APPENDIX 'A' - GEOTECHNICAL REPORT

PAVEMENT CORES FOR:

Bronx Avenue from Henderson Highway to Roch Street – Concrete Pavement Rehabilitation
Helmsdale Avenue from Henderson Highway to Brazier Street – Concrete Pavement Rehabilitation
Hazel Dell Avenue from Henderson Highway to Brazier Street – Concrete Pavement Rehabilitation
Linden Avenue from Henderson Highway to Roch Street – Concrete Pavement Rehabilitation
Oakview Avenue from Henderson Highway to Brazier Street – Concrete Pavement Rehabilitation
Raleigh Street from Gilmore Avenue to Glenway Avenue – Asphalt Pavement Resurfacing

The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure and/or soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. However, variations in pavement structure and/or soil conditions 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.

Stantec Consulting Ltd.
199 Henlow Bay
Winnipeg MB R3Y 1G4

January 31, 2023

Project/File: 123316298

Erik Hansen
City of Winnipeg
1155 Pacific Avenue
Winnipeg, MB R3B 1B9

Good day Erik,

Reference: 2023 Local Street Renewals Program – Bronx Avenue and Various Locations

Stantec Consulting Ltd. (Stantec) was retained to undertake a factual geotechnical investigation for the 2023 Local Street Renewals Program (Bronx Avenue and Various Locations) located in Winnipeg, MB. Use of this report is subject to the Statement of General Conditions provided in **Appendix A**.

The subsurface coring and drilling sampling program was conducted from January 6 to January 13, 2023. Pavement coring was performed by Stantec geotechnical personnel, and drilling services were provided by Maple Leaf Drilling Ltd. under Stantec's supervision. The borehole locations are shown on the attached Borehole Location Plan provided in **Appendix B**. The pavement cores were sampled with a 150 or 100 mm bit and boreholes were drilled with 125 mm solid stem augers. Geotechnical drilling boreholes were terminated at a depth of 1.0 m below pavement, and soil samples were obtained directly from the auger flights at 0.3 m intervals. Upon completion of drilling, the testholes were examined for evidence of sloughing and groundwater seepage. The soil classification used in the borehole records is as per ASTM D2487 – *Standard Practice for Classification of Soils for Engineering Purposes.* The borehole records are provided in **Appendix C** and core photographs are provided in **Appendix D**.

The following laboratory tests were conducted on select soil samples:

- ASTM D2216 - *Laboratory Determination of Water (Moisture) Content of Soil by Mass*
- ASTM D4318 - *Liquid Limit, Plastic Limit, and Plasticity Index of Soils*
- ASTM D7928 - *Particle-Size Distribution of Fine-Grained Soils Using The Sedimentation Analysis*
- CSA A23.2-14C – *Obtaining and testing drilled cores for compressive strength testing*

The concrete compressive strength tests were conducted under wet conditions. The moisture content results are shown on the borehole records, and the laboratory test reports are provided in **Appendix E**.

We appreciate the opportunity to assist you on this project. Please contact the undersigned if you have any questions regarding this report.

Reference: **2023 Local Street Renewals Program – Bronx Avenue and Various Locations**

Regards,

STANTEC CONSULTING LTD.

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Attachment: Appendix A – Statement of General Conditions
Appendix B – Borehole Location Plan
Appendix C – Borehole Records
Appendix D – Core Photographs
Appendix E – Laboratory Test Reports

APPENDIX A

Statement of General Conditions

STATEMENT OF GENERAL CONDITIONS

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Stantec and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Stantec's present understanding of the site-specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site-specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Stantec is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state or province of execution for the specific professional service provided to the Client. No other warranty is made.

