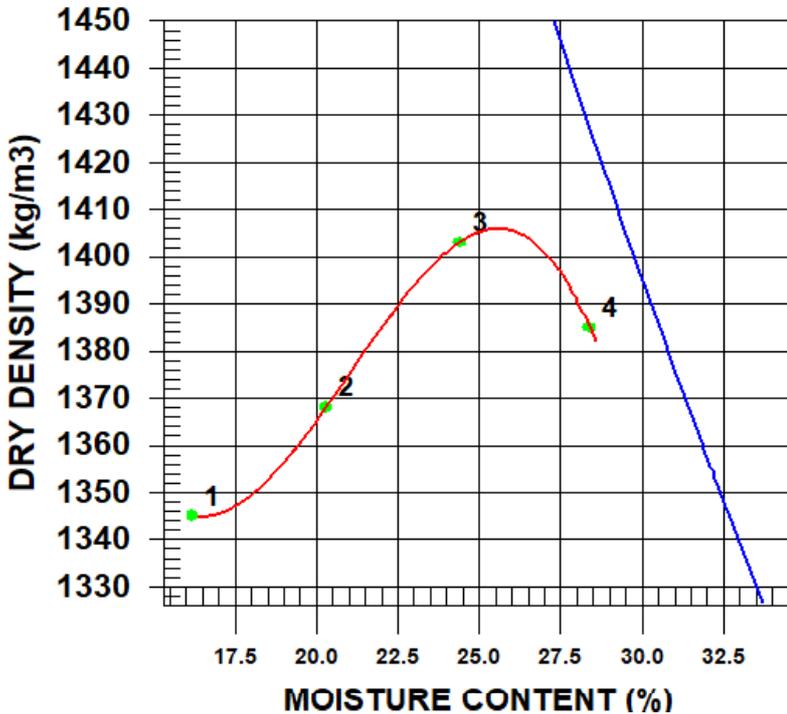
PROCTOR NO. 1

DATE SAMPLED 2022.Jan.25

DATE RECEIVED 2022.Feb.02

DATE TESTED 2022.Feb.07

INSITU MOISTURE	39.5 %	COMPACTION STANDARD	Standard Proctor, ASTM D698
TESTED BY	Donald Eliazar	COMPACTION PROCEDURE	A: 101.6mm Mold, Passing 4.75mm
MATERIAL IDENTIFICATION		RAMMER TYPE	Manual
MATERIAL USE	Subgrade	PREPARATION	Dry
MAX. NOMINAL SIZE		OVERSIZE CORRECTION METHOD	None
MATERIAL TYPE	Clay	RETAINED 4.75mm SCREEN	
SUPPLIER	Existing Material		
SOURCE	Testholes		



TRIAL NUMBER	WET DENSITY (kg/m <sup>3</sup> )	DRY DENSITY (kg/m <sup>3</sup> )	MOISTURE CONTENT (%)
1	1563	1345	16.2
2	1646	1368	20.3
3	1745	1403	24.4
4	1778	1385	28.4

	MAXIMUM DRY DENSITY (kg/m <sup>3</sup> )	OPTIMUM MOISTURE CONTENT (%)
CALCULATED	1410	25.5
OVERSIZE CORRECTED		

COMMENTS

Material tested was a composite sample of clay taken from TH22-01 & TH22-03. Samples were identified by the client as Site 9 Hudson Lane.

REVIEWED BY  Jason Thompson, C.E.T.



**Stantec Consulting Ltd.**  
 199 Henlow Bay, Winnipeg, MB R3Y 1G4  
 Tel: (204) 488-6999

## ASTM D1883 - CALIFORNIA BEARING RATIO (CBR) OF LABORATORY-COMPACTED SOILS

TO KGS Group Inc.  
 3rd Floor - 865 Waverley St.  
 Winnipeg, MB  
 R3T 5P4

PROJECT City Streets (22-0535-001)  
 Site 9 - Hudson Lane

PROJECT NO. 123315885

ATTN: Taunya Ernst

REPORT NO. 1 (Data page - see Page 2 for Chart)

DATE SAMPLED: 2022.Jan.25

DATE RECEIVED: 2022.Feb.03

DATE TESTED: 2022.Feb.10

SAMPLED BY: KGS Group Inc.

SUBMITTED BY: KGS Group Inc.

