APPENDIX ‘A’

GEOTECHNICAL REPORT

APPENDIX 'A' - GEOTECHNICAL REPORT

The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. However, variations in pavement structure may exist between test holes and fluctuations in groundwater levels can be expected seasonally and may occur as a result of construction activities. The nature and extent of variations may not become evident until construction commences.

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

The field and laboratory test results, as shown for each hole, are described below.

1. NATURAL MOISTURE CONTENT

The relationship between the natural moisture content and depth is significant in determining the subsurface moisture conditions. The Atterberg Limits for a sample should be compared to its natural moisture content and plotted on the Plasticity Chart in order to determine the soil classification.

2. SOIL PROFILE AND DESCRIPTION

Each soil stratum is classified and described noting any special conditions. The Modified Unified Classification System (MUCS) is used. The soil profile refers to the existing ground level at the time the hole was done. Where available, the ground elevation is shown. The soil symbols used are shown in detail on the soil classification chart.

3. TESTS ON SOIL SAMPLES

Laboratory and field tests are identified by the following and are on the logs:

N - Standard Penetration Test (SPT) Blow Count. The SPT is conducted in the field to assess the in-situ consistency of cohesive soils and the relative density of non-cohesive soils. The N value recorded is the number of blows from a 63.5 kg hammer dropped 760 mm which is required to drive a 51 mm split spoon sampler 300 mm into the soil.

SO_4 - Water Soluble Sulphate Content. Expressed in percent. Conducted primarily to determine requirements for the use of sulphate resistant cement. Further details on the water-soluble sulphate content are given in Section 6.

γ_D - Dry Unit Weight. Usually expressed in kN/m^3.

γ_T - Total Unit Weight. Usually expressed in kN/m^3.

Q_U - Unconfined Compressive Strength. Usually expressed in kPa and may be used in determining allowable bearing capacity of the soil.

C_U - Undrained Shear Strength. Usually expressed in kPa. This value is determined by either a direct shear test or by an unconfined compression test and may also be used in determining the allowable bearing capacity of the soil.

C_{PEN} - Pocket Penetrometer Reading. Usually expressed in kPa. Estimate of the undrained shear strength as determined by a pocket penetrometer.

The following tests may also be performed on selected soil samples and the results are given on separate sheets enclosed with the logs:

- Grain Size Analysis
- Standard or Modified Proctor Compaction Test
- California Bearing Ratio Test
- Direct Shear Test
- Permeability Test
- Consolidation Test
- Triaxial Test

4. SOIL DENSITY AND CONSISTENCY

The SPT test described above may be used to estimate the consistency of cohesive soils and the density of cohesionless soils. These approximate relationships are summarized in the following tables:

Table 1 Cohesive Soils

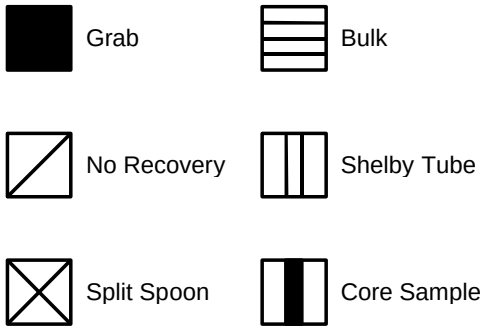
N	Consistency	C_u (kPa) approx.
0 - 1	Very Soft	<10
1 - 4	Soft	10 - 25
4 - 8	Firm	25 - 50
8 - 15	Stiff	50 - 100
15 - 30	Very Stiff	100 - 200
30 - 60	Hard	200 - 300
>60	Very Hard	>300

Table 2 Cohesionless Soils

N	Density
0 - 5	Very Loose
5 - 10	Loose
10 - 30	Compact
30 - 50	Dense
>50	Very Dense

5. SAMPLE CONDITION AND TYPE

The depth, type, and condition of samples are indicated on the logs by the following symbols:



6. WATER SOLUBLE SULPHATE CONCENTRATION

The following table, from CSA Standard A23.1-14, indicates the requirements for concrete subjected to sulphate attack based upon the percentage of water-soluble sulphate as presented on the logs. CSA Standard A23.1-14 should be read in conjunction with the table.

Table 3 Requirements for Concrete Subjected to Sulphate Attack*

Class of exposure	Degree of exposure	Water-soluble sulphate (SO_4)† in soil sample, %	Sulphate (SO_4) in groundwater samples, mg/L‡	Water soluble sulphate (SO_4) in recycled aggregate sample, %	Cementing materials to be used§††	Performance requirements§,§§		
						Maximum expansion when tested using CSA A3004-C8 Procedure A at 23 °C, %		Maximum expansion when tested using CSA A3004-C8 Procedure B at 5 °C, % †††
						At 6 months	At 12 months††	At 18 months‡‡
S-1	Very severe	> 2.0	> 10 000	> 2.0	HS** ,HSb, HSLb*** or HSe	0.05	0.10	0.10
S-2	Severe	0.20–2.0	1500–10 000	0.60–2.0	HS**, HSb, HSLb*** or HSe	0.05	0.10	0.10
S-3	Moderate (including seawater exposure*)	0.10–0.20	150–1500	0.20–0.60	MS, MSb, MSe, MSLb***, LH, LHb, HS**, HSb, HSLb*** or HSe	0.10		0.10

*For sea water exposure, also see Clause 4.1.1.5.
†In accordance with CSA A23.2-3B.
‡In accordance with CSA A23.2-2B.
§Where combinations of supplementary cementing materials and portland or blended hydraulic cements are to be used in the concrete mix design instead of the cementing materials listed, and provided they meet the performance requirements demonstrating equivalent performance against sulphate exposure, they shall be designated as MS equivalent (MSe) or HS equivalent (HSe) in the relevant sulphate exposures (see Clauses 4.1.1.6.2, 4.2.1.1, and 4.2.1.3, and 4.2.1.4).
**Type HS cement shall not be used in reinforced concrete exposed to both chlorides and sulphates, including seawater. See Clause 4.1.1.6.3.

††The requirement for testing at 5 °C does not apply to MS, HS, MSb, HSb, and MSe and HSe combinations made without portland limestone cement.
‡‡ If the increase in expansion between 12 and 18 months exceeds 0.03%, the sulphate expansion at 24 months shall not exceed 0.10% in order for the cement to be deemed to have passed the sulphate resistance requirement.
§§For demonstrating equivalent performance, use the testing frequency in Table 1 of CSA A3004-A1 and see the applicable notes to Table A3 in A3001 with regard to re-establishing compliance if the composition of the cementing materials used to establish compliance changes.
***Where MSLb or HSLb cements are proposed for use, or where MSe or HSe combinations include Portland-limestone cement, they must also contain a minimum of 25% Type F fly ash or 40% slag or 15% metakaolin (meeting Type N pozzolan requirements) or a combination of 5% Type SF silica fume with 25% slag or a combination of 5% Type SF silica fume with 20% Type F fly ash. For some proposed MSLb, HSLb, and MSe or HSe combinations that include Portland-limestone cement, higher SCM replacement levels may be required to meet the A3004-C8 Procedure B expansion limits. Due to the 18-month test period, SCM replacements higher than the identified minimum levels should also be tested. In addition, sulphate resistance testing shall be run on MSLb and HSLb cement and MSe or HSe combinations that include Portland-limestone cement at both 23 °C and 5 °C as specified in the table.
†††If the expansion is greater than 0.05% at 6 months but less than 0.10% at 1 year, the cementing materials combination under test shall be considered to have passed.

7. SOIL CORROSIVITY

The following table, from the Handbook of Corrosion Engineering (Roberge, 1999) indicates the corrosivity rating can be obtained from the soil resistivity, presented on the logs.

Table 4 Corrosivity Ratings Based on Soil Resistivity

Soil Resistivity (ohm-cm)	Corrosivity Rating
>20,000	Essentially non-corrosive
10,000 – 20,000	Mildly corrosive
5,000 – 10,000	Moderately corrosive
3,000 – 5,000	Corrosive
1,000 – 3,000	Highly corrosive
<1,000	Extremely corrosive

8. GROUNDWATER TABLE

The groundwater table is indicated by the equilibrium level of water in a standpipe installed in a testhole or test pit. This level is generally taken at least 24 hours after installation of the standpipe. The groundwater level is subject to seasonal variations and is usually highest in the spring. The symbol on the logs indicating the groundwater level is an inverted solid triangle (▼).

TABLE 1 Soil Classification Chart

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
COARSE-GRAINED SOILS	Gravels (More than 50 % of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5 % fines[C])	Cu ≥ 4.0 and 1 ≤ Cc ≤ 3.0[D]	GW	Well-graded gravel[E]
			Cu < 4.0 and/or [Cc < 1 or Cc > 3.0][D]	GP	Poorly graded gravel[E]
		Gravels with Fines (More than 12 % fines[C])	Fines classify as ML or MH	GM	Silty gravel[E,F,G]
			Fines classify as CL or CH	GC	Clayey gravel[E,F,G]
More than 50 % retained on No. 200 sieve	Sands (50 % or more of coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5 % fines[H])	Cu ≥ 6.0 and 1.0 ≤ Cc ≤ 3.0[D]	SW	Well-graded sand[I]
			Cu < 6.0 and/or [Cc < 1.0 or Cc > 3.0][D]	SP	Poorly graded sand[I]
		Sands with Fines (More than 12 % fines[H])	Fines classify as ML or MH	SM	Silty sand[F,G,I]
			Fines classify as CL or CH	SC	Clayey sand[F,G,I]
FINE-GRAINED SOILS	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	$\frac{\text{Liquid limit – oven dried}}{\text{Liquid limit – not dried}} < 0.75$	OL	Organic clay[K,L,M,N] / Organic silt[K,L,M,O]
50 % or more passes the No. 200 sieve	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	$\frac{\text{Liquid limit – oven dried}}{\text{Liquid limit – not dried}} < 0.75$	OH	Organic clay[K,L,M,P] / Organic silt[K,L,M,Q]
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12 % fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
[D] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[E] If soil contains ≥15 % sand, add "with sand" to group name.
[F] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[G] If fines are organic, add "with organic fines" to group name.
[H] Sands with 5 to 12 % fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
[I] If soil contains ≥15 % gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to <30 % plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥30 % plus No. 200, predominantly sand, add "sandy" to group name.
[M] If soil contains ≥30 % plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.

C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
C702 Practice for Reducing Samples of Aggregate to Testing Size
D653 Terminology Relating to Soil, Rock, and Contained Fluids
D1140 Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing
D2216 Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
D2488 Practice for Description and Identification of Soils (Visual-Manual Procedures)
D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
D4083 Practice for Description of Frozen Soils (Visual-Manual Procedure)
D4318 Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
D4427 Classification of Peat Samples by Laboratory Testing

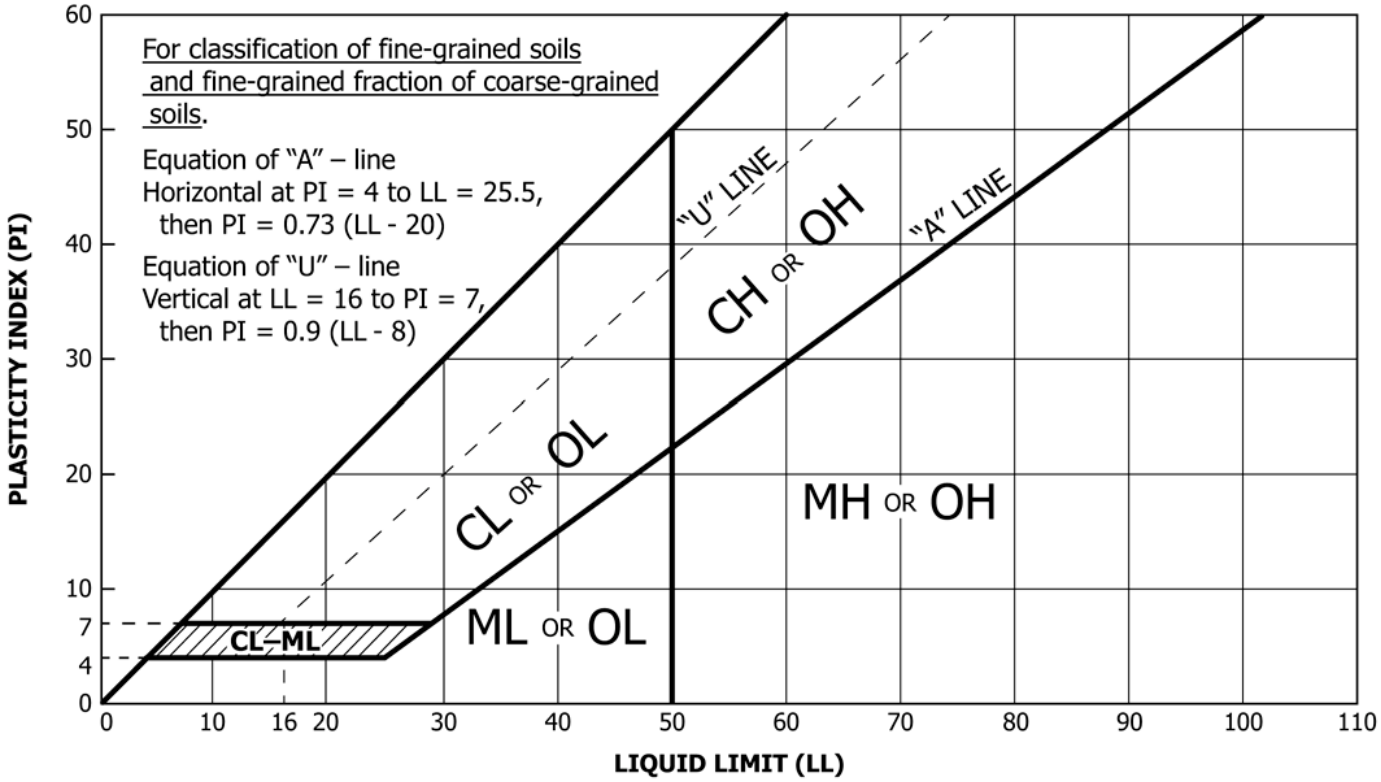
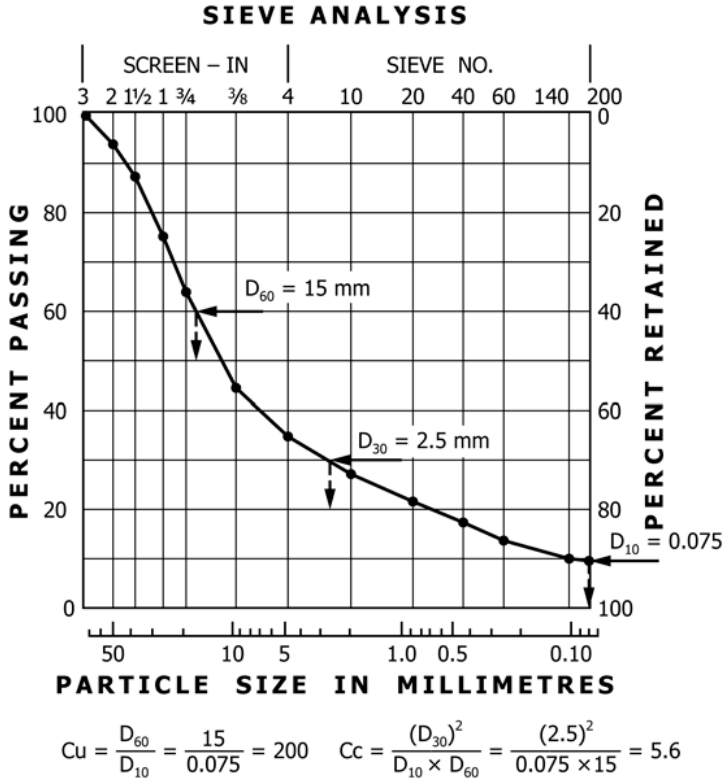


FIG. 4 Plasticity Chart



$$Cu = \frac{D_{60}}{D_{10}} = \frac{15}{0.075} = 200 \qquad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}} = \frac{(2.5)^2}{0.075 \times 15} = 5.6$$

FIG. 5 Cumulative Particle-Size Plot

Site Investigation Requirements for Public Works Street Projects

General

This guideline provides basic principles and requirements for site investigations and testing with which to guide the designer in the preparation of proposals and completion of their investigations. Irrespective of the requirements listed in this document, it is important that the Engineer clearly outlines what assumptions were made in estimating the effort and resources necessary to complete the scope of work. A proposal should be submitted for approval to the City's Project Manager.

When using this guideline, the designer remains responsible for the proposed plan in accordance to good engineering standards that address the specific needs and site conditions of the project. Without limiting that broad and general obligation, this guideline should be the minimum requirement.

Boreholes and pavement core spacing, and material testing guidelines presented in this guide are only applicable to pavement investigations. Site investigation and testing may also be conducted as per common industry practice for other road elements such as sidewalks, boulevards, and medians. The City's Project Manager should be notified of any unusual conditions or difficulties encountered, and any changes made in the investigation program.

New Construction and Reconstruction Projects

The number of boreholes can be calculated using Table 1.

Table 1 : Number of Boreholes and Depths

Lanes/Locals	Industrials and Collectors	Arterials
Number of boreholes = 0.1 × (Street area (m^2))$^{0.45}$ A minimum of two boreholes, 2 m ± 150 mm depth from the bottom of the proposed or the existing pavement per project location.	Number of boreholes = 0.1 × (Street area (m^2))$^{0.46}$ A minimum of three boreholes, 2.5 m ± 150 mm depth from the bottom of the proposed or the existing pavement per project location.	Number of boreholes = 0.1 × (Street area (m^2))$^{0.48}$ A minimum of three boreholes, 2.5 m ± 150 mm depth from the bottom of the proposed or the existing pavement per project location.

[1]If previous soil information is available and relevant, the number of boreholes can be reduced - confirm with the City's Project Manager.
[2]Additional boreholes should be undertaken where adverse soil conditions are expected or encountered during the course of field drilling.

Offset the boreholes as appropriate to provide coverage across the full width of the proposed construction. Boreholes should not be advanced on utility cut patching. The locations of the boreholes should be shown clearly on a scaled plan map of the site under investigation.

The following factors should be considered while selecting borehole locations:

- Visual sub-grade variability;
- Significant pavement failures (rutting, fatigue cracking, settlement and faulting) which are often associated with sub-grade issues to diagnose the cause of these conditions; and,
- Exiting buried infrastructure.

Information regarding the sampler type, date and time of sampling, sample type and color, sample depth, ground water elevations, boreholes location, etc. should be shown in log form using notations and a graphical system. The log form should distinguish between visual evaluations of soil samples in the field versus a more precise laboratory evaluation supported by tests. Detailed boring logs including the results of laboratory tests should be included in the geotechnical report.

Measure and identify pavement materials (thickness and types of pavement structure materials). Photograph core samples recovered from the pavement surface (concrete, asphalt or composite).

Visual identification of the soil must be reported at the following depths from the bottom of the proposed or the existing pavement – 0.6 m, 0.9 m, 1.2 m, 1.6 m, 2.0 m, and 2.5 m (if required). Ensure that each soil type encountered in the boreholes is identified. The visual identification should describe the existing pavement structure, if any, including the materials encountered and the layer thicknesses.

Backfill boreholes with granular fill. Patch pavement surface with an approved cold patch asphalt or rapid set cementitious product to match the surface pavement type.

Where significant embankments are proposed along the roadway, specific testing and recommendations for the fill materials and placement should be made including expected settlements, load compensation requirements, and potential buoyancy of the embankment. The size, complexity and extent of the testing program will depend primarily on the type, height and size of embankment as well as the expected imported soil conditions – confirm with the City's Project Manager.

For embankments less than 100 m in length, a minimum of two boreholes are required. For embankments more than 100 m in length, the spacing between boreholes along the length of the embankment should not exceed 75 m with a minimum of two (2) boreholes. Extend the boreholes depths to a minimum of 2 m $\pm$ 150 mm below the proposed sub-grade level. At critical locations and where embankment heights exceed 1.0 m, a minimum of two (2) boreholes are required in the transverse direction to define the existing geological conditions for stability analyses.