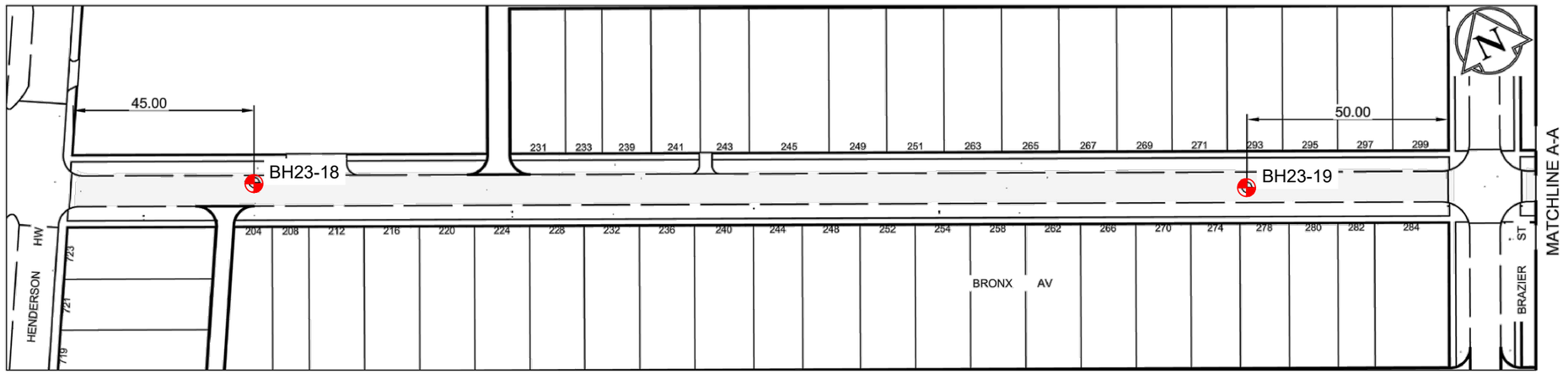
INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Stantec at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock, and groundwater conditions as influenced by geological processes, construction activity, and site use.

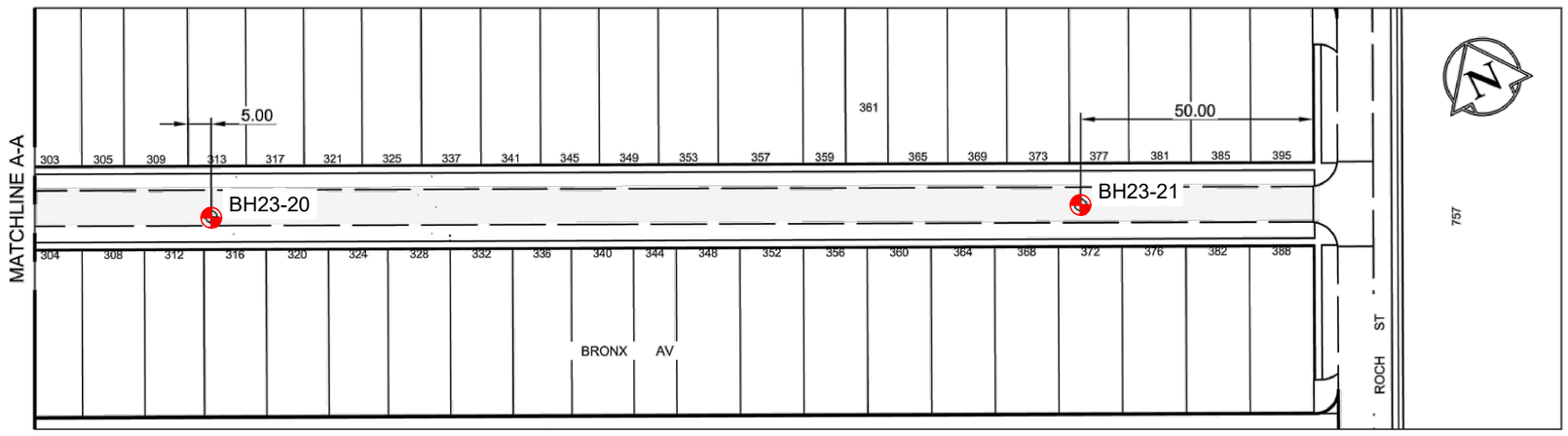
VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Stantec must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Stantec will not be responsible to any party for damages incurred as a result of failing to notify Stantec that differing site or sub-surface conditions are present upon becoming aware of such conditions.

PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Stantec, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc.), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Stantec cannot be responsible for site work carried out without being present.

APPENDIX B

Borehole Location Plan





NOTE: -DRILL PAVEMENT CORE ONLY EACH TEST HOLE LOCATION
-MAJOR REHABILITATION

EXACT LOCATIONS OF TEST HOLES TO BE MARKED IN FIELD BY CONTRACT ADMINISTRATOR.

TESTHOLE

DATE:	DRAWING NO.:
17/05/2021	1
DRAWN BY: M.A.D.	SCALE: N.T.S.