TESTED BY: Donald Eliazar

**MATERIAL IDENTIFICATION**

MATERIAL USE	Subgrade	SUPPLIER	Existing Material
MAX. NOMINAL SIZE	4.75 mm	SOURCE	Testhole
MATERIAL TYPE	Clay	SAMPLE LOCATION	TH22-01 & TH22-03
SPECIFICATION	Not Applicable	STANTEC SAMPLE NO.	4065

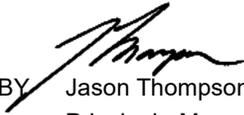
IMMERSION PERIOD	96 ± 2 hr	TARGET MAX. DRY DENSITY	1410 kg/m <sup>3</sup>
CONDITION OF SAMPLE	Soaked	TARGET OPTIMUM MOISTURE	25.5 %
SURCHARGE MASS	4.54 kg	AS-COMPACTED MAX. DRY DENSITY	1342 kg/m <sup>3</sup>
SWELL OF SAMPLE	9.0%	AS-COMPACTED MOISTURE CONTENT	25.4 %
		POST-TEST MOISTURE CONTENT (TOP 25 mm)	49.3 %

CBR VALUE AT <b>2.54 mm</b> PENETRATION	<b>1.2</b>
CBR VALUE AT <b>5.08 mm</b> PENETRATION	<b>1.0</b>

**COMMENTS:**

Sample prepared to 95% of the maximum dry density at the optimum moisture content as determined from ASTM D698.  
 We appreciate the opportunity to assist you on this project. Please contact the undersigned if you have any questions regarding this report.

REPORT DATE 2022.Feb.15

REVIEWED BY  Jason Thompson, C.E.T.  
 Principal - Manager of Materials Testing Services

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided on written request. The data presented is for sole use of client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.

## ASTM D1883 - CALIFORNIA BEARING RATIO (CBR) OF LABORATORY-COMPACTED SOILS

TO KGS Group Inc.  
 3rd Floor - 865 Waverley St.  
 Winnipeg, MB  
 R3T 5P4

PROJECT City Streets (22-0535-001)  
 Site 9 - Hudson Lane

PROJECT NO. 123315885

ATTN: Taunya Ernst

REPORT NO. 1 (Chart page - See Page 1 for Data)