Laboratory Testing Program

Determine the moisture content of the soils encountered in every borehole in accordance with ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass, at the following depths from the bottom of the proposed or existing pavement – 0.6 m, 0.9 m, 1.2 m, 1.6 m, 2.0 m, and 2.5 m (if required).

Classify and test the anticipated sub-grade soil in accordance with Table 2. The sub-grade soil is the material on which the pavement structure will be built; 0.6 m, 0.9 m, and 1.2 m may be used for locals, collectors, and arterials, respectively – confirm with the City's Project Manager.

Table 2: Boreholes Testing Frequency

Lanes/Locals	Collectors	Arterials
Number of boreholes = 0.1 × (Street area (m^2))$^{0.4}$ A minimum of two boreholes should be tested per project location.	Number of boreholes = 0.1 × (Street area (m^2))$^{0.41}$ A minimum of three boreholes should be tested per project location.	Number of boreholes = 0.1 × (Street area (m^2))$^{0.42}$ A minimum of three boreholes should be tested per project location.

The testing program should include:

- Particle Size Analysis – ASTM D6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis and ASTM D7928 Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis;
- Atterberg Limits – ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; and,
- California Bearing Ratio (CBR) – ASTM D1883 Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils. CBR test shall be performed at 95 % maximum dry density and optimum water content. All samples shall be soaked prior to testing.

The sub-grade classification should be in accordance with:

- ASTM D3282 - Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes; and,
- ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes.

The designer should consider the site specific factors listed above for borehole locations while selecting testing location and frequency.

More advanced testing may be required depending upon site conditions including direct shear tests, triaxial tests, unconfined compressive tests, permeability tests, consolidation tests, point load tests, slaking tests, pinhole dispersion tests or other tests as deemed appropriate and justified by the designer – confirm with the City's Project Manager.

Rehabilitation Projects

For any rehabilitation projects (Concrete, Asphalt or Composite), measure and identify pavement materials (thickness and types of pavement structure materials). Photograph core samples recovered from the pavement.

For concrete rehabilitation projects, 150 mm-diameter cores shall be taken at joints to identify proper rehabilitation strategies (i.e. mill/fill, partial depth repair, full depth repair). The number and location of cores will be determined by the designer after visiting the site – confirm with the City's Project Manager. A minimum of two (2) cores shall be collected mid-slab to determine the existing pavement thickness and concrete strength in accordance with CSA A23.2-14C – wet condition.

Factors that should be considered while selecting pavement core locations include but are not limited to:

- Significant variation in joint condition;
- Pumping slabs, cracks or distress and perceived moisture issues from side slopes/edge cracking; and,
- Significant changes in pavement structure thickness.

Non-destructive testing (i.e. Falling Weight Deflectometer and Ground Penetrating Radar) can be used to identify layer thicknesses and structural adequacy, load transfer at joints, and appropriate rehabilitation strategies, including partial depth repairs, full depth repairs, slab replacement, and overlays – confirm with the City's Project Manager.

PROJECT: 2022 Local Streets Package No. 22-R-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH21-01B
LOCATION: 1388 Chancellor Dr. - 2.0 m W of E curb		PROJECT NO.: 60672214
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Track Rig - 125 mm SSA	ELEVATION (m):

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

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS / UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0	ASPH		ASPHALT (200 mm)						
	FILL		GRANULAR FILL (50 mm) - sandy, gravelly - brown, frozen						
			CLAY - brown, firm, moist - intermediate to high plasticity - soft below 1.5 m		G1				
					G2				
1	CL				G3 B1			(G3): Gravel 0.0%, Sand 4.8%, Silt 65.6%, Clay 29.6% (B1) Soaked CBR: 3.5%, SPMDD: 1721 kg/m3, OMC: 18.4%	1
					G4				
			- moist to wet below 1.5 m		G5				
			CLAY - brown, firm, moist - high plasticity						
2	CH								2
					G6				
			END OF TEST HOLE AT 2.59 m IN CLAY Notes: 1. No seepage observed during augering. 2. No sloughing observed during augering. 3. Test hole backfilled with auger cuttings, bentonite chips and asphalt patch to original ground surface.						
3									3
4									4
5									

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

LOG OF TEST HOLE 2022-01-24- CHANCELLOR (AUGUSTA - QUINCY BAY).GPJ UMA WINN.GDT 3/23/22

AECOM

LOGGED BY: Enrico Manimbao	COMPLETION DEPTH: 2.59 m
REVIEWED BY: Ryan Harras	COMPLETION DATE: 12/22/21
PROJECT ENGINEER: Thomas Findlay	Page 1 of 1

PROJECT: 2022 Local Streets Package No. 22-R-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH21-02B
LOCATION: 1419 Chancellor Dr. - 3.4 m E of W curb		PROJECT NO.: 60672214
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Track Rig - 125 mm SSA	ELEVATION (m):

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

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	ASPH		ASPHALT (280 mm)					
			CLAY - grey, firm, moist - high plasticity		G1			
					G2		(G2): Gravel 0.0%, Sand 1.6%, Silt 19.7%, Clay 78.7%	
1					G3			1
			- brown below 1.2 m		G4			
	CH				G5			
2								2
					G6			
			END OF TEST HOLE AT 2.59 m IN CLAY Notes: 1. No seepage observed during augering. 2. No sloughing observed during augering. 3. Test hole backfilled with auger cuttings, bentonite chips and asphalt patch to original ground surface.					
3								3
4								4
5								

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: Enrico Manimbao	COMPLETION DEPTH: 2.59 m
REVIEWED BY: Ryan Harras	COMPLETION DATE: 12/22/21
PROJECT ENGINEER: Thomas Findlay	Page 1 of 1

LOG OF TEST HOLE 2022-01-24- CHANCELLOR (AUGUSTA - QUINCY BAY).GPJ UMA WINN.GDT 3/23/22

PROJECT: 2022 Local Streets Package No. 22-R-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH21-03B
LOCATION: 1454 Chancellor Dr. - 2.8 m S of N curb		PROJECT NO.: 60672214
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Track Rig - 125 mm SSA	ELEVATION (m):

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

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	ASPH		ASPHALT (230 mm)					
	FILL		CLAY (Fill) - dark grey, frozen		G1			
	CL		CLAY - brown, soft to firm, moist - low plasticity		G2			
1					G3			1
					G4			
					G5			
2								2
	CH		CLAY - brown, firm, moist - high plasticity		G6			
3			END OF TEST HOLE AT 2.59 m IN CLAY Notes: 1. No seepage observed during augering. 2. No sloughing observed during augering. 3. Test hole backfilled with auger cuttings, bentonite chips and asphalt patch to original ground surface.					3
4								4
5								

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

LOGGED BY: Enrico Manimbao	COMPLETION DEPTH: 2.59 m
REVIEWED BY: Ryan Harras	COMPLETION DATE: 12/22/21
PROJECT ENGINEER: Thomas Findlay	Page 1 of 1

AECOM

LOG OF TEST HOLE 2022-01-24- CHANCELLOR (AUGUSTA - QUINCY BAY).GPJ UMA WINN.GDT 3/23/22

PROJECT: 2022 Local Streets Package No. 22-R-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH21-04B
LOCATION: 1480 Chancellor Dr. - 2.6 m S of N curb		PROJECT NO.: 60672214
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Track Rig - 125 mm SSA	ELEVATION (m):

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

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	ASPH		ASPHALT (280 mm)					
	FILL		GRANULAR FILL (150 mm) - sandy, gravelly - brown, frozen		G1			
			CLAY - dark grey, firm, moist - high plasticity		G2			
			- brown below 0.8 m		G3 B2		(B2) Soaked CBR: 2.5%, SPMDD: 1545 kg/m3, OMC: 23.6%	
1					G4		(G4): Gravel 0.0%, Sand 1.6%, Silt 25.5%, Clay 72.9%	1
	CH				G5			
2								2
					G6			
3			END OF TEST HOLE AT 2.59 m IN CLAY Notes: 1. No seepage observed during augering. 2. No sloughing observed during augering. 3. Test hole backfilled with auger cuttings, bentonite chips and asphalt patch to original ground surface.					3
4								4
5								

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

LOG OF TEST HOLE 2022-01-24- CHANCELLOR (AUGUSTA - QUINCY BAY).GPJ UMA WINN.GDT 3/23/22

AECOM

LOGGED BY: Enrico Manimbao	COMPLETION DEPTH: 2.59 m
REVIEWED BY: Ryan Harras	COMPLETION DATE: 12/22/21
PROJECT ENGINEER: Thomas Findlay	Page 1 of 1

PROJECT: 2022 Local Streets Package No. 22-R-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH21-01E
LOCATION: 7 Lakeshore Rd. - 1.8 m E of W curb		PROJECT NO.: 60672214
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Track Rig - 125 mm SSA	ELEVATION (m):

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)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	ASPH		ASPHALT (280 mm)					
	FILL		GRANULAR FILL (330 mm) - sandy, gravelly - brown, moist		G1			
			CLAY - brown, firm, moist - high plasticity		G2			
1					G3 B1		(B1) Soaked CBR: 1.9%, SPMDD: 1455 kg/m3, OMC: 27.4% (G4): Gravel 0.0%, Sand 0.2%, Silt 14.3%, Clay 85.5%	1
					G4			
	CH				G5			
2								2
					G6			
			END OF TEST HOLE AT 2.59 m IN CLAY Notes: 1. No seepage observed during augering. 2. No sloughing observed during augering. 3. Test hole backfilled with auger cuttings, bentonite chips and asphalt patch to original ground surface.					
3								3
4								4
5								

AECOM

LOGGED BY: Enrico Manimbao	COMPLETION DEPTH: 2.59 m
REVIEWED BY: Ryan Harras	COMPLETION DATE: 12/22/21
PROJECT ENGINEER: Thomas Findlay	Page 1 of 1

LOG OF TEST HOLE 2022-01-24- LAKESHORE (CHANCELLOR - CHANCELLOR).GPJ UMA WINN.GDT 3/21/22

PROJECT: 2022 Local Streets Package No. 22-R-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH21-02E
LOCATION: 50 Lakeshore Rd. - 1.1 m N of S curb		PROJECT NO.: 60672214
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Track Rig - 125 mm SSA	ELEVATION (m):

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

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	ASPH		ASPHALT (280 mm)					
	FILL		GRANULAR FILL (305 mm) - sandy, gravelly - brown, moist		G1			
	CL		CLAY - trace organics - dark grey, firm, moist - low plasticity		G2			
1	CL-CH		CLAY - brown, firm, moist - low to high plasticity		G3		(G3): Gravel 0.0%, Sand 7.6%, Silt 43.2%, Clay 49.2%	1
	CH		CLAY - brown, firm, moist - high plasticity		G4			
					G5			
2								2
					G6			
			END OF TEST HOLE AT 2.59 m IN CLAY Notes: 1. No seepage observed during augering. 2. No sloughing observed during augering. 3. Test hole backfilled with auger cuttings, bentonite chips and asphalt patch to original ground surface.					
3								3
4								4
5								

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: Enrico Manimbao	COMPLETION DEPTH: 2.59 m
	REVIEWED BY: Ryan Harras	COMPLETION DATE: 12/22/21
	PROJECT ENGINEER: Thomas Findlay	Page 1 of 1

LOG OF TEST HOLE 2022-01-24- LAKESHORE (CHANCELLOR - CHANCELLOR).GPJ UMA WINN.GDT 3/21/22

PROJECT: 2022 Local Streets Package No. 22-R-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH21-03E
LOCATION: 83 Lakeshore Rd. - 2.4 m S of N curb		PROJECT NO.: 60672214
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Track Rig - 125 mm SSA	ELEVATION (m):

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

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	ASPH		ASPHALT (280 mm)					
	FILL		GRANULAR FILL (150 mm) - sandy, gravelly - brown, moist		G1			
			CLAY - dark grey, firm, moist - high plasticity		G2		(G2): Gravel 0.0%, Sand 6.6%, Silt 31.2%, Clay 62.2%	
1					G3 B2		(B2) Soaked CBR: 3.2%, SPMDD: 1510 kg/m3, OMC: 25.4%	1
					G4			
	CH		- brown below 1.4 m		G5			
2								2
					G6			
			END OF TEST HOLE AT 2.59 m IN CLAY Notes: 1. No seepage observed during augering. 2. No sloughing observed during augering. 3. Test hole backfilled with auger cuttings, bentonite chips and asphalt patch to original ground surface.					
3								3
4								4
5								

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: Enrico Manimbao	COMPLETION DEPTH: 2.59 m
	REVIEWED BY: Ryan Harras	COMPLETION DATE: 12/22/21
	PROJECT ENGINEER: Thomas Findlay	Page 1 of 1

LOG OF TEST HOLE 2022-01-24- LAKESHORE (CHANCELLOR - CHANCELLOR).GPJ UMA WINN.GDT 3/21/22

PROJECT: 2022 Local Streets Package No. 22-R-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH21-04E
LOCATION: Lakeshore Rd. - 2.2 m S of N curb, 63.0 m W of Chancellor Dr.		PROJECT NO.: 60672214
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Track Rig - 125 mm SSA	ELEVATION (m):

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)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	ASPH		ASPHALT (230 mm)					
	FILL		GRANULAR FILL (130 mm) - sandy, gravelly - brown, frozen		G1			
			CLAY - brown, firm, moist - low plasticity		G2			
1					G3			1
	CH				G4		(G4): Gravel 0.0%, Sand 0.0%, Silt 11.3%, Clay 88.7%	
					G5			
2								2
					G6			
			END OF TEST HOLE AT 2.59 m IN CLAY Notes: 1. No seepage observed during augering. 2. No sloughing observed during augering. 3. Test hole backfilled with auger cuttings, bentonite chips and asphalt patch to original ground surface.					
3								3
4								4
5								

LOG OF TEST HOLE 2022-01-24- LAKESHORE (CHANCELLOR - CHANCELLOR).GPJ UMA WINN.GDT 3/21/22

AECOM

LOGGED BY: Enrico Manimbao	COMPLETION DEPTH: 2.59 m
REVIEWED BY: Ryan Harras	COMPLETION DATE: 12/22/21
PROJECT ENGINEER: Thomas Findlay	Page 1 of 1

PROJECT: 2022 Local Streets Package No. 22-R-02	CLIENT: City of Winnipeg	TESTHOLE NO: TH21-01F
LOCATION: 31 Lakeshore Rd. - 2.5 m E of W curb		PROJECT NO.: 60672214
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Track Rig - 125 mm SSA	ELEVATION (m):

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

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	COMMENTS	DEPTH
0	ASPH		ASPHALT (240 mm)					
	FILL		GRANULAR FILL (215 mm) - sandy, gravelly - brown, moist		G1			
	CL		CLAY - light brown, firm, moist - low plasticity		G2		(G2): Gravel 0.0%, Sand 4.0%, Silt 51.6%, Clay 44.4%	
1					G3			1
	CH		CLAY - brown, firm, moist - high plasticity		G4			
					G5			
2								2
					G6			
			END OF TEST HOLE AT 2.59 m IN CLAY Notes: 1. No seepage observed during augering. 2. No sloughing observed during augering. 3. Test hole backfilled with auger cuttings, bentonite chips and asphalt patch to original ground surface.					
3								3
4								4
5								

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

LOGGED BY: Enrico Manimbao	COMPLETION DEPTH: 2.59 m
REVIEWED BY: Ryan Harras	COMPLETION DATE: 12/22/21
PROJECT ENGINEER: Thomas Findlay	Page 1 of 1

AECOM

LOG OF TEST HOLE 2022-01-24- LAKESHORE (FRONTAGE).GPJ UMA WINN.GDT 3/21/22

City of Winnipeg

2022 Local and Industrial Street and Alley Renewal Program (22-R-02) - Geotechnical Investigation

Table 01 – Core Hole Summary – Briar Cliff Bay (Killarney Avenue to Killarney Avenue)

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-01A	2 Briar Cliff Bay – 2.9 m E of W Curb (Pavement Slab)	Asphalt	0											
		Concrete	150											
CH21-02A	15 Briar Cliff Bay – 2.1 m W of E Curb (Pavement Joint)	Asphalt	0											
		Concrete	0	No recovery. Specimen decomposed to granular and irretrievable										
CH21-03A	23 Briar Cliff Bay – 1.5 m W of E Curb (Pavement Slab)	Asphalt	0											
		Concrete	150											
CH21-04A	44 Briar Cliff Bay – 2.4 m E of W Curb (Pavement Slab)	Asphalt	0											
		Concrete	150											
CH21-05A	47 Briar Cliff Bay – 1.4 m E of W Curb (Pavement Slab)	Asphalt	0											
		Concrete	140											
CH21-06A	Between 44 and 54 Briar Cliff Bay – 2.4 m E of W Curb (Pavement Joint)	Asphalt	0											
		Concrete	0	No recovery. Specimen decomposed to granular and irretrievable										

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-07A	79 Briar Cliff Bay – 2.2 m E of W Curb (Pavement Slab)	Asphalt	0											
		Concrete	175											
CH21-08A	84 Briar Cliff Bay – 1.6 m W of E Curb (Pavement Joint)	Asphalt	0											
		Concrete	130	Partially recovered. Specimen decomposed to granular and irretrievable										
CH21-09A	99 Briar Cliff Bay – 2.3 m E of W Curb (Pavement Slab)	Asphalt	0											
		Concrete	150											
CH21-10A	102 Briar Cliff Bay – 1.9 m W of E Curb (Pavement Slab)	Asphalt	0											
		Concrete	150											
CH21-11A	111 Briar Cliff Bay – 2.0 m E of W Curb (Pavement Joint)	Asphalt	0											
		Concrete	130	Partially recovered. Specimen decomposed to granular and irretrievable										

* Subgrade Description based on ASTM D2487-17 in accordance with City of Winnipeg Site Investigation Requirements for Public Works Street Projects (January 2021)

City of Winnipeg

2022 Local and Industrial Street and Alley Renewal Program (22-R-02) - Geotechnical Investigation

Table 02 –Test Hole and Core Hole Summary – Chancellor Drive (Quincy Bay to Augusta Drive)

Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
TH21-01B	1388 Chancellor Dr. - 2.0 m W of E curb (Pavement Slab)	Asphalt	200		CLAY (CL)	0.3	17.8							
					CLAY (CL)	0.6	18.6							
		Concrete	0		CLAY (CL)	0.9	17.4	0.0	4.8	65.6	29.6	32.7	13.3	19.4
					CLAY (CL)	1.2	30.2							
		Granular Fill	50		CLAY (CL)	1.5	22.1							
					CLAY (CH)	2.4	45.3							
TH21-02B	1419 Chancellor Dr. - 3.4 m E of W curb (Pavement Slab)	Asphalt	280		CLAY (CH)	0.3	32.6							
					CLAY (CH)	0.6	31.2	0.0	1.6	19.7	78.7	77.7	24.4	53.3
		Concrete	0		CLAY (CH)	0.9	33.4							
					CLAY (CH)	1.2	38.0							
		Granular Fill	0		CLAY (CH)	1.5	44.0							
					CLAY (CH)	2.4	49.7							
TH21-03B	1454 Chancellor Dr. - 2.8 m S of N curb (Pavement Slab)	Asphalt	230		CLAY FILL	0.3	19.6							
					CLAY (CL)	0.6	25.3							
		Concrete	0		CLAY (CL)	0.9	23.4							
					CLAY (CL)	1.2	25.4							
		Granular Fill	0		CLAY (CL)	1.5	27.3							
					CLAY (CH)	2.4	40.5							
TH21-04B	1480 Chancellor Dr. - 2.6 m S of N curb (Pavement Slab)	Asphalt	280		GRANULAR FILL	0.3	7.5							
					CLAY (CH)	0.6	25.7							
		Concrete	0		CLAY (CH)	0.9	25.6							
					CLAY (CH)	1.2	27.3	0	1.6	25.5	72.9	65.4	20.4	45.0
		Granular Fill	150		CLAY (CH)	1.5	29.6							
					CLAY (CH)	2.4	42.0							
CH21-01B	1417 Chancellor Dr. – 3.6 m E of W curb (Pavement Slab)	Asphalt	130											
		Concrete	0											
CH21-02B	1448 Chancellor Dr. – 1.9 m S of N curb (Pavement Slab)	Asphalt	95											
		Concrete	0											