DATE SAMPLED: 2022.Jan.25

DATE RECEIVED: 2022.Feb.03

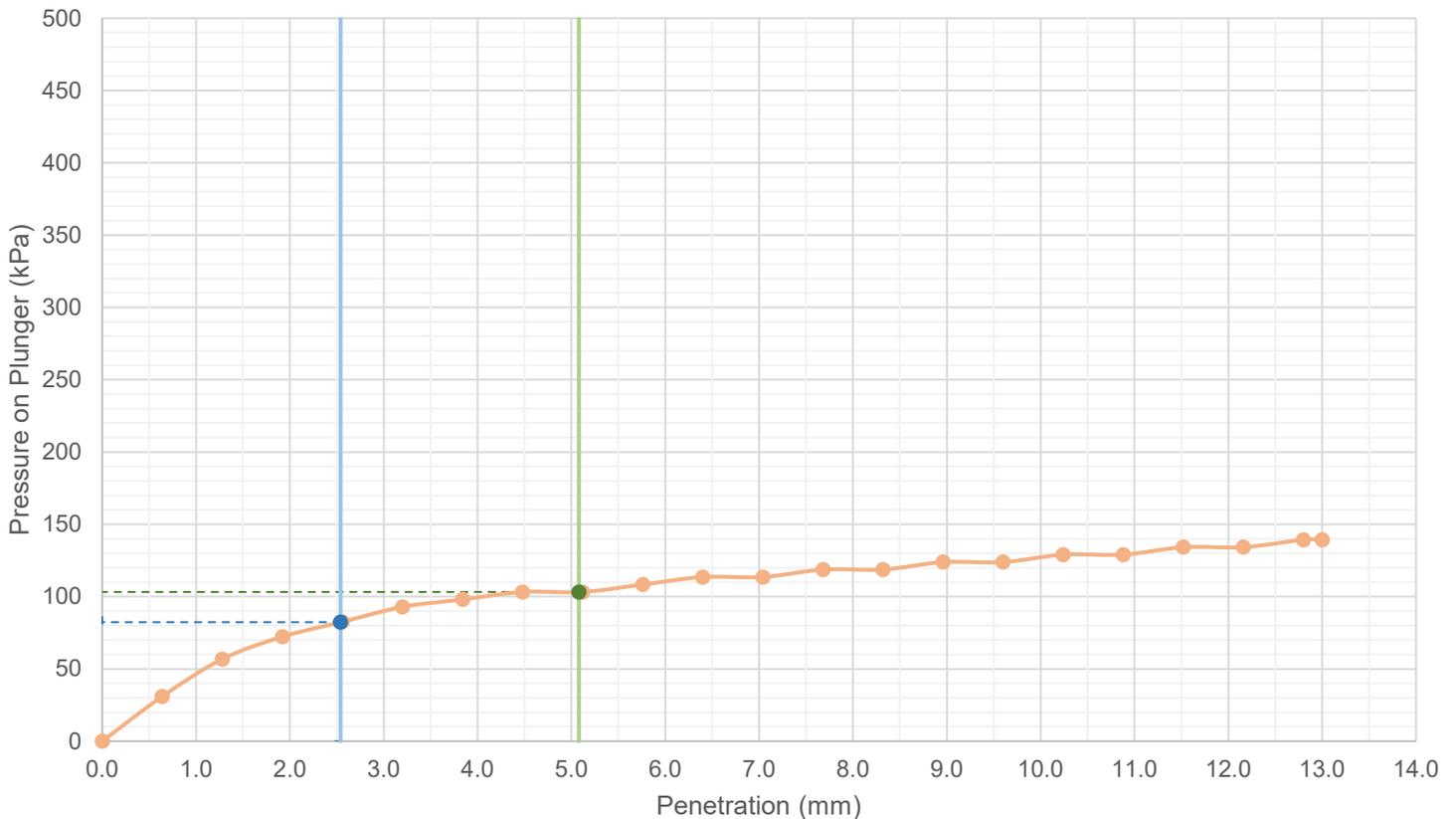
DATE TESTED: 2022.Feb.10

SAMPLED BY: KGS Group Inc.

SUBMITTED BY: KGS Group Inc.

TESTED BY: Donald Eliazar

**LOAD PENETRATION CURVE**



REPORT DATE 2022.Feb.15

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# APPENDIX C

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Core Photo Log

### SITE 1 – JEWETT BAY



Photo 1: TH22-01 Jewett Bay core



Photo 2: TH22-01 Jewett Bay core



Photo 3: TH22-01 Jewett Bay core



Photo 4: TH22-01 Jewett Bay core

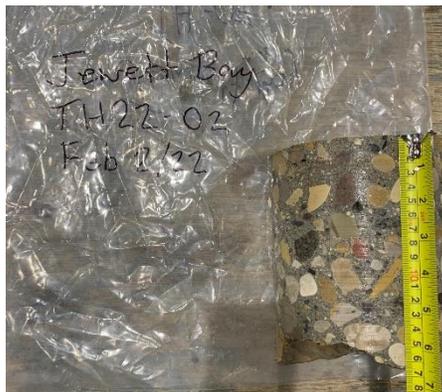


Photo 5: TH22-02 Jewett Bay core

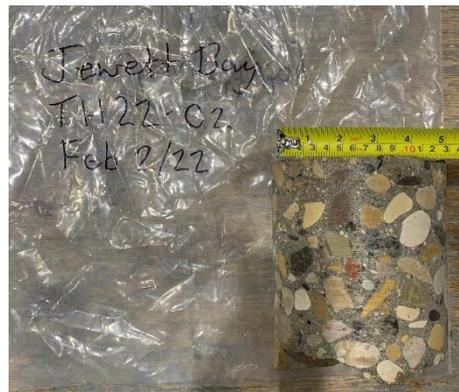


Photo 6: TH22-02 Jewett Bay core



Photo 7: TH22-02 Jewett Bay core



Photo 8: TH22-03 Jewett Bay core

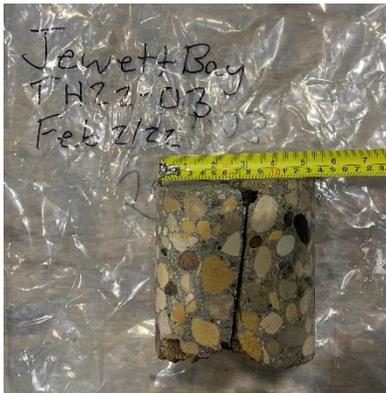


Photo 9: TH22-03 Jewett Bay core



Photo 10: TH22-03 Jewett Bay core

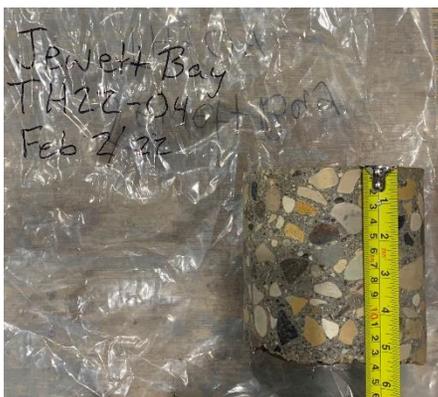


Photo 11: TH22-04 Jewett Bay core

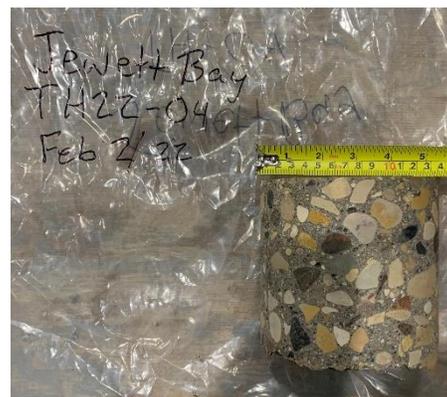


Photo 12: TH22-04 Jewett Bay core



**Photo 13: TH22-02 Jewett Bay core**

## SITE 2 – ASCOT BAY



Photo 1: TH22-01 Ascot Bay core

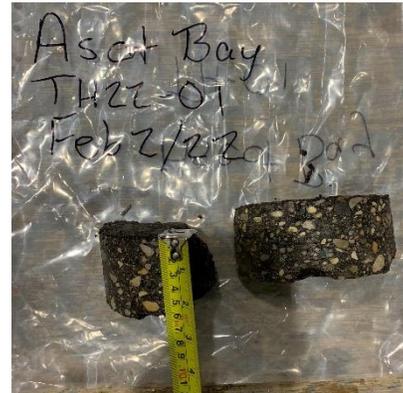


Photo 2: TH22-01 Ascot Bay core



Photo 3: TH22-01 Ascot Bay core



Photo 4: TH22-02 Ascot Bay core



Photo 5: TH22-02 Ascot Bay core