* Subgrade Description based on ASTM D2487-17 in accordance with City of Winnipeg Site Investigation Requirements for Public Works Street Projects (January 2021)

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-03B	1488 Chancellor Dr. – 2.8 m S of N curb (Pavement Slab)	Asphalt	120											
		Concrete	0											
CH21-04B	1477 Chancellor Dr. – 1.6 m N of S curb (Pavement Slab)	Asphalt	125											
		Concrete	0											
CH21-05B	1398 Chancellor Dr. – 2.4 m W of E curb (Pavement Slab)	Asphalt	95											
		Concrete	0											

* Subgrade Description based on ASTM D2487-17 in accordance with City of Winnipeg Site Investigation Requirements for Public Works Street Projects (January 2021)

Table 03 – Core Hole Summary – De Leglise Avenue (Rue Campeau to Pembina Highway)

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-01C	Opposite of 932 De Leglise Ave. – 1.8 m S of N curb (Pavement Slab)	Asphalt	100											
		Concrete	0											
CH21-02C	934 De Leglise Ave. – 1.9 m N of S curb (Pavement Slab)	Asphalt	110											
		Concrete	0											
CH21-03C	957 De Leglise Ave. – 1.8 m S of N curb (Pavement Slab)	Asphalt	100											
		Concrete	0											
CH21-04C	Front of Henri Roux Park, De Leglise Ave. – 2.4 m N of S curb (Pavement Slab)	Asphalt	75											
		Concrete	0											
CH21-05C	Front of King Express on De Leglise Ave. – 2.0 m S of N curb (Pavement Slab)	Asphalt	100											
		Concrete	0											

* Subgrade Description based on ASTM D2487-17 in accordance with City of Winnipeg Site Investigation Requirements for Public Works Street Projects (January 2021)

City of Winnipeg

2022 Local and Industrial Street and Alley Renewal Program (22-R-02) - Geotechnical Investigation

Table 04 – Core Hole Summary – La Grave Street (Lemay Avenue to Lord Avenue)

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-01D	5 La Grave St. – 1.8 m E of W curb (Pavement Slab)	Asphalt	60											
		Concrete	0											
CH21-02D	18 La Grave St. – 2.5 m W of E curb (Pavement Slab)	Asphalt	70											
		Concrete	0											
CH21-03D	25 La Grave St. – 1.5 m E of W curb (Pavement Slab)	Asphalt	70											
		Concrete	0											
CH21-04D	38 La Grave St. – 1.6 m W of E curb (Pavement Slab)	Asphalt	120											
		Concrete	0											

* Subgrade Description based on ASTM D2487-17 in accordance with City of Winnipeg Site Investigation Requirements for Public Works Street Projects (January 2021)

City of Winnipeg

2022 Local and Industrial Street and Alley Renewal Program (22-R-02) - Geotechnical Investigation

Table 05 –Test Hole and Core Hole Summary – Lakeshore Drive (Chancellor Drive to Chancellor Drive)

Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
TH21-01E	7 Lakeshore Rd. - 1.8 m E of W curb (Pavement Slab)	Asphalt	280		GRANULAR FILL	0.3	6.0							
					CLAY (CH)	0.6	39.1							
		Concrete	0		CLAY (CH)	0.9	43.6							
					CLAY (CH)	1.2	40.6	0.0	0.2	14.3	85.5	85.6	28.0	57.6
		Granular Fill	330		CLAY (CH)	1.5	45.5							
					CLAY (CH)	2.4	52.3							
TH21-02E	50 Lakeshore Rd. - 1.1 m N of S curb (Pavement Slab)	Asphalt	280		GRANULAR FILL	0.3	5.7							
					CLAY (CL)	0.6	35.5							
		Concrete	0		CLAY (CL-CH)	0.9	25.3	0.0	7.6	43.2	49.2	50.1	16.8	33.3
					CLAY (CH)	1.2	26.7							
		Granular Fill	305		CLAY (CH)	1.5	31.0							
					CLAY (CH)	2.4	44.3							
TH21-03E	83 Lakeshore Rd. - 2.4 m S of N curb (Pavement Slab)	Asphalt	280		GRANULAR FILL	0.3	5.6							
					CLAY (CH)	0.6	25.9	0.0	6.6	31.2	62.2	60.7	19.8	40.9
		Concrete	0		CLAY (CH)	0.9	23.6							
					CLAY (CH)	1.2	26.0							
		Granular Fill	150		CLAY (CH)	1.5	26.2							
					CLAY (CH)	2.4	40.9							
TH21-04E	Lakeshore Rd. - 2.2 m S of N curb, 63.0 m W of Chancellor Dr. (Pavement Slab)	Asphalt	230		GRANULAR FILL	0.3	8.5							
					CLAY (CH)	0.6	42.8							
		Concrete	0		CLAY (CH)	0.9	44.3							
					CLAY (CH)	1.2	47.9	0.0	0.0	11.3	88.7	97.2	28.1	69.1
		Granular Fill	130		CLAY (CH)	1.5	39.0							
					CLAY (CH)	2.4	54.9							
CH21-01E	15 Lakeshore Rd. – 1.8 m E of W curb (Pavement Slab)	Asphalt	75											
		Concrete	0											
CH21-02E	Lakeshore Rd. in front of garage of 2 Montclair Bay – 2.1 m N of S curb (Pavement Slab)	Asphalt	75											
		Concrete	0											

* Subgrade Description based on ASTM D2487-17 in accordance with City of Winnipeg Site Investigation Requirements for Public Works Street Projects (January 2021)

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-03E	79 Lakeshore Rd. – 1.8 m S of N curb (Pavement Slab)	Asphalt	85											
		Concrete	0											
CH21-04E	91 Lakeshore Rd. – 2.3 m S of N curb (Pavement Slab)	Asphalt	100											
		Concrete	0											
CH21-05E	Lakeshore Rd. aligned with NW corner of 90 Montclair Bay – 1.6 m S of N curb (Pavement Slab)	Asphalt	100											
		Concrete	0											

* Subgrade Description based on ASTM D2487-17 in accordance with City of Winnipeg Site Investigation Requirements for Public Works Street Projects (January 2021)

City of Winnipeg

2022 Local and Industrial Street and Alley Renewal Program (22-R-02) - Geotechnical Investigation

Table 06 –Test Hole and Core Hole Summary – Lakeshore Drive Frontage (from House 27 to 51)

Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
TH21-01F	31 Lakeshore Rd. - 2.5 m E of W curb (Pavement Slab)	Asphalt	240		GRANULAR FILL	0.3	11.9							
					CLAY (CL)	0.6	19.0	0.0	4.0	51.6	44.4	45.7	15.4	30.3
		Concrete	0		CLAY (CL)	0.9	13.6							
					CLAY (CH)	1.2	14.9							
		Granular Fill	215		CLAY (CH)	1.5	23.8							
					CLAY (CH)	2.4	41.1							
CH21-01F	31 Lakeshore Rd. – 4.0 m E of W curb (Pavement Slab)	Asphalt	120											
		Concrete	0											
CH21-02F	51 Lakeshore Rd. – 2.0 m W of E curb (Pavement Slab)	Asphalt	90											
		Concrete	0											

* Subgrade Description based on ASTM D2487-17 in accordance with City of Winnipeg Site Investigation Requirements for Public Works Street Projects (January 2021)

City of Winnipeg

2022 Local and Industrial Street and Alley Renewal Program (22-R-02) - Geotechnical Investigation

Table 06 – Core Hole Summary – Moore Avenue (St. Mary's Road to River Road)

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-01G	Moore Ave., W bound, beside Galaxy Printing – 2.2 m S of N Curb (Pavement Joint)	Asphalt	0											
		Concrete	165											
CH21-02G	20 Moore Ave. – 1.9 m N of S Curb (Pavement Slab)	Asphalt	0											
		Concrete	160											
CH21-03G	25 Moore Ave. – 1.6 m S of N Curb (Pavement Slab)	Asphalt	0											
		Concrete	165											
CH21-04G	29 Moore Ave. – 1.8 m S of N Curb (Pavement Slab)	Asphalt	0											
		Concrete	150											
CH21-05G	36 Moore Ave. – 2.0 m N of S Curb (Pavement Joint)	Asphalt	0											
		Concrete	140											
CH21-06G	39 Moore Ave. – 1.8 m S of N Curb (Pavement Slab)	Asphalt	0											
		Concrete	140											

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-07G	42 Moore Ave. – 2.1 m N of S Curb (Pavement Slab)	Asphalt	0											
		Concrete	175											
CH21-08G	47 Moore Ave. – 2.0 m S of N Curb (Pavement Slab)	Asphalt	0											
		Concrete	140											
CH21-09G	50 Moore Ave. – 2.0 m N of S Curb (Pavement Slab)	Asphalt	0											
		Concrete	140											
CH21-10G	61 Moore Ave. – 2.0 m S of N Curb (Pavement Joint)	Asphalt	0											
		Concrete	110	No recovery. Specimen decomposed to granular and irretrievable										
CH21-11G	66 Moore Ave. – 1.8 m N of S Curb (Pavement Slab)	Asphalt	0											
		Concrete	190											
CH21-12G	81 Moore Ave. – 2.6 m S of N Curb (Pavement Slab)	Asphalt	0											
		Concrete	155											

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-13G	87 Moore Ave. – 1.9 m S of N Curb (Pavement Joint)	Asphalt	0											
		Concrete	0	No recovery. Specimen decomposed to granular and irretrievable										
CH21-14G	95 Moore Ave. – 1.5 m S of N Curb (Pavement Joint)	Asphalt	0											
		Concrete	155	Partially recovered. Specimen decomposed to granular and irretrievable										
CH21-15G	100 Moore Ave. – 2.3 m N of S Curb (Pavement Slab)	Asphalt	0											
		Concrete	150											
CH21-16G	113 Moore Ave. – 2.1 m S of N Curb (Pavement Joint)	Asphalt	0											
		Concrete	150	Partially recovered. Specimen decomposed to granular and irretrievable										
CH21-17G	123 Moore Ave. – 2.4 m S of N Curb (Pavement Joint)	Asphalt	0	No recovery. Specimen decomposed to granular and irretrievable										
		Concrete	0	No recovery. Specimen decomposed to granular and irretrievable										
CH21-18G	128 Moore Ave. – 1.9 m N of S Curb (Pavement Slab)	Asphalt	100											
		Concrete	100	Partially recovered. Specimen decomposed to granular and irretrievable										

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-19G	129 Moore Ave. – 2.5 m S of N Curb (Pavement Slab)	Asphalt	90											
		Concrete	120	Partially recovered. Specimen decomposed to granular and irretrievable										
CH21-20G	131 Moore Ave. – 2.2 m E of S Curb (Pavement Slab)	Asphalt	90											
		Concrete	150											
CH21-21G	138 Moore Ave. – 1.7 m N of S Curb (Pavement Slab)	Asphalt	40											
		Concrete	130	Partially recovered. Specimen decomposed to granular and irretrievable										
CH21-22G	141 Moore Ave. – 1.9 m S of N Curb (Pavement Slab)	Asphalt	70											
		Concrete	100	Partially recovered. Specimen decomposed to granular and irretrievable										
CH21-23G	148 Moore Ave. – 1.8 m N of S Curb (Pavement Slab)	Asphalt	110											
		Concrete	0	No recovery. Specimen decomposed to granular and irretrievable										
CH21-24G	147 Moore Ave. – 1.5 m E of S Curb (Pavement Slab)	Asphalt	90	Partially recovered. Specimen decomposed to granular and irretrievable										
		Concrete	0	No recovery. Specimen decomposed to granular and irretrievable										

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-25G	156 Moore Ave. – 1.8 m E of S Curb (Pavement Joint)	Asphalt	90	Partially recovered. Specimen decomposed to granular and irretrievable										
		Concrete	0	No recovery. Specimen decomposed to granular and irretrievable										
CH21-26G	155 Moore Ave. – 1.5 m S of N Curb (Pavement Slab)	Asphalt	50											
		Concrete	0	No recovery. Specimen decomposed to granular and irretrievable										
CH21-27G	164 Moore Ave. – 1.8 m N of S Curb (Pavement Joint)	Asphalt	0											
		Concrete	150	Partially recovered. Specimen decomposed to granular and irretrievable										
CH21-28G	163 Moore Ave. – 1.7 m S of N Curb (Pavement Joint)	Asphalt	0											
		Concrete	160											
CH21-29G	170 Moore Ave. – 2.2 m N of S Curb (Pavement Joint)	Asphalt	0											
		Concrete	160	Partially recovered. Specimen decomposed to granular and irretrievable										
CH21-30G	167 Moore Ave. – 1.9 m S of N Curb (Pavement Slab)	Asphalt	0											
		Concrete	160											

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-31G	174 Moore Ave. – 2.6 m N of S Curb (Pavement Slab)	Asphalt	0											
		Concrete	160											
CH21-32G	171 Moore Ave. – 2.0 m S of N Curb (Pavement Joint)	Asphalt	0											
		Concrete	150											
CH21-33G	182 Moore Ave. – 2.2 m N of S Curb (Pavement Slab)	Asphalt	0											
		Concrete	150											
CH21-34G	179 Moore Ave. – 1.8 m S of N Curb (Pavement Slab)	Asphalt	0											
		Concrete	150											
CH21-35G	188 Moore Ave. – 1.9 m N of S Curb (Pavement Slab)	Asphalt	0											
		Concrete	160											
CH21-36G	187 Moore Ave. – 2.0 m S of N Curb (Pavement Slab)	Asphalt	0											
		Concrete	100	Partially recovered. Specimen decomposed to granular and irretrievable										

Test Hole No.	Test Hole Location	Pavement Structure		Remarks	Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
CH21-37G	192 Moore Ave. – 2.5 m N of S Curb (Pavement Slab)	Asphalt	0											
		Concrete	150											

* Subgrade Description based on ASTM D2487-17 in accordance with City of Winnipeg Site Investigation Requirements for Public Works Street Projects (January 2021)

Photograph 1: CH21-01A - Briar Cliff Bay

Photograph 2: CH21-03A - Briar Cliff Bay

Photograph 3: CH21-04A - Briar Cliff Bay

Photograph 4: CH21-05A - Briar Cliff Bay

Photograph 5: CH21-07A - Briar Cliff Bay

Photograph 6: CH21-08A - Briar Cliff Bay

Photograph 7: CH21-09A - Briar Cliff Bay

Photograph 8: CH21-10A - Briar Cliff Bay

Photograph 9: CH21-11A - Briar Cliff Bay

Photograph 10: CH21-01B - Chancellor Drive

Photograph 11: CH21-02B - Chancellor Drive

Photograph 12: CH21-03B - Chancellor Drive

Photograph 13: CH21-04B - Chancellor Drive

Photograph 14: CH21-05B - Chancellor Drive

Photograph 15: CH21-01C - De Leglise Avenue

Photograph 16: CH21-02C - De Leglise Avenue

Photograph 17: CH21-03C - De Leglise Avenue

Photograph 18: CH21-04C - De Leglise Avenue

Photograph 19: CH21-05C - De Leglise Avenue

Photograph 20: CH21-01D - La Grave Street

Photograph 21: CH21-02D - La Grave Street

Photograph 22: CH21-03D - La Grave Street

Photograph 23: CH21-04D - La Grave Street

Photograph 24: CH21-01E - Lakeshore Road

Photograph 25: CH21-02E - Lakeshore Road

Photograph 26: CH21-03E - Lakeshore Road

Photograph 27: CH21-04E - Lakeshore Road

Photograph 28: CH21-05E - Lakeshore Road

Photograph 29: CH21-01F - Lakeshore Road (Frontage)

Photograph 30: CH21-02F - Lakeshore Road (Frontage)

Photograph 31: CH21-01G - Moore Avenue

Photograph 32: CH21-02G - Moore Avenue

Photograph 33: CH21-03G - Moore Avenue

Photograph 34: CH21-04G - Moore Avenue

Photograph 35: CH21-06G - Moore Avenue

Photograph 36: CH21-07G - Moore Avenue

Photograph 37: CH21-08G - Moore Avenue

Photograph 38: CH21-09G - Moore Avenue

Photograph 39: CH21-11G - Moore Avenue

Photograph 40: CH21-12G - Moore Avenue

Photograph 41: CH21-14G - Moore Avenue

Photograph 42: CH21-15G - Moore Avenue

Photograph 43: CH21-16G - Moore Avenue

Photograph 44: CH21-18G - Moore Avenue

Photograph 45: CH21-19G - Moore Avenue

Photograph 46: CH21-20G - Moore Avenue

Photograph 47: CH21-21G - Moore Avenue

Photograph 48: CH21-22G - Moore Avenue

Photograph 49: CH21-23G - Moore Avenue

Photograph 50: CH21-24G - Moore Avenue

Photograph 51: CH21-25G - Moore Avenue

Photograph 52: CH21-26G - Moore Avenue

Photograph 53: CH21-27G - Moore Avenue

Photograph 54: CH21-28G - Moore Avenue

Photograph 55: CH21-29G - Moore Avenue

Photograph 56: CH21-30G - Moore Avenue

Photograph 57: CH21-31G - Moore Avenue

Photograph 58: CH21-32G - Moore Avenue

Photograph 59: CH21-33G - Moore Avenue

Photograph 60: CH21-34G - Moore Avenue

Photograph 61: CH21-35G - Moore Avenue

Photograph 62: CH21-36G - Moore Avenue

Photograph 63: CH21-37G - Moore Avenue

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CERTIFIED BY CCIL

Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	Chancellor Dr. (Augusta-Quincy)	Sample Date:	Varies
Sample Depth:	Varies	Lab Technician:	EManimbao
Sample Number:	Varies	Date Tested:	February 11, 2022

Moisture Content (ASTM D2216-10)

Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Location	Sample	Depth (m)	**Moisture Content (%)**
TH21-01B	G1	0.30 - 0.46 m	**17.8%**
	G2	0.61 - 0.76 m	**18.6%**
	B1	0.61 - 1.52 m	**-**
	G3	0.91 - 1.07 m	**17.4%**
	G4	1.22 - 1.37 m	**30.2%**
	G5	1.52 - 1.68 m	**22.1%**
	G6	2.44 - 2.59 m	**45.3%**
TH21-02B	G1	0.30 - 0.46 m	**32.6%**
	G2	0.61 - 0.76 m	**31.2%**
	G3	0.91 - 1.07 m	**33.4%**
	G4	1.22 - 1.37 m	**38.0%**
	G5	1.52 - 1.68 m	**44.0%**
	G6	2.44 - 2.59 m	**49.7%**
TH21-03B	G1	0.30 - 0.46 m	**19.6%**
	G2	0.61 - 0.76 m	**25.3%**
	G3	0.91 - 1.07 m	**23.4%**
	G4	1.22 - 1.37 m	**25.4%**
	G5	1.52 - 1.68 m	**27.3%**
	G6	2.44 - 2.59 m	**40.5%**
TH21-04B	G1	0.30 - 0.46 m	**7.5%**
	G2	0.61 - 0.76 m	**25.7%**
	B2	0.61 - 1.52 m	**-**
	G3	0.91 - 1.07 m	**25.6%**
	G4	1.22 - 1.37 m	**27.3%**
	G5	1.52 - 1.68 m	**29.6%**
	G6	1.83 - 1.98 m	**42.0%**