Photo 6: TH22-02 Ascot Bay core



Photo 7: TH22-03 Ascot Bay core



Photo 8: TH22-03 Ascot Bay core



Photo 9: TH22-03 Ascot Bay core



Photo 10: TH22-04 Ascot Bay core



Photo 11: TH22-04 Ascot Bay core



Photo 12: TH22-04 Ascot Bay core

SITE 3 – LINTON LANE



Photo 1: Th22-01 Linton Lane Street Core



Photo 2: Th22-01 Linton Lane Street Core



Photo 3: Th22-02 Linton Lane Street Core

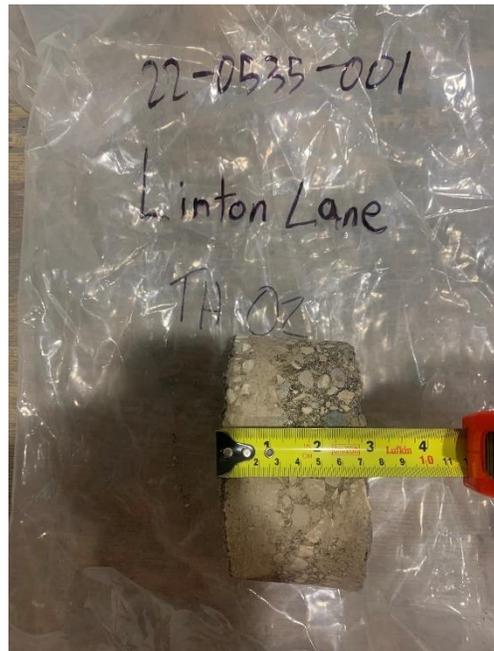


Photo 4: Th22-02 Linton Lane Street Core

## SITE 4 – CARPATHIA ROAD



Photo 1: TH22-01 Carpathia Rd. Core



Photo 2: TH22-01 Carpathia Rd. Core



Photo 3: TH22-02 Carpathia Rd. Core



Photo 4: TH22-02 Carpathia Rd. Core



Photo 5: TH22-03 Carpathia Rd. Core



Photo 6: TH22-03 Carpathia Rd. Core



Photo 7: TH22-04 Carpathia Rd. Core



Photo 8: TH22-04 Carpathia Rd. Core



Photo 9: TH22-05 Carpathia Rd. Core



Photo 10: TH22-05 Carpathia Rd. Core

### SITE 5 – RENFREW STREET



Photo 1: TH22-01 Renfrew Street core

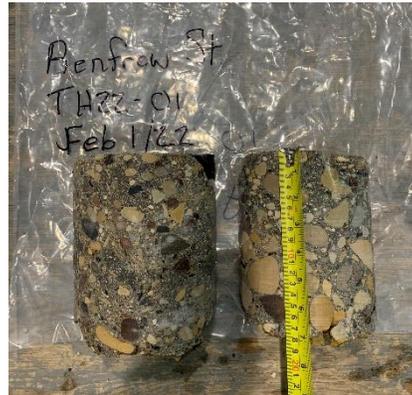


Photo 2: TH22-01 Renfrew Street core



Photo 3: TH22-01 Renfrew Street core



Photo 4: TH22-01 Renfrew Street core



Photo 5: TH22-02 Renfrew Street core

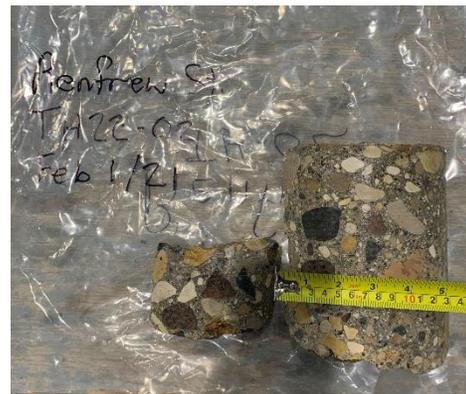


Photo 6: TH22-02 Renfrew Street core



Photo 7: TH22-02 Renfrew Street core



Photo 8: TH22-02 Renfrew Street core

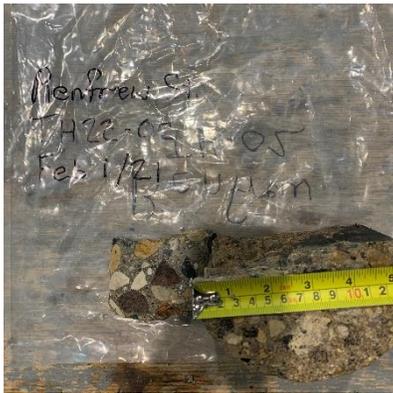


Photo 9: TH22-02 Renfrew Street core

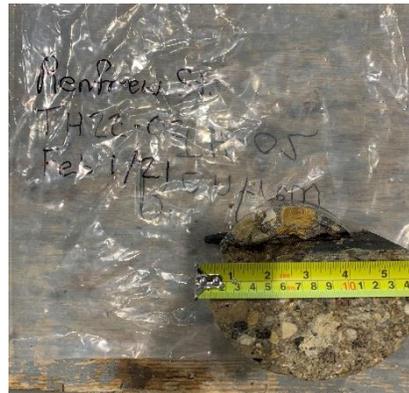


Photo 10: TH22-02 Renfrew Street core



Photo 11: TH22-03 Renfrew Street core



Photo 12: TH22-03 Renfrew Street core

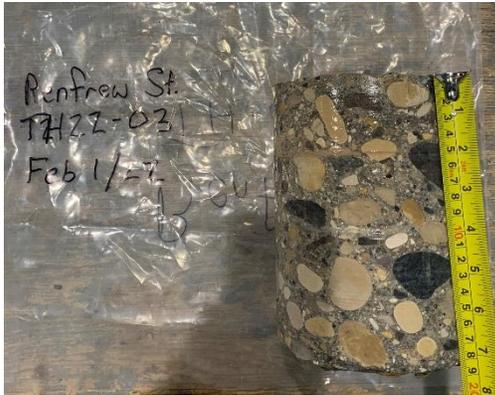


Photo 13: TH22-03 Renfrew Street core

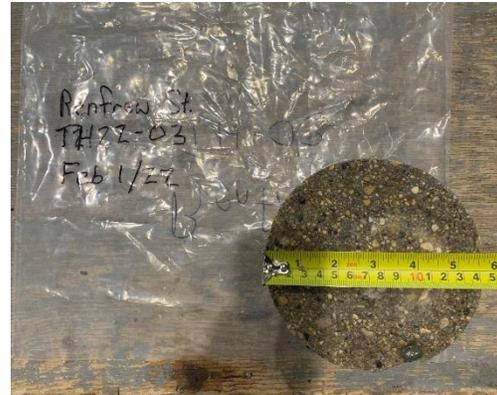


Photo 14: TH22-03 Renfrew Street core



Photo 15: TH22-04 Renfrew Street core



Photo 16: TH22-04 Renfrew Street core



Photo 17: TH22-04 Renfrew Street core



Photo 18: TH22-04 Renfrew Street core



Photo 19: TH22-05 Renfrew Street core



Photo 20: TH22-05 Renfrew Street core

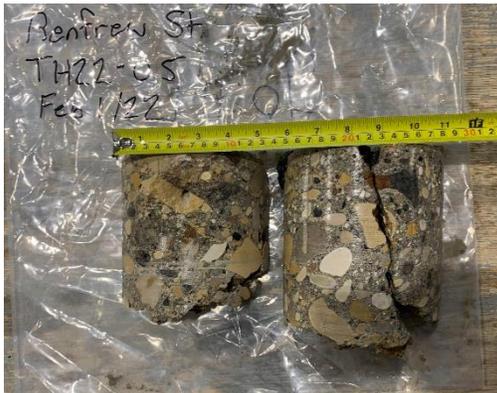


Photo 21: TH22-05 Renfrew Street core



Photo 22: TH22-05 Renfrew Street core



Photo 23: TH22-05 Renfrew Street core



Photo 24: TH22-06 Renfrew Street core



Photo 25: TH22-06 Renfrew Street core

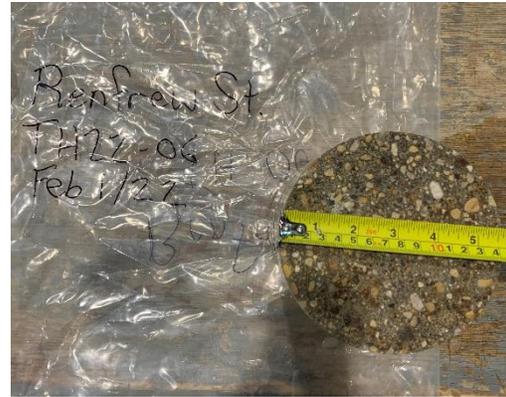