Location	Sample	Depth (m)	**Moisture Content (%)**

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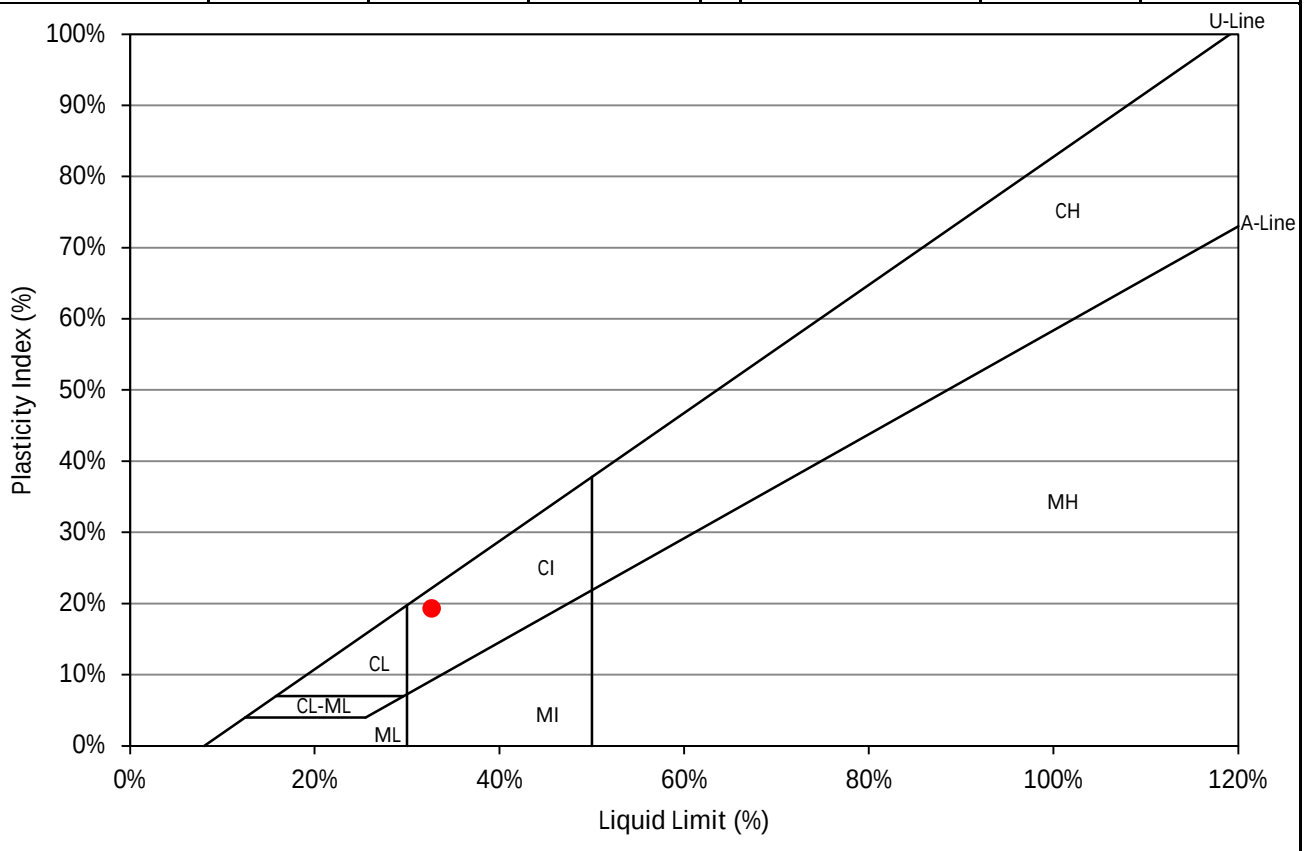
Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	TH21-01B (Chancellor)	Sample Date:	December 22, 2021
Sample Depth:	0.91 - 1.07 m	Lab Technician:	EManimbao
Sample Number:	G3	Date Tested:	March 3, 2022

Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	34	25	16
Wet Sample (g)	9.4	8.7	10.7
Dry Sample (g)	7.2	6.6	7.9
Water Content (%)	31.1%	32.6%	35.0%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.2	7.7
Dry Sample (g)	5.5	6.8
Water Content (%)	13.6%	13.1%



Liquid Limit (%): 32.7%	Plastic Limit (%): 13.3%	Plasticity Index (%): 19.3%

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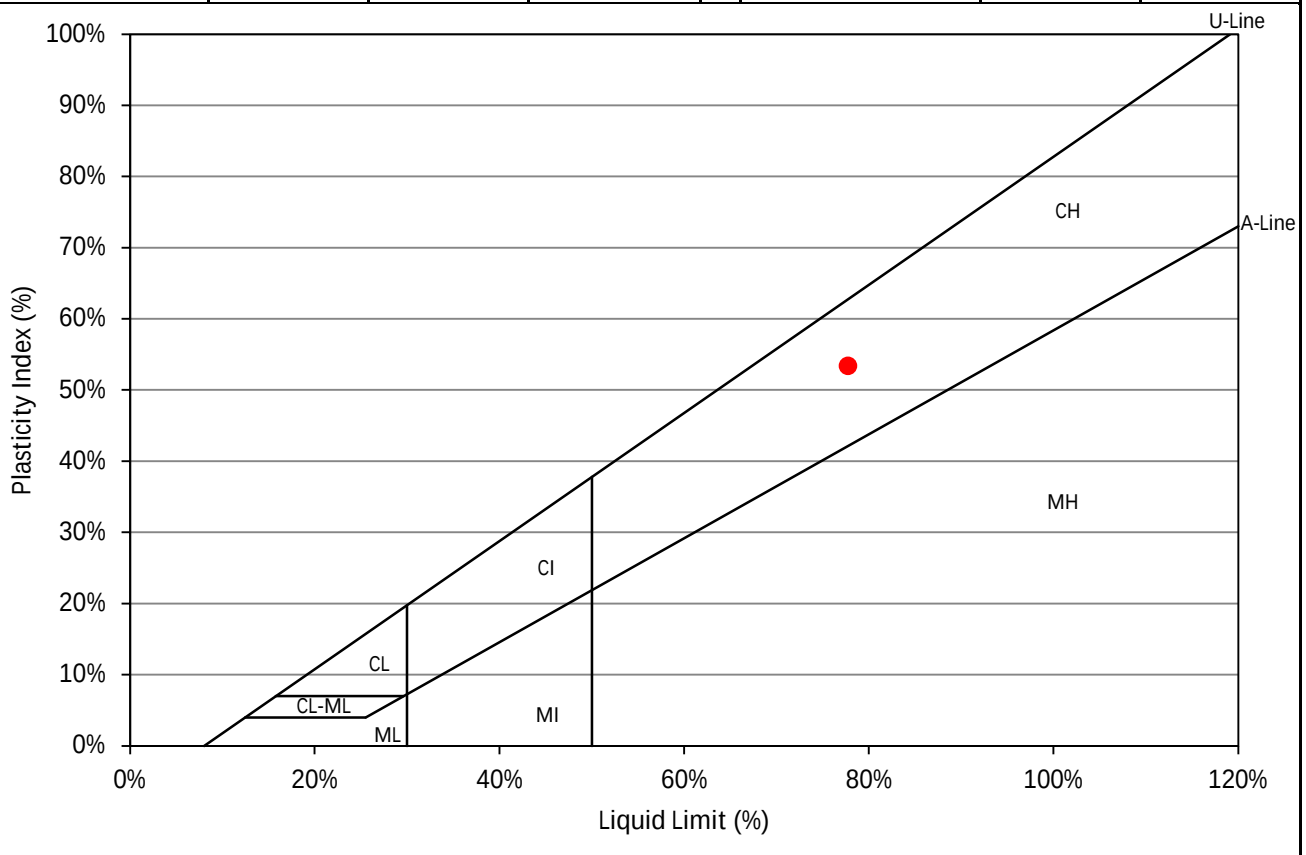
Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	TH21-02B (Chancellor)	Sample Date:	December 22, 2021
Sample Depth:	0.61 - 0.76 m	Lab Technician:	EManimbao
Sample Number:	G2	Date Tested:	March 3, 2022

Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	34	29	24
Wet Sample (g)	8.6	9.7	7.4
Dry Sample (g)	5.0	5.5	4.2
Water Content (%)	73.3%	75.6%	78.5%

Plastic Limit		
Trial	1	2
Wet Sample (g)	7.6	7.6
Dry Sample (g)	6.1	6.1
Water Content (%)	24.4%	24.4%



Liquid Limit (%): 77.7%	Plastic Limit (%): 24.4%	Plasticity Index (%): 53.4%

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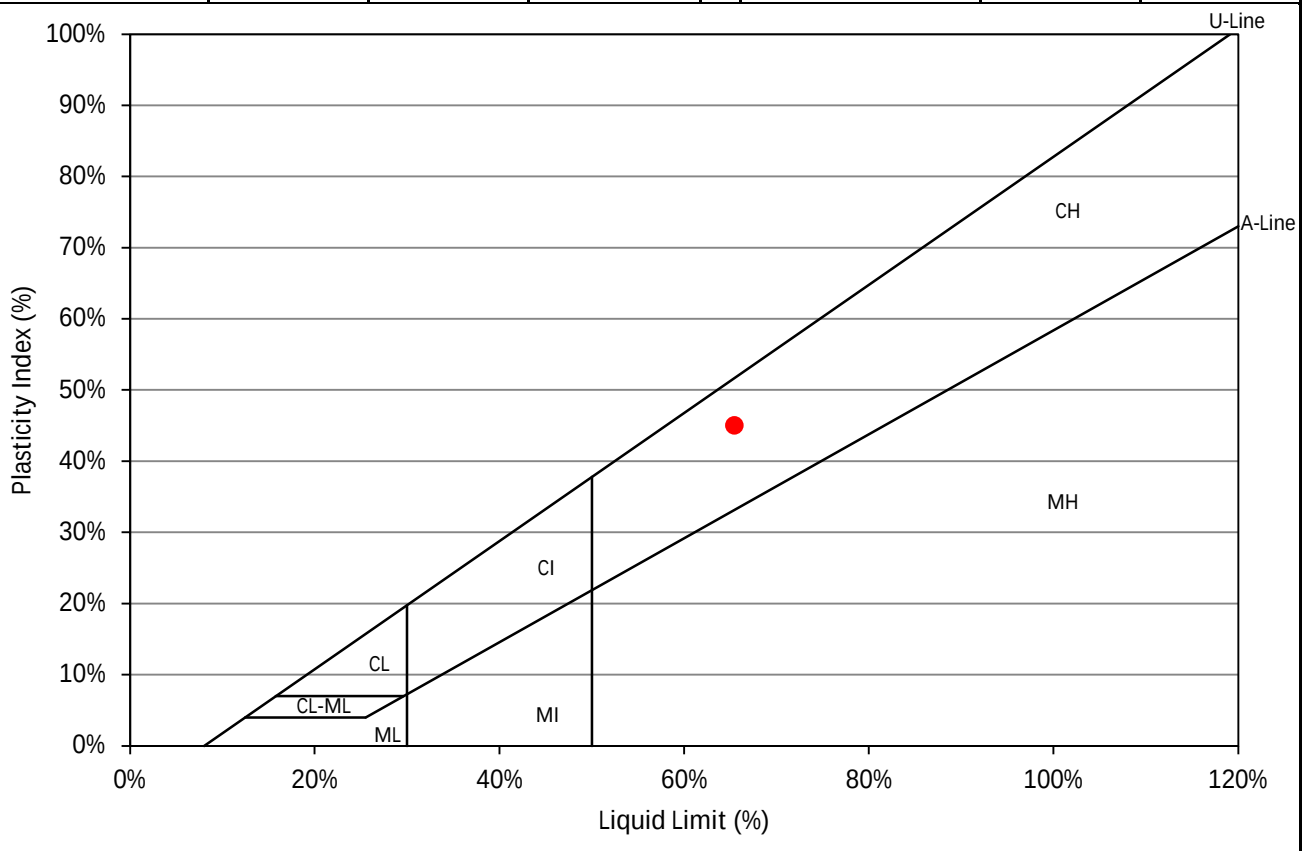
Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	TH21-04B (Chancellor)	Sample Date:	December 22, 2021
Sample Depth:	1.22 - 1.37 m	Lab Technician:	EManimbao
Sample Number:	G4	Date Tested:	March 3, 2022

Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	35	29	20
Wet Sample (g)	8.0	8.6	9.0
Dry Sample (g)	5.0	5.3	5.4
Water Content (%)	62.3%	64.1%	67.6%

Plastic Limit		
Trial	1	2
Wet Sample (g)	7.2	6.7
Dry Sample (g)	5.9	5.6
Water Content (%)	20.7%	20.1%



Liquid Limit (%): 65.4%	Plastic Limit (%): 20.4%	Plasticity Index (%): 45.0%

GRAIN SIZE DISTRIBUTION
(ASTM D422-63)

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tel (204) 477-5381 **fax** (431) 800-1210

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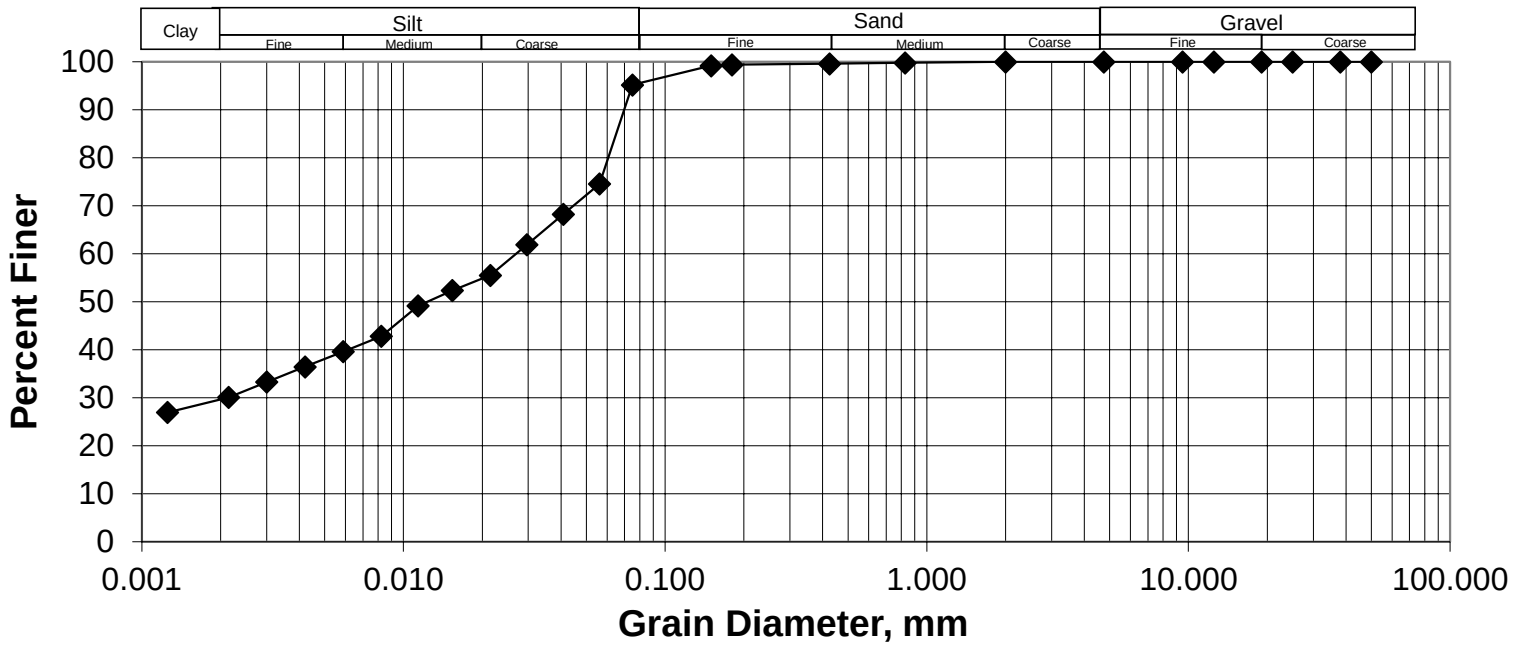
Job No.:	60672214	Hole No.:	TH21-01B (Chancellor)
Client:	City of Winnipeg	Sample No.:	G3
Project :	2022 Local Streets (22-R-02)	Depth:	0.91 - 1.07 m
Date Tested:	28-Feb-22	Date Sampled:	Varies
Tested By:	EManimbao	Sampled By:	AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	95.2
38.0	100.0	2.00	100.0	0.0561	74.6
25.0	100.0	0.825	99.8	0.0408	68.2
19.0	100.0	0.425	99.6	0.0296	61.9
12.5	100.0	0.18	99.4	0.0215	55.5
9.5	100.0	0.15	99.2	0.0154	52.3
4.75	100.0	0.075	95.2	0.0114	49.2
				0.0082	42.8
				0.0059	39.6
				0.0042	36.5
				0.0030	33.3
				0.0021	30.1
				0.0013	26.9

GRAIN SIZE DISTRIBUTION CURVE



Gravel	**0.0%**	**Silt**	**65.6%**
Sand	**4.8%**	**Clay**	**29.6%**

GRAIN SIZE DISTRIBUTION
(ASTM D422-63)

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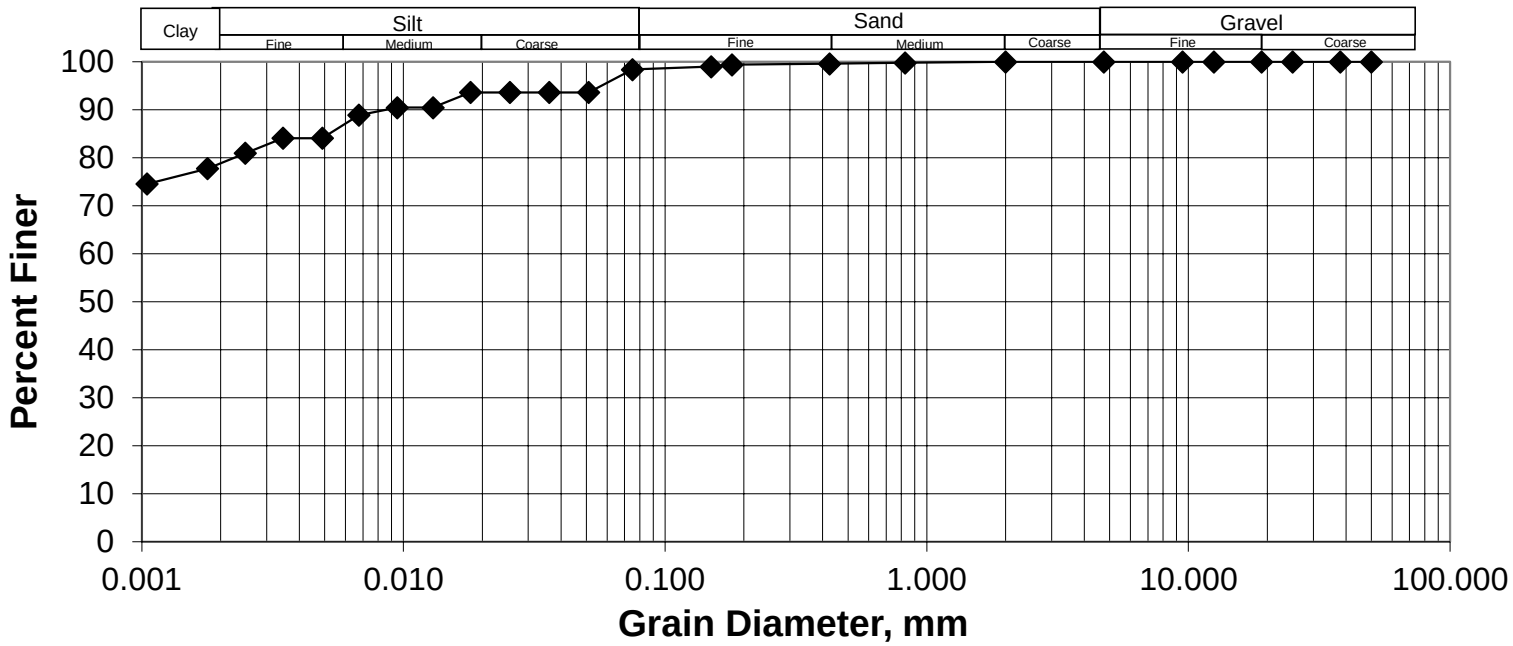
Job No.:	60672214	Hole No.:	TH21-02B (Chancellor)
Client:	City of Winnipeg	Sample No.:	G2
Project :	2022 Local Streets (22-R-02)	Depth:	0.61 - 0.76 m
Date Tested:	28-Feb-22	Date Sampled:	Varies
Tested By:	EManimbao	Sampled By:	AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	98.4
38.0	100.0	2.00	100.0	0.0510	93.6
25.0	100.0	0.825	99.8	0.0360	93.6
19.0	100.0	0.425	99.6	0.0255	93.6
12.5	100.0	0.18	99.4	0.0180	93.6
9.5	100.0	0.15	99.0	0.0130	90.5
4.75	100.0	0.075	98.4	0.0095	90.5
				0.0067	88.9
				0.0049	84.1
				0.0035	84.1
				0.0025	80.9
				0.0018	77.8
				0.0010	74.6