Photo 26: TH22-06 Renfrew Street core

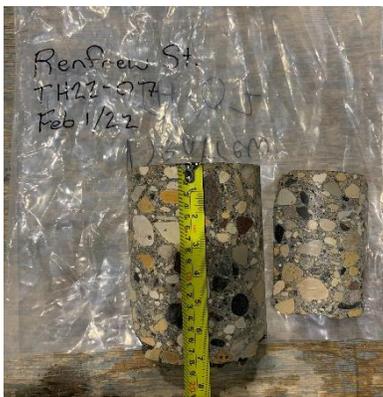


Photo 27: TH22-07 Renfrew Street core



Photo 28: TH22-07 Renfrew Street core



Photo 29: TH22-07 Renfrew Street core



Photo 30: TH22-07 Renfrew Street core



Photo 31: TH22-07 Renfrew Street core



Photo 32: TH22-07 Renfrew Street core



Photo 33: TH22-08 Renfrew Street core



Photo 34: TH22-08 Renfrew Street core



Photo 35: TH22-08 Renfrew Street core

### SITE 6 – CAMPBELL STREET

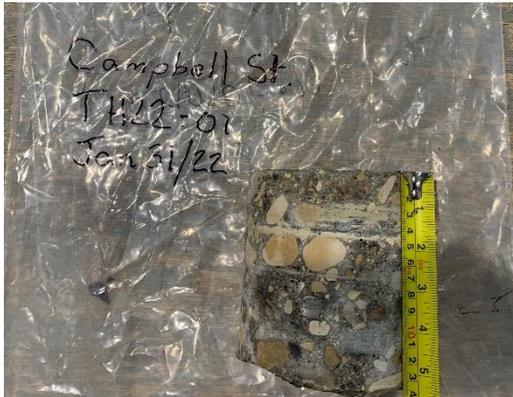


Photo 1: TH22-01 Campbell Street core

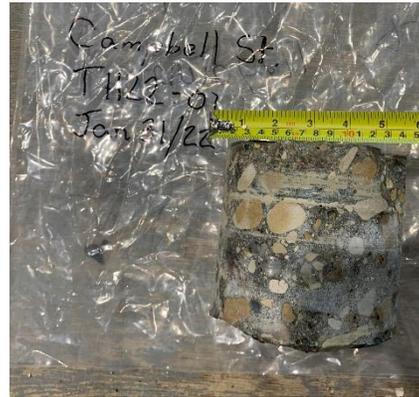


Photo 2: TH22-01 Campbell Street core

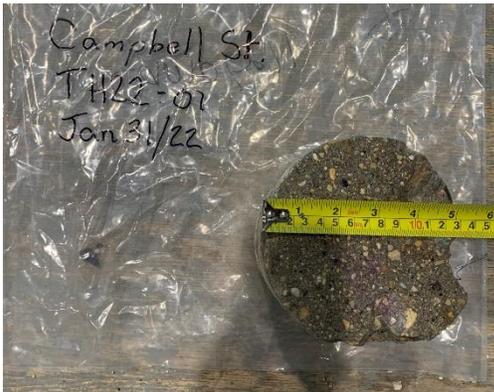


Photo 3: TH22-01 Campbell Street core

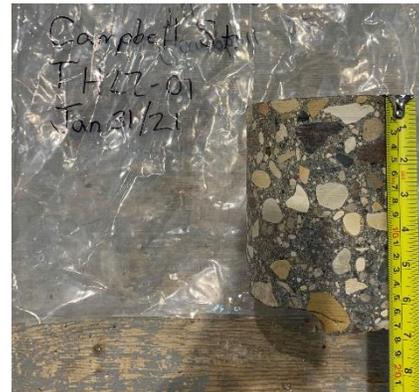


Photo 4: TH22-02 Campbell Street core

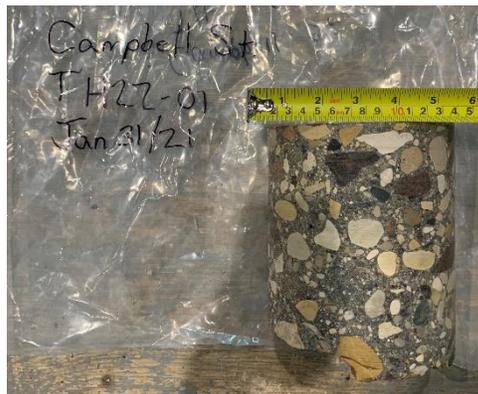


Photo 5: TH22-02 Campbell Street core



Photo 6: TH22-02 Campbell Street core



Photo 7: TH22-03 Campbell Street core



Photo 8: TH22-03 Campbell Street core

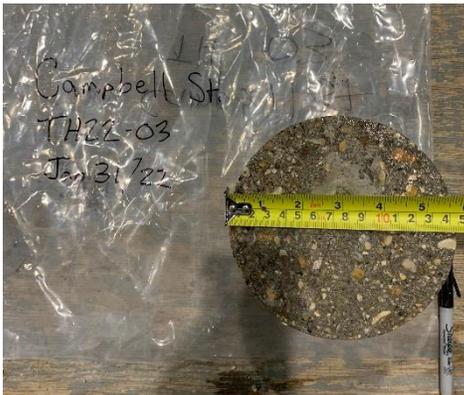


Photo 9: TH22-03 Campbell Street core



Photo 10: TH22-04 Campbell Street core



Photo 11: TH22-04 Campbell Street core