GRAIN SIZE DISTRIBUTION CURVE



Gravel	**0.0%**	**Silt**	**19.7%**
Sand	**1.6%**	**Clay**	**78.7%**

GRAIN SIZE DISTRIBUTION
(ASTM D422-63)

AECOM
WINNIPEG GEOTECHNICAL LABORATORY
99 Commerce Dr., Winnipeg, MB R3P 0Y7 Canada
tel (204) 477-5381 **fax** (431) 800-1210

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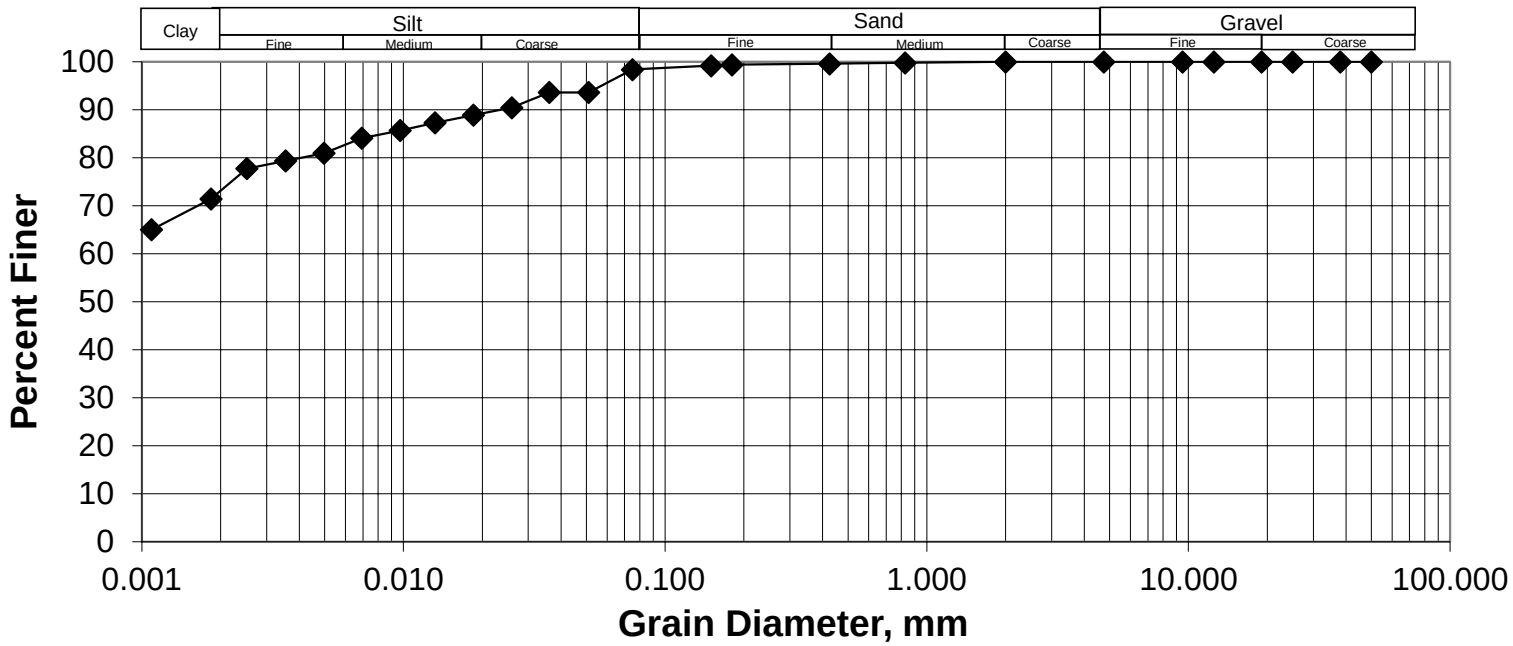
Job No.:	60672214	Hole No.:	TH21-04B (Chancellor)
Client:	City of Winnipeg	Sample No.:	G4
Project :	2022 Local Streets (22-R-02)	Depth:	1.22 - 1.37 m
Date Tested:	28-Feb-22	Date Sampled:	Varies
Tested By:	EManimbao	Sampled By:	AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	98.4
38.0	100.0	2.00	100.0	0.0510	93.6
25.0	100.0	0.825	99.8	0.0360	93.6
19.0	100.0	0.425	99.6	0.0259	90.5
12.5	100.0	0.18	99.4	0.0185	88.9
9.5	100.0	0.15	99.2	0.0132	87.3
4.75	100.0	0.075	98.4	0.0097	85.7
				0.0069	84.1
				0.0050	80.9
				0.0035	79.3
				0.0025	77.8
				0.0018	71.4
				0.0011	65.1

GRAIN SIZE DISTRIBUTION CURVE



Gravel	**0.0%**	**Silt**	**25.5%**
Sand	**1.6%**	**Clay**	**72.9%**

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Phone: 204-697-3854 Cell: 204-997-1355

Canadian Council of Independent Laboratories

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

Client:	AECOM Canada Ltd.	Project No.:	112-2205
	99 Commerce Drive	CBR test No.:	1
	Winnipeg MB R3P 0Y7	Lab No.:	HM 007
Attention:	Rico Manimbao	Date sampled:	
Project	Job No. 60672214	Date Received :	27-Jan-22
Location:	Chancellor Dr. - Augusta to Quincy	Date Tested /By:	15-Feb-22 / ECS

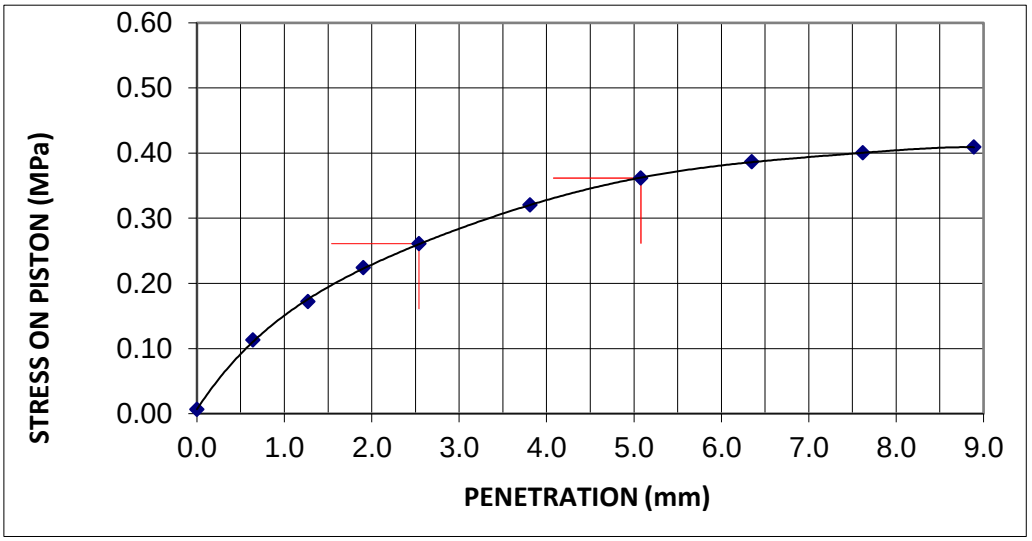
SAMPLE DATA			
Sample Type:	Clay		
Source:	TH21-01, B1 2'-5'		
Sampled by:	Client		
Optimum Moisture Content:	18.4	%	
Maximum Dry Density:	1721	kg/cm^3	
Method of Compaction:	Standard Proctor		
Tested by:	ECS	Date Tested:	08-Feb-22

SPECIMEN DATA		
DESCRIPTION	Before Soaking	After Testing
Moisture Content (MC), %	18.9	
MC of top 25mm layer, %		23.3
Dry Density, kg/m^3	1684	
Compaction,%	98%	
CBR, %	3.8	
Swell, %	1.3	

LOAD DATA

PENETRATION mm	STRESS MPa
0	0.01
0.64	0.11
1.27	0.17
1.91	0.22
2.54	0.26
3.81	0.32
5.08	0.36
6.35	0.39
7.62	0.40
8.89	0.41

LOAD PENETRATION CURVE



PENETRATION mm	STANDARD LOAD MPa	TEST LOAD ACTUAL MPa	TEST LOAD CORRECTED MPa	BEARING RATIO (soaked) at 2.5 mm penetration	BEARING RATIO (soaked) at 5.1 mm penetration
2.54	6.9	0.26	0.26	3.8	-
5.08	10.3	0.36	0.36	-	3.5

Remarks: 4 days soaked

Reviewed by: Hermie Manalo

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hermie@hmanalo.ca

MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd.	PROJECT No.:	112-2205
	99 Commerce Drive	PROCTOR Test No.:	1
	Winnipeg MB R3P 0Y7	LAB No.:	HM 008
ATTENTION:	Rico Manimbao		
PROJECT:	Job No. 60672214		
	Chancellor Dr. - Augusta to Quincy		

Date Sampled:	N/A	Date Received:	27-Jan-22
Sampled By:	Client	Date Tested:	08-Feb-22

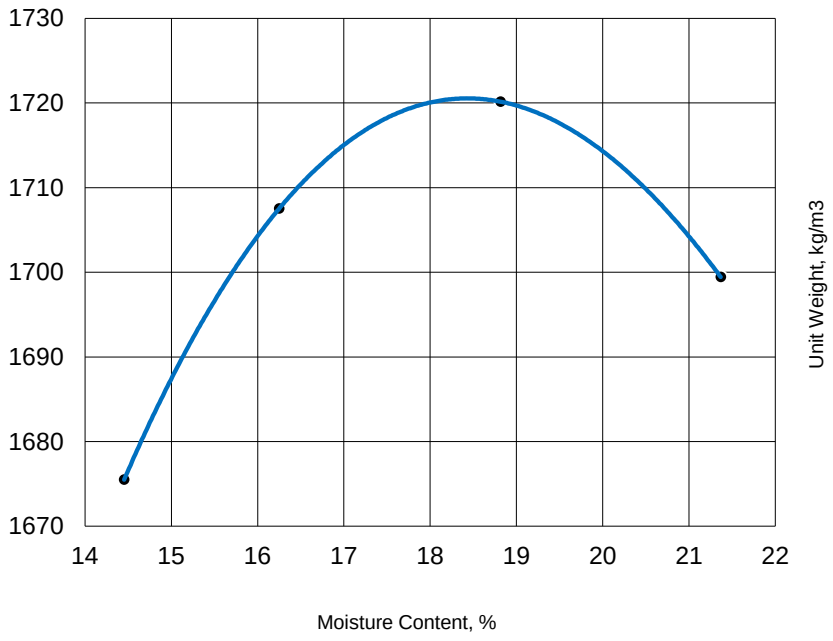
MATERIAL INFORMATION

Material Type:	Clay		
Material Use:	Subgrade	Material Supplier:	in-situ
Maximum Size:	4.75 mm	Material Source:	TH21-01, B1 2'-5'

PROCEDURE	A
PREPARATION	Dry
COMPACTION METHOD	Manual
BLOWS PER LAYER	25
NO. OF LAYERS	3
MOLD SIZE	100
MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg

Test No.	1	2	3	4		
Wet Density	1918	1985	2044	2063		
Moisture Content	14.5	16.3	18.8	21.4		
Dry Density	1675	1708	1720	1699		

Moisture - Density Relationship



Maximum Dry Density (MDD): 1721 kg/m³

Optimum Moisture Content 18.4 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve: ____ %

Corrected Moisture: 18.4 %

Corrected Maximum Dry Density: 1721 kg/m³

Remarks:

P. Bevel

Tested by: E. Santiago

Reviewed by: Paul Bevel

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Canadian Council of Independent Laboratories

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

Client:	AECOM Canada Ltd.	Project No.:	112-2205
	99 Commerce Drive	CBR test No.:	2
	Winnipeg MB R3P 0Y7	Lab No.:	HM 008
Attention:	Rico Manimbao	Date sampled:	
Project	Job No. 60672214	Date Received :	27-Jan-22
Location:	Chancellor Dr. - Augusta to Quincy	Date Tested /By:	15-Feb-22 / ECS

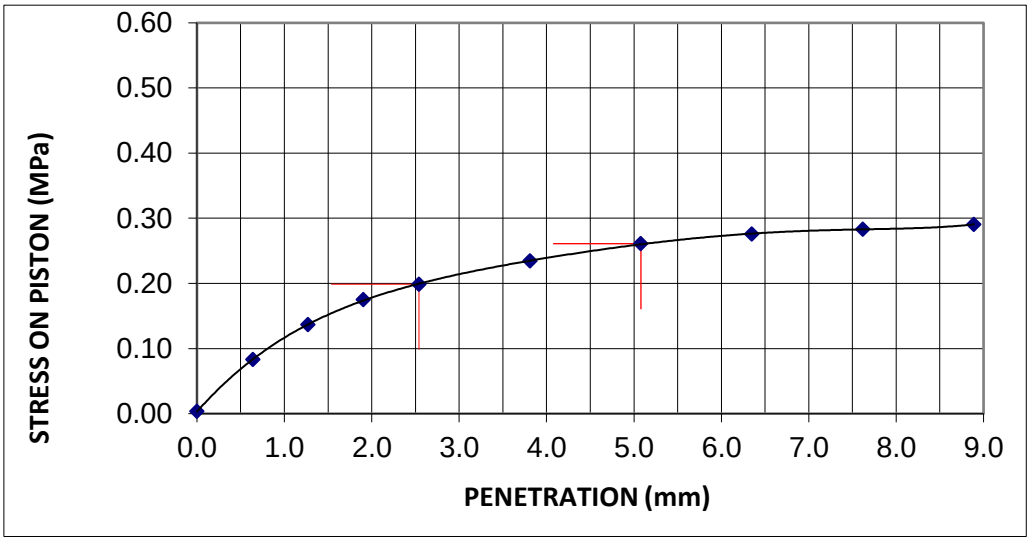
SAMPLE DATA			
Sample Type:	Clay		
Source:	TH21-04, B2 2'-5'		
Sampled by:	Client		
Optimum Moisture Content:	23.6	%	
Maximum Dry Density:	1545	kg/cm^3	
Method of Compaction:	Standard Proctor		
Tested by:	ECS	Date Tested:	08-Feb-22

SPECIMEN DATA		
DESCRIPTION	Before Soaking	After Testing
Moisture Content (MC), %	23.6	
MC of top 25mm layer, %		29.6
Dry Density, kg/m^3	1521	
Compaction,%	98%	
CBR, %	2.9	
Swell, %	1.6	

LOAD DATA

PENETRATION mm	STRESS MPa
0	0.00
0.64	0.08
1.27	0.14
1.91	0.18
2.54	0.20
3.81	0.23
5.08	0.26
6.35	0.28
7.62	0.28
8.89	0.29

LOAD PENETRATION CURVE



PENETRATION mm	STANDARD LOAD MPa	TEST LOAD ACTUAL MPa	TEST LOAD CORRECTED MPa	BEARING RATIO (soaked) at 2.5 mm penetration	BEARING RATIO (soaked) at 5.1 mm penetration
2.54	6.9	0.20	0.20	2.9	-
5.08	10.3	0.26	0.26	-	2.5

Remarks: 4 days soaked

Reviewed by: Hermie Manalo

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Phone: 204 697-3854 Cell: 204 997-1355
hermie@hmanalo.ca

MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd.	PROJECT No.:	112-2204
	99 Commerce Drive	PROCTOR Test No.:	2
	Winnipeg MB R3P 0Y7	LAB No.:	HM 008
ATTENTION:	Rico Manimbao		
PROJECT:	Job No. 60672214		
	Chancellor Dr. - Augusta to Quincy		

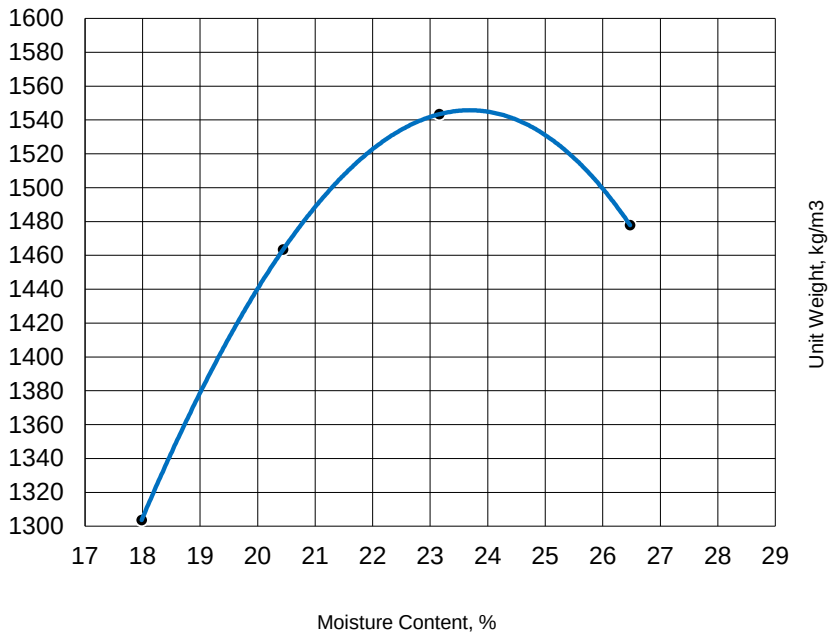
Date Sampled:	N/A	Date Received:	27-Jan-22
Sampled By:	Client	Date Tested:	08-Feb-22

MATERIAL INFORMATION

Material Type:	Clay		
Material Use:	Subgrade	Material Supplier:	in-situ
Maximum Size:	4.75 mm	Material Source:	TH21-04, B2 2'-5'

PROCEDURE	A
PREPARATION	Dry
COMPACTION METHOD	Manual
BLOWS PER LAYER	25
NO. OF LAYERS	3
MOLD SIZE	100
MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg

Test No.	1	2	3	4
Wet Density	1538	1762	1901	1869
Moisture Content	18.0	20.4	23.2	26.5
Dry Density	1304	1463	1543	1478



Maximum Dry Density (MDD):
1545 kg/m³
Optimum Moisture Content
23.6 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve:
_____ %
Corrected Moisture:
23.6 %
Corrected Maximum Dry Density:
1545 kg/m³

Remarks:

Tested by: E. Santiago

Reviewed by: Paul Bevel

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Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	Lakeshore Rd, (Chancellor-Chancellor)	Sample Date:	December 22, 2021
Sample Depth:	Varies	Lab Technician:	EManimbao
Sample Number:	Varies	Date Tested:	February 11, 2022

Moisture Content (ASTM D2216-10)

Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Location	Sample	Depth (m)	**Moisture Content (%)**
TH21-01E	G1	0.30 - 0.46 m	**6.0%**
	G2	0.61 - 0.76 m	**39.1%**
	B1	0.61 - 1.52 m	**-**
	G3	0.91 - 1.07 m	**43.6%**
	G4	1.22 - 1.37 m	**40.6%**
	G5	1.52 - 1.68 m	**45.5%**
	G6	2.44 - 2.59 m	**52.3%**
TH21-02E	G1	0.30 - 0.46 m	**5.7%**
	G2	0.61 - 0.76 m	**35.5%**
	G3	0.91 - 1.07 m	**25.3%**
	G4	1.22 - 1.37 m	**26.7%**
	G5	1.52 - 1.68 m	**31.0%**
	G6	2.44 - 2.59 m	**44.3%**
TH21-03E	G1	0.30 - 0.46 m	**5.6%**
	G2	0.61 - 0.76 m	**25.9%**
	B2	0.61 - 1.52 m	**-**
	G3	1.22 - 1.37 m	**23.6%**
	G4	1.52 - 1.68 m	**26.0%**
	G5	2.44 - 2.59 m	**26.2%**
	G6	0.30 - 0.46 m	**40.9%**
TH21-04E	G1	0.61 - 0.76 m	**8.5%**
	G2	0.61 - 1.52 m	**42.8%**
	G3	0.91 - 1.07 m	**44.3%**
	G4	1.22 - 1.37 m	**47.9%**
	G5	1.52 - 1.68 m	**39.0%**
	G6	1.83 - 1.98 m	**54.9%**

Location	Sample	Depth (m)	**Moisture Content (%)**

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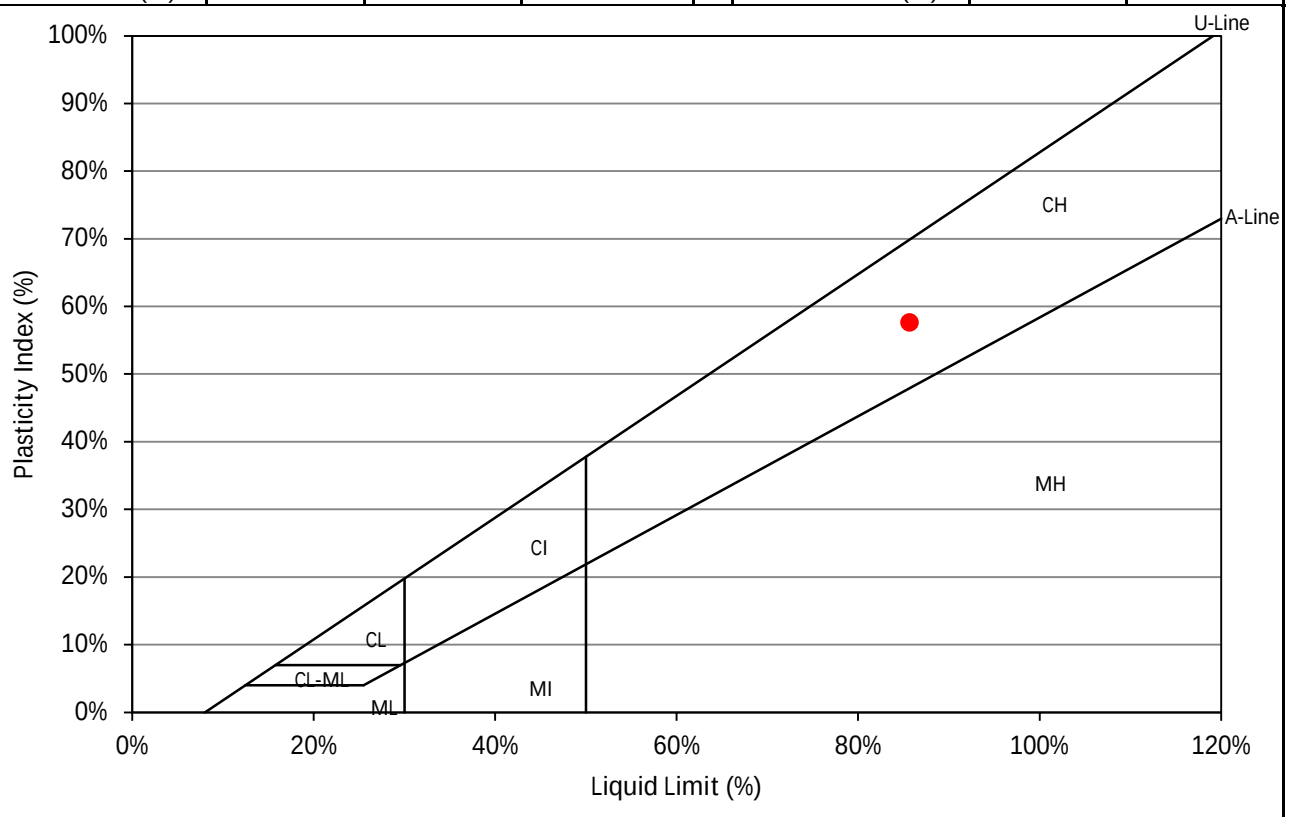
Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	TH21-01E (Lakeshore Rd.)	Sample Date:	December 22, 2021
Sample Depth:	1.22 - 1.37 m	Lab Technician:	EManimbao
Sample Number:	G4	Date Tested:	March 3, 2022

Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	34	28	24
Wet Sample (g)	8.2	8.5	7.5
Dry Sample (g)	4.5	4.6	4.0
Water Content (%)	82.2%	84.3%	86.3%

Plastic Limit		
Trial	1	2
Wet Sample (g)	8.1	7.6
Dry Sample (g)	6.4	5.9
Water Content (%)	27.6%	28.4%



Liquid Limit (%): 85.6%	Plastic Limit (%): 28.0%	Plasticity Index (%): 57.6%

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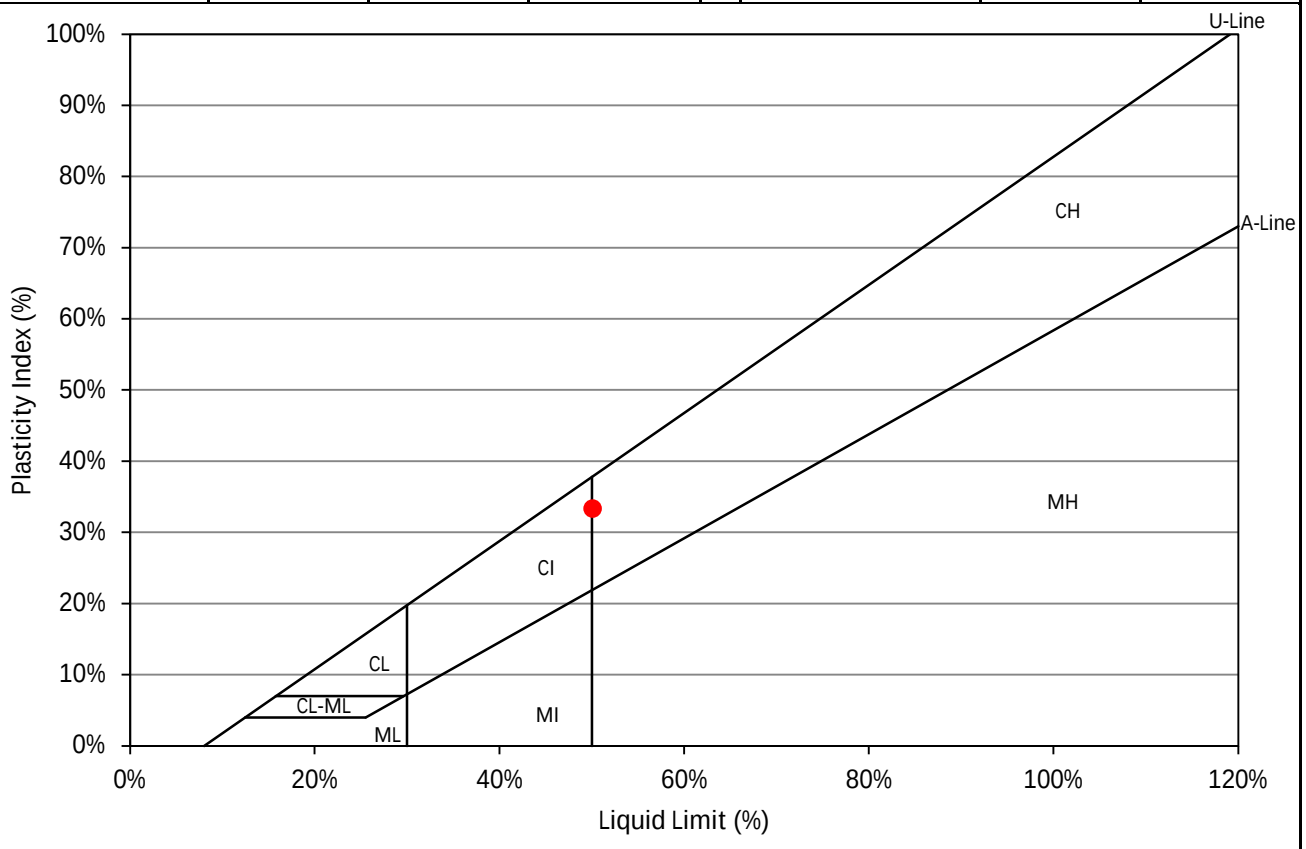
Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	TH21-02E (Lakeshore Rd.)	Sample Date:	December 22, 2021
Sample Depth:	0.91 - 1.07 m	Lab Technician:	EManimbao
Sample Number:	G3	Date Tested:	March 3, 2022

Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	34	28	21
Wet Sample (g)	9.1	10.2	9.7
Dry Sample (g)	6.1	6.8	6.4
Water Content (%)	47.4%	49.4%	51.5%

Plastic Limit		
Trial	1	2
Wet Sample (g)	7.1	8.2
Dry Sample (g)	6.1	7.0
Water Content (%)	16.9%	16.7%



Liquid Limit (%): 50.1%	Plastic Limit (%): 16.8%	Plasticity Index (%): 33.3%

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R3P 0Y7
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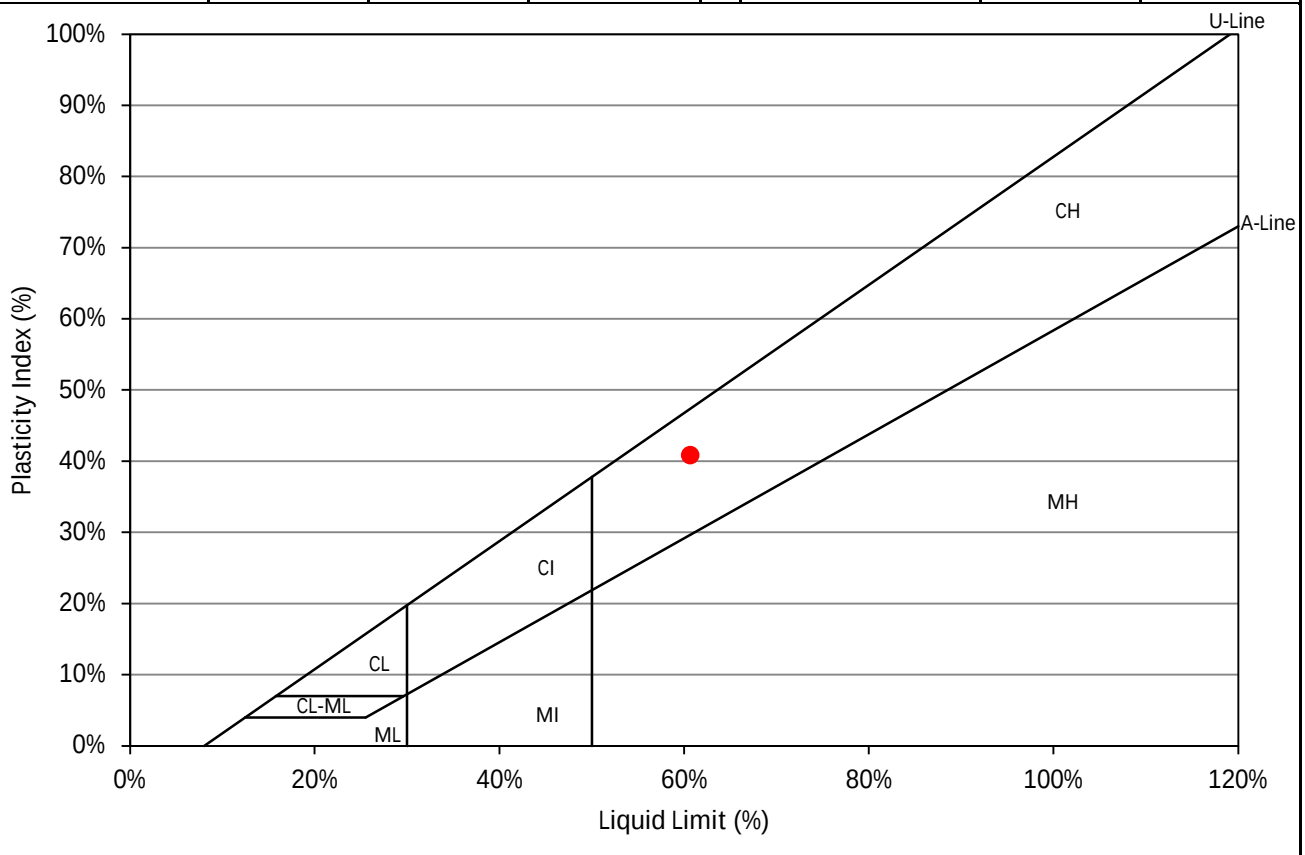
Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	TH21-03E (Lakeshore)	Sample Date:	December 22, 2021
Sample Depth:	0.61 - 0.76 m	Lab Technician:	EManimbao
Sample Number:	G2	Date Tested:	March 3, 2022

Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	33	24	19
Wet Sample (g)	8.5	8.7	7.5
Dry Sample (g)	5.3	5.4	4.6
Water Content (%)	59.2%	61.0%	62.3%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.2	6.6
Dry Sample (g)	5.2	5.5
Water Content (%)	19.8%	19.9%



Liquid Limit (%): 60.7%	Plastic Limit (%): 19.8%	Plasticity Index (%): 40.9%

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CERTIFIED BY CCIL

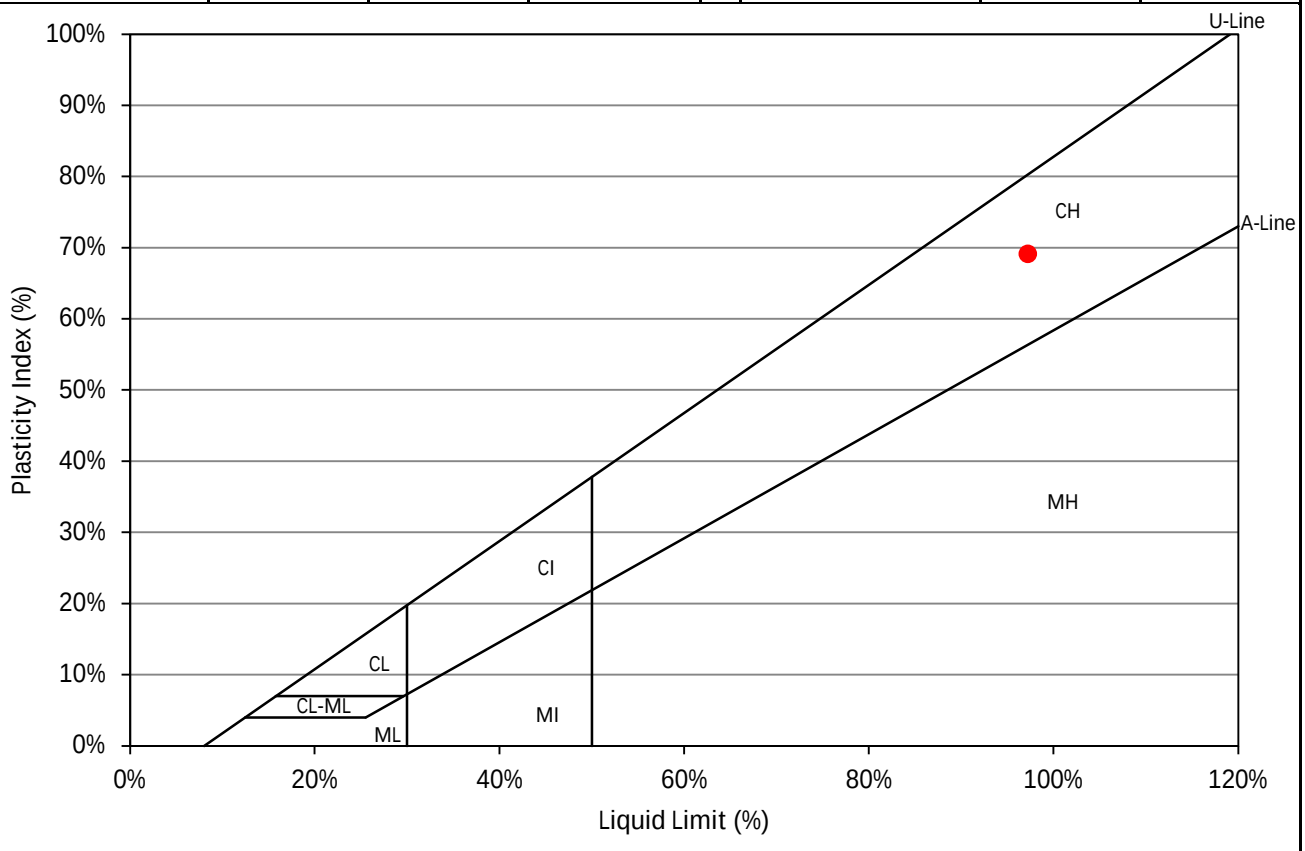
Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	TH21-04E (Lakeshore Rd.)	Sample Date:	December 22, 2021
Sample Depth:	1.22 - 1.37 m	Lab Technician:	EManimbao
Sample Number:	G4	Date Tested:	March 3, 2022

Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	34	30	23
Wet Sample (g)	7.7	7.8	7.2
Dry Sample (g)	4.0	4.0	3.6
Water Content (%)	93.9%	95.0%	98.2%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.5	7.2
Dry Sample (g)	5.1	5.6
Water Content (%)	28.1%	28.1%



Liquid Limit (%): 97.2%	Plastic Limit (%): 28.1%	Plasticity Index (%): 69.1%

GRAIN SIZE DISTRIBUTION
(ASTM D422-63)