Photo 12: TH22-04 Campbell Street core

### SITE 7 – BROCK STREET



Photo 1: TH22-01 Brock Street core



Photo 2: TH22-01 Brock Street core



Photo 3: TH22-01 Brock Street core

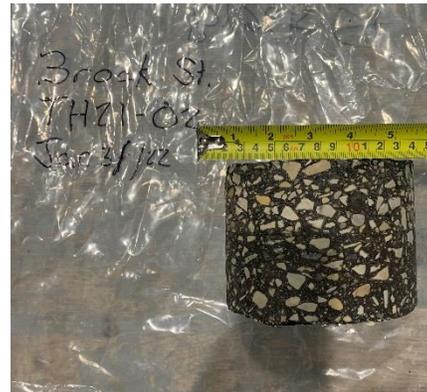


Photo 4: TH22-02 Brock Street core



Photo 5: TH22-02 Brock Street core



Photo 6: TH22-03 Brock Street core

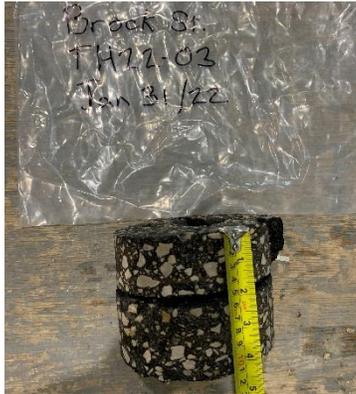


Photo 7: TH22-03 Brock Street core



Photo 8: TH22-03 Brock Street core



Photo 9: TH22-04 Brock Street core

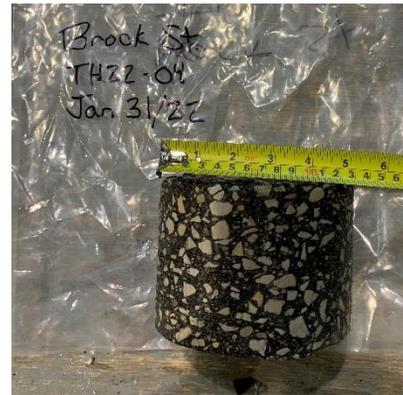


Photo 10: TH22-04 Brock Street core



Photo 11: TH22-04 Brock Street core

### SITE 8 – BISCAYNE BAY

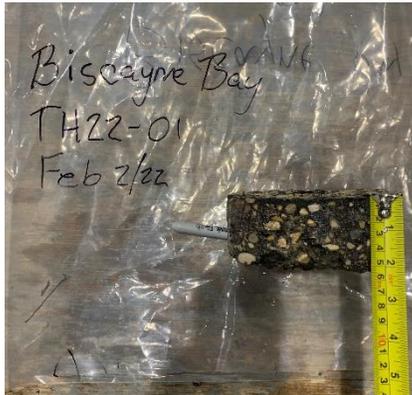


Photo 1: TH22-01 Biscayne Bay core

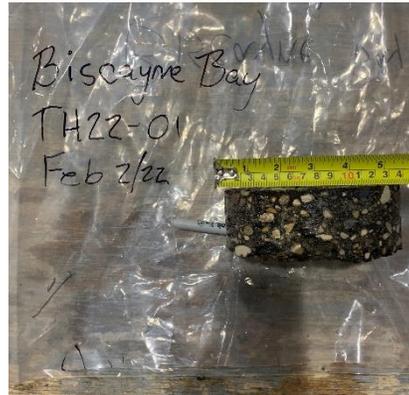


Photo 2: TH22-01 Biscayne Bay core

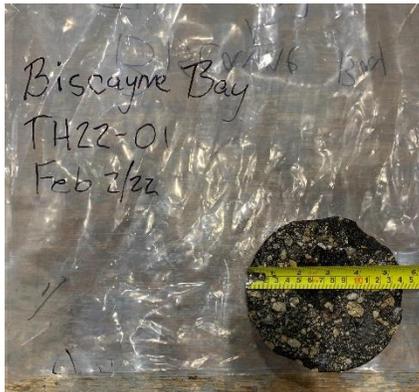


Photo 3: TH22-01 Biscayne Bay core



Photo 4: TH22-02 Biscayne Bay core



Photo 5: TH22-02 Biscayne Bay core

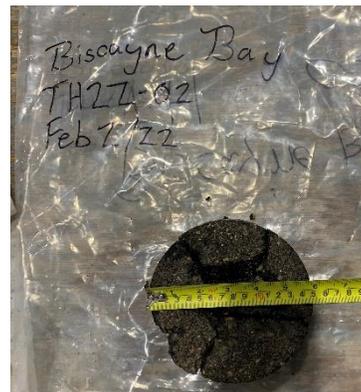


Photo 6: TH22-02 Biscayne Bay core



Photo 7: TH22-03 Biscayne Bay core



Photo 8: TH22-03 Biscayne Bay core



Photo 9: TH22-03 Biscayne Bay core