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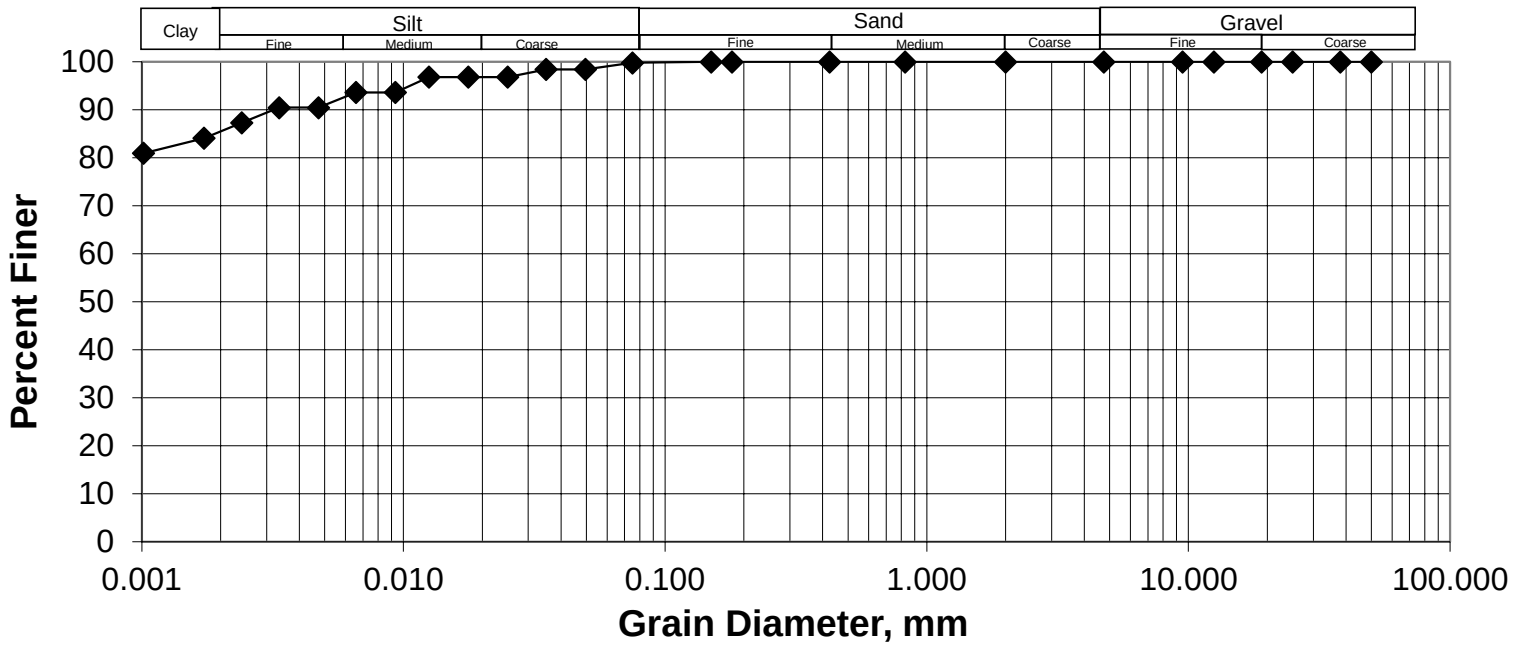
Job No.:	60672214	Hole No.:	TH21-01E (Lakeshore Rd.)
Client:	City of Winnipeg	Sample No.:	G4
Project :	2022 Local Streets (22-R-02)	Depth:	1.22 - 1.37 m
Date Tested:	28-Feb-22	Date Sampled:	Varies
Tested By:	EManimbao	Sampled By:	AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	99.8
38.0	100.0	2.00	100.0	0.0496	98.4
25.0	100.0	0.825	100.0	0.0351	98.4
19.0	100.0	0.425	100.0	0.0250	96.8
12.5	100.0	0.18	100.0	0.0177	96.8
9.5	100.0	0.15	100.0	0.0125	96.8
4.75	100.0	0.075	99.8	0.0093	93.6
				0.0066	93.6
				0.0047	90.5
				0.0033	90.5
				0.0024	87.3
				0.0017	84.1
				0.0010	80.9

GRAIN SIZE DISTRIBUTION CURVE



Gravel	**0.0%**	**Silt**	**14.3%**
Sand	**0.2%**	**Clay**	**85.5%**

GRAIN SIZE DISTRIBUTION
(ASTM D422-63)

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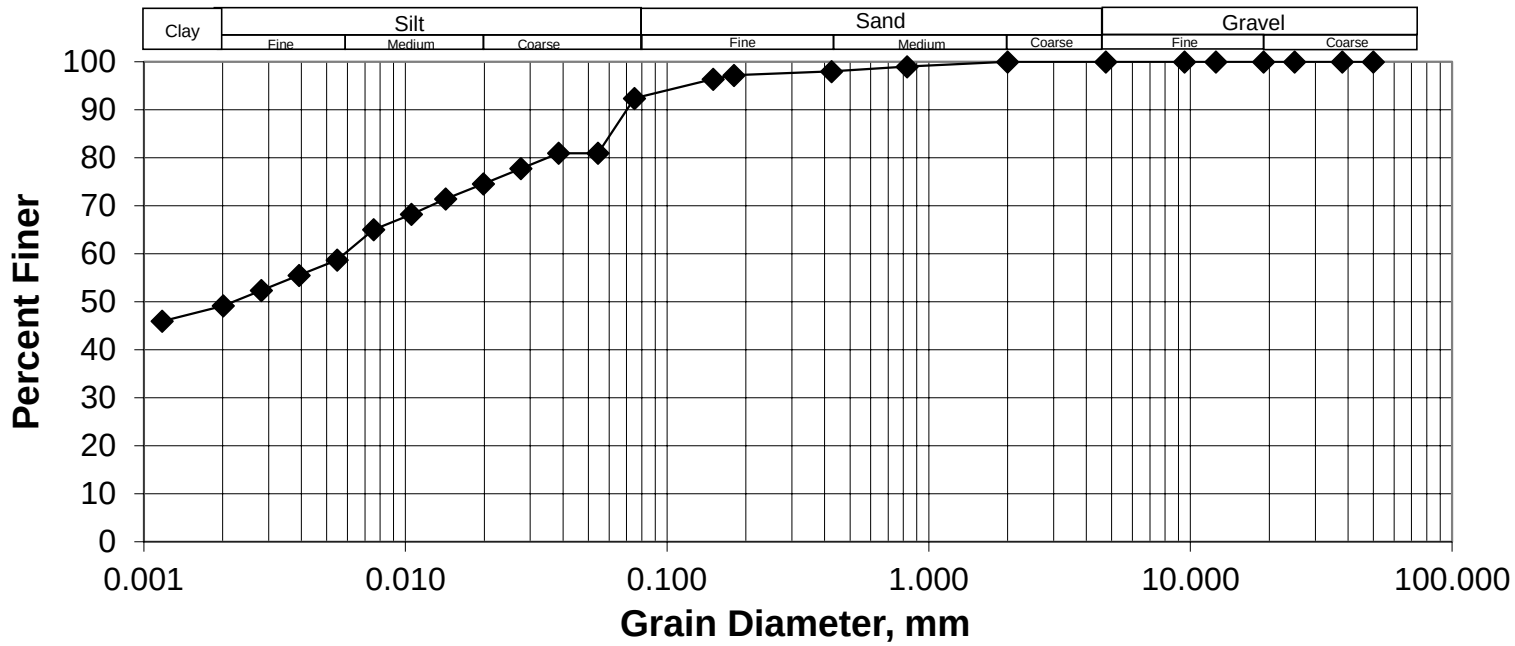
CERTIFIED BY CCIL

Job No.:	60672214	Hole No.:	TH21-02E (Lakeshore Rd.)
Client:	City of Winnipeg	Sample No.:	G3
Project :	2022 Local Streets (22-R-02)	Depth:	0.91 - 1.07 m
Date Tested:	28-Feb-22	Date Sampled:	Varies
Tested By:	EManimbao	Sampled By:	AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	92.4
38.0	100.0	2.00	100.0	0.0544	80.9
25.0	100.0	0.825	99.0	0.0385	80.9
19.0	100.0	0.425	98.0	0.0276	77.8
12.5	100.0	0.18	97.2	0.0198	74.6
9.5	100.0	0.15	96.4	0.0142	71.4
4.75	100.0	0.075	92.4	0.0105	68.2
				0.0075	65.1
				0.0055	58.7
				0.0039	55.5
				0.0028	52.3
				0.0020	49.2
				0.0012	46.0

GRAIN SIZE DISTRIBUTION CURVE



Gravel	**0.0%**	**Silt**	**43.2%**
Sand	**7.6%**	**Clay**	**49.2%**

GRAIN SIZE DISTRIBUTION
(ASTM D422-63)

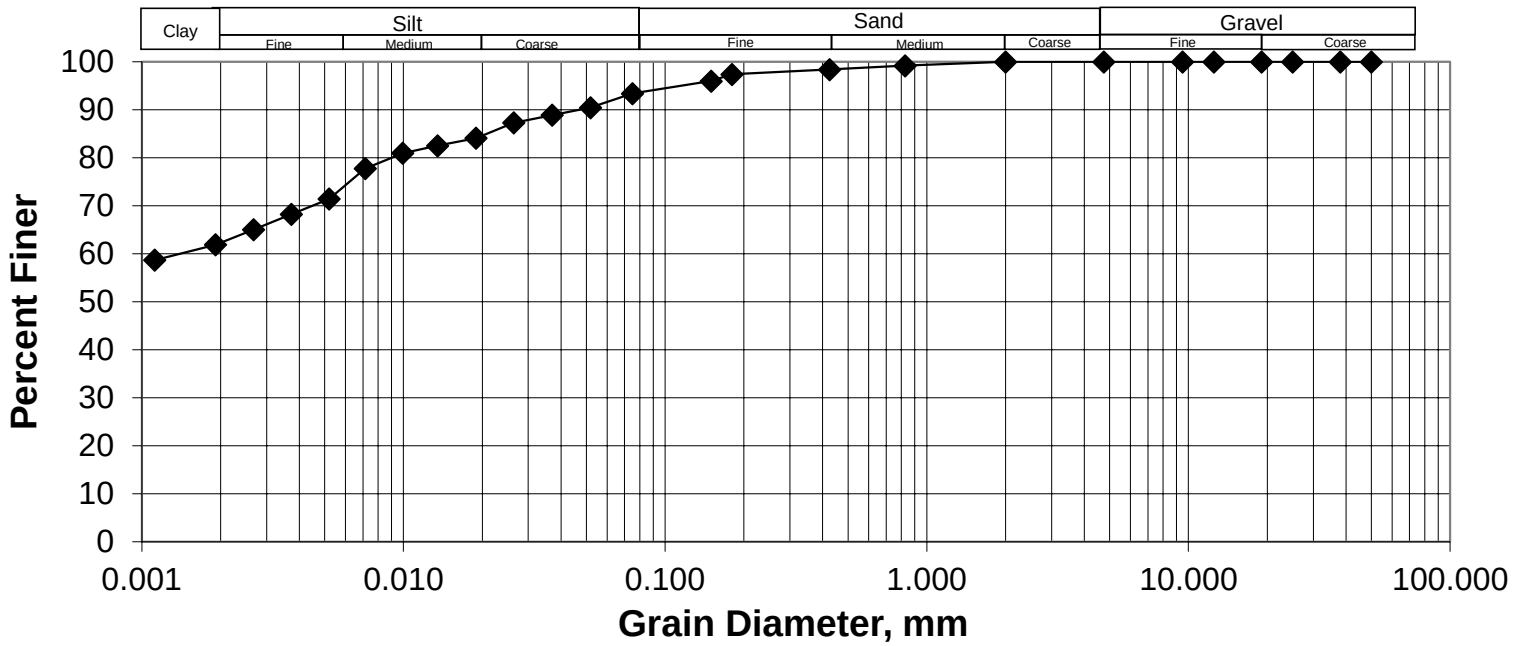
AECOM
WINNIPEG GEOTECHNICAL LABORATORY
99 Commerce Dr., Winnipeg, MB R3P 0Y7 Canada
tel (204) 477-5381 **fax** (431) 800-1210

CERTIFIED BY CCIL

Job No.:	60672214	Hole No.:	TH21-03E (Lakeshore Rd.)
Client:	City of Winnipeg	Sample No.:	G2
Project :	2022 Local Streets (22-R-02)	Depth:	0.61 - 0.76 m
Date Tested:	28-Feb-22	Date Sampled:	Varies
Tested By:	EManimbao	Sampled By:	AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	93.4
38.0	100.0	2.00	100.0	0.0518	90.5
25.0	100.0	0.825	99.2	0.0370	88.9
19.0	100.0	0.425	98.4	0.0264	87.3
12.5	100.0	0.18	97.4	0.0189	84.1
9.5	100.0	0.15	96.0	0.0135	82.5
4.75	100.0	0.075	93.4	0.0099	80.9
				0.0071	77.8
				0.0052	71.4
				0.0037	68.2
				0.0027	65.1
				0.0019	61.9
				0.0011	58.7

GRAIN SIZE DISTRIBUTION CURVE



Gravel	**0.0%**	**Silt**	**31.2%**
Sand	**6.6%**	**Clay**	**62.2%**

GRAIN SIZE DISTRIBUTION
(ASTM D422-63)

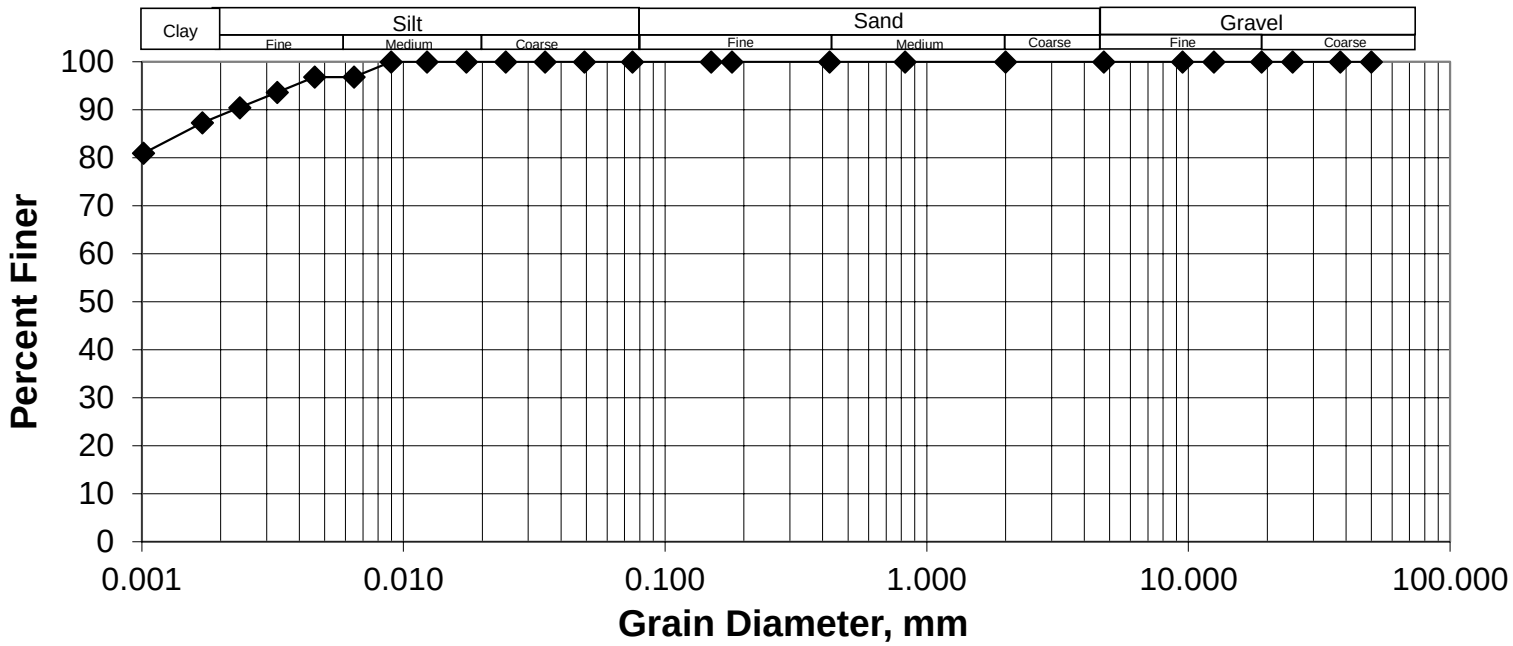
AECOM
WINNIPEG GEOTECHNICAL LABORATORY
99 Commerce Dr., Winnipeg, MB R3P 0Y7 Canada
tel (204) 477-5381 **fax** (431) 800-1210

CERTIFIED BY CCIL

Job No.:	60672214	Hole No.:	TH21-04E (Lakeshore Rd.)
Client:	City of Winnipeg	Sample No.:	G4
Project :	2022 Local Streets (22-R-02)	Depth:	1.22 - 1.37 m
Date Tested:	28-Feb-22	Date Sampled:	Varies
Tested By:	EManimbao	Sampled By:	AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0491	100.0
25.0	100.0	0.825	100.0	0.0347	100.0
19.0	100.0	0.425	100.0	0.0246	100.0
12.5	100.0	0.18	100.0	0.0174	100.0
9.5	100.0	0.15	100.0	0.0123	100.0
4.75	100.0	0.075	100.0	0.0090	100.0
				0.0065	96.8
				0.0046	96.8
				0.0033	93.6
				0.0024	90.5
				0.0017	87.3
				0.0010	80.9

GRAIN SIZE DISTRIBUTION CURVE



Gravel	**0.0%**	**Silt**	**11.3%**
Sand	**0.0%**	**Clay**	**88.7%**

H. MANALO CONSULTING LTD.
1402 Notre Dame Ave, Winnipeg MB R3E 3G5
Phone: 204-697-3854 Cell: 204-997-1355

Canadian Council of Independent Laboratories

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

Client:	AECOM Canada Ltd.	Project No.:	112-2205
	99 Commerce Drive	CBR test No.:	4
	Winnipeg MB R3P 0Y7	Lab No.:	HM 008
Attention:	Rico Manimbao	Date sampled:	
Project	Job No. 60672214	Date Received :	27-Jan-22
Location:	Lakeshore Rd. - Chancellor to Chancellor	Date Tested /By:	19-Feb-22 / ECS

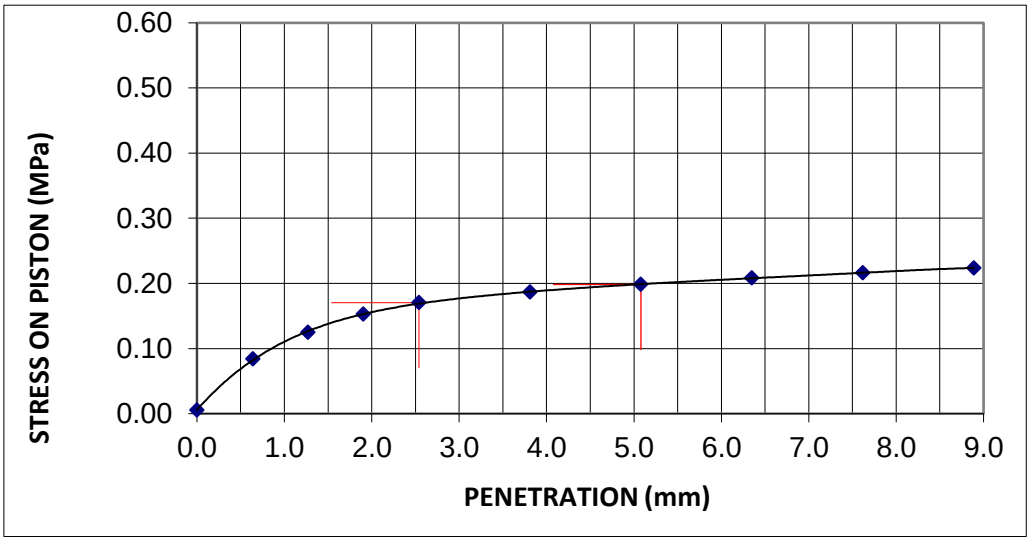
SAMPLE DATA			
Sample Type:	Clay		
Source:	TH21-01, B1 2'-5'		
Sampled by:	Client		
Optimum Moisture Content:	27.4	%	
Maximum Dry Density:	1455	kg/cm^3	
Method of Compaction:	Standard Proctor		
Tested by:	ECS	Date Tested:	10-Feb-22

SPECIMEN DATA		
DESCRIPTION	Before Soaking	After Testing
Moisture Content (MC), %	27.8	
MC of top 25mm layer, %		33.4
Dry Density, kg/m^3	1430	
Compaction,%	98%	
CBR, %	2.5	
Swell, %	1.6	

LOAD DATA

PENETRATION mm	STRESS MPa
0	0.01
0.64	0.08
1.27	0.12
1.91	0.15
2.54	0.17
3.81	0.19
5.08	0.20
6.35	0.21
7.62	0.22
8.89	0.22

LOAD PENETRATION CURVE



PENETRATION mm	STANDARD LOAD MPa	TEST LOAD ACTUAL MPa	TEST LOAD CORRECTED MPa	BEARING RATIO (soaked) at 2.5 mm penetration	BEARING RATIO (soaked) at 5.1 mm penetration
2.54	6.9	0.17	0.17	2.5	-
5.08	10.3	0.20	0.20	-	1.9

Remarks: 4 days soaked

Reviewed by: Hermie Manalo

H. MANALO CONSULTING LTD.
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Phone: 204 697-3854 Cell: 204 997-1355
hermie@hmanalo.ca

MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd.	PROJECT No.:	112-2205
	99 Commerce Drive	PROCTOR Test No.:	4
	Winnipeg MB R3P 0Y7	LAB No.:	HM 008
ATTENTION:	Rico Manimbao		
PROJECT:	Job No. 60672214		
	Lakeshore Rd. - Chancellor to Chancellor		

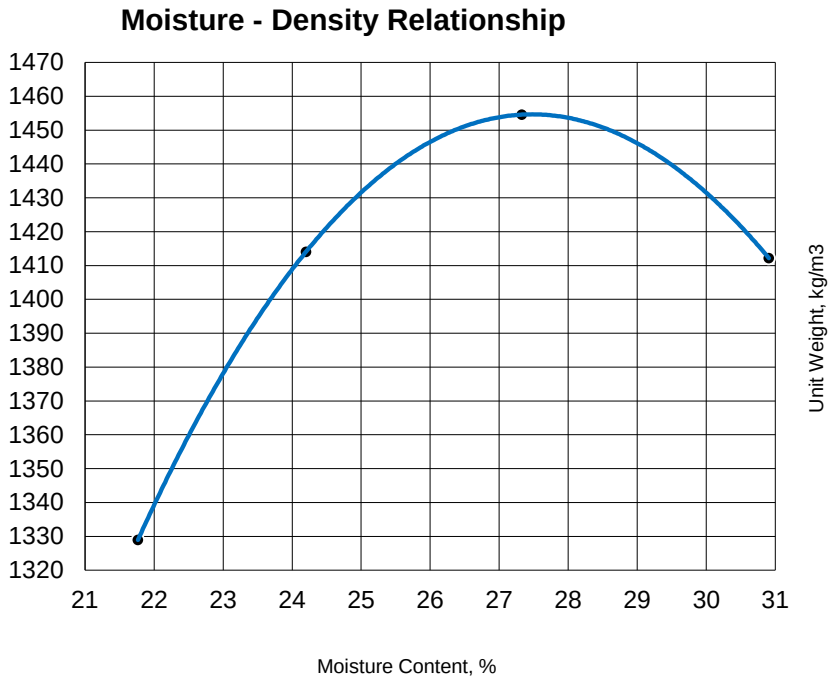
Date Sampled:	N/A	Date Received:	27-Jan-22
Sampled By:	Client	Date Tested:	10-Feb-22

MATERIAL INFORMATION

Material Type:	Clay		
Material Use:	Subgrade	Material Supplier:	in-situ
Maximum Size:	4.75 mm	Material Source:	TH21-01, B1 2'-5'

PROCEDURE	A
PREPARATION	Dry
COMPACTION METHOD	Manual
BLOWS PER LAYER	25
NO. OF LAYERS	3
MOLD SIZE	100
MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg

Test No.	1	2	3	4
Wet Density	1618	1756	1852	1849
Moisture Content	21.8	24.2	27.3	30.9
Dry Density	1329	1414	1455	1412



Maximum Dry Density (MDD): 1455 kg/m³

Optimum Moisture Content 27.4 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve: ____ %

Corrected Moisture: 27.4 %

Corrected Maximum Dry Density: 1455 kg/m³

Remarks:

P. Bevel

Tested by: E. Santiago

Reviewed by: Paul Bevel

H. MANALO CONSULTING LTD.
1402 Notre Dame Ave, Winnipeg MB R3E 3G5
Phone: 204-697-3854 Cell: 204-997-1355

Canadian Council of Independent Laboratories

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

Client:	AECOM Canada Ltd.	Project No.:	112-2205
	99 Commerce Drive	CBR test No.:	3
	Winnipeg MB R3P 0Y7	Lab No.:	HM 008
Attention:	Rico Manimbao	Date sampled:	
Project	Job No. 60672214	Date Received :	27-Jan-22
Location:	Lakeshore Rd. - Chancellor to Chancellor	Date Tested /By:	19-Feb-22 / ECS

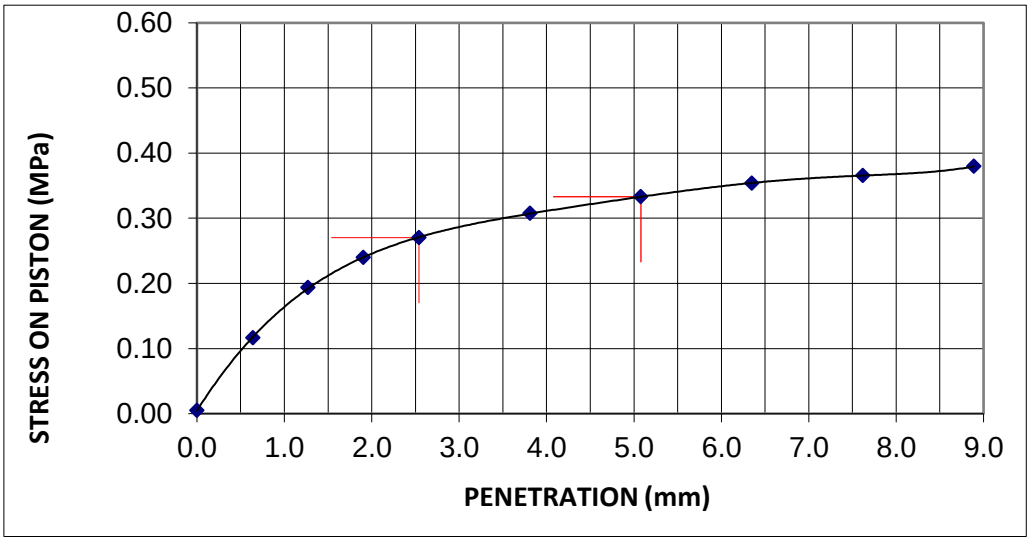
SAMPLE DATA			
Sample Type:	Clay		
Source:	TH21-03, B2 2'-5'		
Sampled by:	Client		
Optimum Moisture Content:	25.4	%	
Maximum Dry Density:	1510	kg/cm^3	
Method of Compaction:	Standard Proctor		
Tested by:	ECS	Date Tested:	10-Feb-22

SPECIMEN DATA		
DESCRIPTION	Before Soaking	After Testing
Moisture Content (MC), %	25.7	
MC of top 25mm layer, %		28.9
Dry Density, kg/m^3	1497	
Compaction,%	99%	
CBR, %	3.9	
Swell, %	1.6	

LOAD DATA

PENETRATION mm	STRESS MPa
0	0.00
0.64	0.12
1.27	0.19
1.91	0.24
2.54	0.27
3.81	0.31
5.08	0.33
6.35	0.35
7.62	0.37
8.89	0.38

LOAD PENETRATION CURVE



PENETRATION mm	STANDARD LOAD MPa	TEST LOAD ACTUAL MPa	TEST LOAD CORRECTED MPa	BEARING RATIO (soaked) at 2.5 mm penetration	BEARING RATIO (soaked) at 5.1 mm penetration
2.54	6.9	0.27	0.27	3.9	-
5.08	10.3	0.33	0.33	-	3.2

Remarks: 4 days soaked

Reviewed by: Hermie Manalo

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Phone: 204 697-3854 Cell: 204 997-1355
hermie@hmanalo.ca

MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	AECOM Canada Ltd.	PROJECT No.:	112-2205
	99 Commerce Drive	PROCTOR Test No.:	3
	Winnipeg MB R3P 0Y7	LAB No.:	HM 008
ATTENTION:	Rico Manimbao		
PROJECT:	Job No. 60672214		
	Lakeshore Rd. - Chancellor to Chancellor		

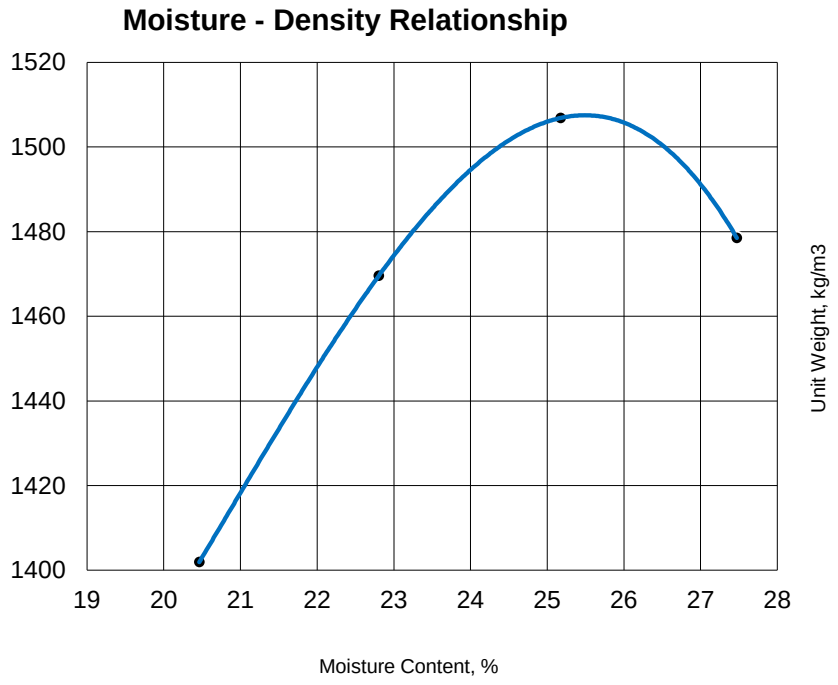
Date Sampled:	N/A	Date Received:	27-Jan-22
Sampled By:	Client	Date Tested:	10-Feb-22

MATERIAL INFORMATION

Material Type:	Clay		
Material Use:	Subgrade	Material Supplier:	in-situ
Maximum Size:	4.75 mm	Material Source:	TH21-03, B2 2'-5'

PROCEDURE	A
PREPARATION	Dry
COMPACTION METHOD	Manual
BLOWS PER LAYER	25
NO. OF LAYERS	3
MOLD SIZE	100
MOLD VOLUME	935
WEIGHT OF HAMMER	2.5 kg

Test No.	1	2	3	4		
Wet Density	1689	1805	1886	1885		
Moisture Content	20.5	22.8	25.2	27.5		
Dry Density	1402	1470	1507	1479		



Maximum Dry Density (MDD): 1510 kg/m³

Optimum Moisture Content 25.4 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75 mm sieve: ____ %

Corrected Moisture: 25.4 %

Corrected Maximum Dry Density: 1510 kg/m³

Remarks:

Tested by: E. Santiago

Reviewed by: Paul Bevel

AECOM Canada Ltd.
Winnipeg Geotechnical Laboratory
99 Commerce Drive
Winnipeg, Manitoba
R3P 0Y7
Phone: 204 477 5381 Fax: 431 800 1210

Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	Lakeshore Rd, (Frontage #27 - #51)	Sample Date:	December 22, 2021
Sample Depth:	Varies	Lab Technician:	EManimbao
Sample Number:	Varies	Date Tested:	February 11, 2022

Moisture Content (ASTM D2216-10)

Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Location	Sample	Depth (m)	**Moisture Content (%)**
TH21-01F	G1	0.30 - 0.46 m	**11.9%**
	G2	0.61 - 0.76 m	**19.0%**
	G3	0.91 - 1.07 m	**13.6%**
	G4	1.22 - 1.37 m	**14.9%**
	G5	1.52 - 1.68 m	**23.8%**
	G6	2.44 - 2.59 m	**41.1%**

Location	Sample	Depth (m)	**Moisture Content (%)**

AECOM Canada Ltd.
Winnipeg Geotechnical Laboratory
99 Commerce Drive
Winnipeg, Manitoba
R3P 0Y7
Phone: 204 477 5381 Fax: 204 284 2040

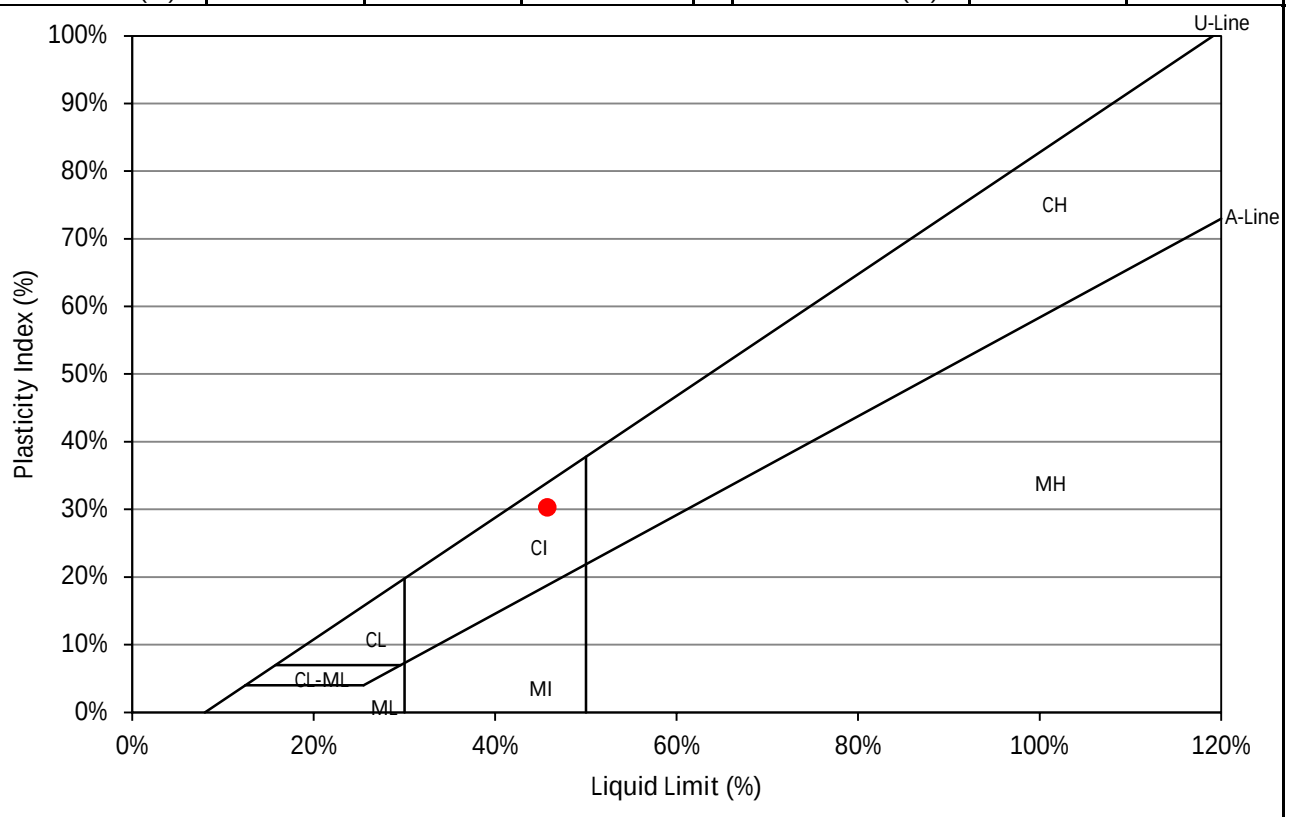
Project Name:	2022 Local Streets (22-R-02)	Supplier:	AECOM
Project Number:	60672214	Specification:	N/A
Client:	City of Winnipeg	Field Technician:	EManimbao
Sample Location:	TH21-01F (Lakeshore-Frontage)	Sample Date:	December 22, 2021
Sample Depth:	0.61 - 0.76 m	Lab Technician:	EManimbao
Sample Number:	G2	Date Tested:	March 3, 2022

Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	30	25	20
Wet Sample (g)	8.2	8.9	9.0
Dry Sample (g)	5.7	6.1	6.1
Water Content (%)	45.0%	45.6%	46.2%

Plastic Limit		
Trial	1	2
Wet Sample (g)	7.3	7.0
Dry Sample (g)	6.3	6.1
Water Content (%)	15.2%	15.6%



Liquid Limit (%): 45.7%	Plastic Limit (%): 15.4%	Plasticity Index (%): 30.3%

GRAIN SIZE DISTRIBUTION
(ASTM D422-63)

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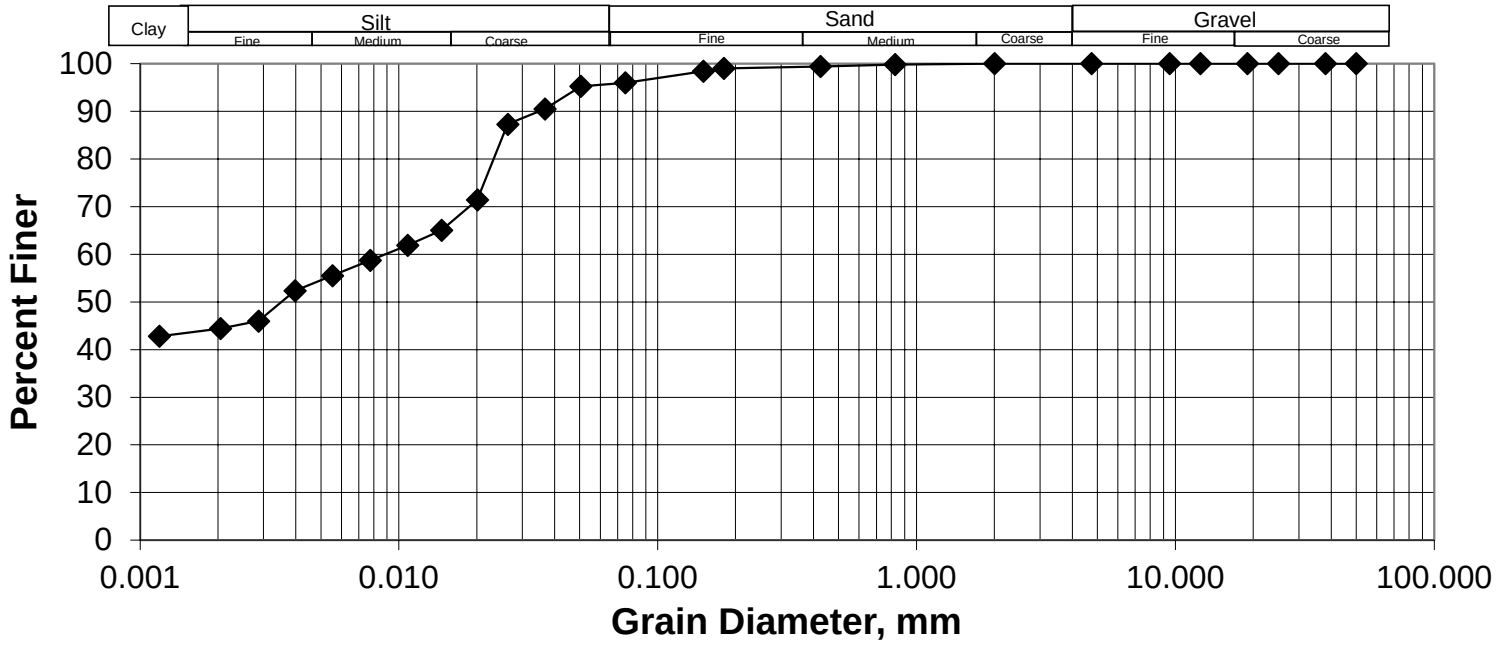
99 Commerce Dr., Winnipeg, MB R3P 0Y7 Canada
tel (204) 477-5381 **fax** (431) 800-1210

CERTIFIED BY CCIL

Job No.:	60672214	Hole No.:	TH21-01F (Lakeshore-Frontage)
Client:	City of Winnipeg	Sample No.:	G2
Project :	2022 Local Streets (22-R-02)	Depth:	0.61 - 0.76 m
Date Tested:	28-Feb-22	Date Sampled:	Varies
Tested By:	EManimbao	Sampled By:	AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	96.0
38.0	100.0	2.00	100.0	0.0505	95.2
25.0	100.0	0.825	99.8	0.0367	90.5
19.0	100.0	0.425	99.4	0.0264	87.3
12.5	100.0	0.18	99.0	0.0201	71.4
9.5	100.0	0.15	98.4	0.0146	65.1
4.75	100.0	0.075	96.0	0.0108	61.9
				0.0077	58.7
				0.0055	55.5
				0.0040	52.3
				0.0029	46.0
				0.0020	44.4
				0.0012	42.8

GRAIN SIZE DISTRIBUTION CURVE



Gravel	**0.0%**	**Silt**	**51.6%**
Sand	**4.0%**	**Clay**	**44.4%**