2023 LOCAL STREET RENEWAL PROGRAM

CORING DRAWING
BRONX AVE : FROM HENDERSON HW TO ROCH ST

ORIGINAL SHEET - ISO 11x17 - v17.05

2023-01-24
123316298

\\CA0196-PFFS01\WorkGroup\1233\active\123316298\field_data\drawings\16298_BHLP.dwg BRONX
2023/01/25 11:04 AM By: Boughton, Lee

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www.stantec.com

Legend

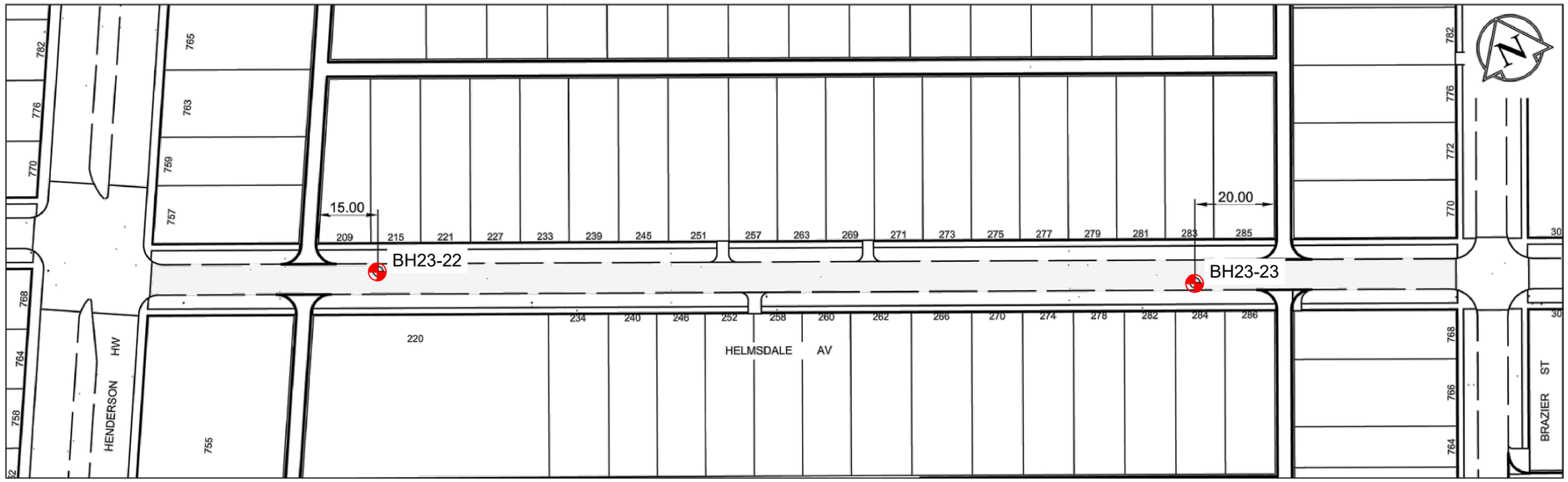
APPROXIMATE BOREHOLE LOCATION

Scale

Client/Project
CITY OF WINNIPEG
2023 LOCAL STREET RENEWALS PROGRAM
WINNIPEG, MB

Figure No.
BRONX

Title
BOREHOLE LOCATION PLAN



NOTE: -DRILL PAVEMENT CORE ONLY EACH TEST HOLE LOCATION
-MAJOR REHABILITATION

EXACT LOCATIONS OF TEST HOLES TO BE MARKED IN FIELD BY CONTRACT ADMINISTRATOR.

TESTHOLE

DATE:	DRAWING NO.:
17/05/2021	1
DRAWN BY:	SCALE:
M.A.D.	N.T.S.

2023 LOCAL STREET RENEWAL PROGRAM

CORING DRAWING
HELMSDALE AVE : FROM HENDERSON HW TO BRAZIER ST

ORIGINAL SHEET - ISO 11x17 - v17.05

2023-01-25
123316298

\\CA0196-PFPS01\WorkGroup\1233\active\123316298\field_data\drawings\16298_BHLP.dwg HELMSDALE
2023/01/31 11:21 AM By: Boughton, Lee

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APPROXIMATE BOREHOLE LOCATION

Scale

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2023 LOCAL STREET RENEWALS PROGRAM
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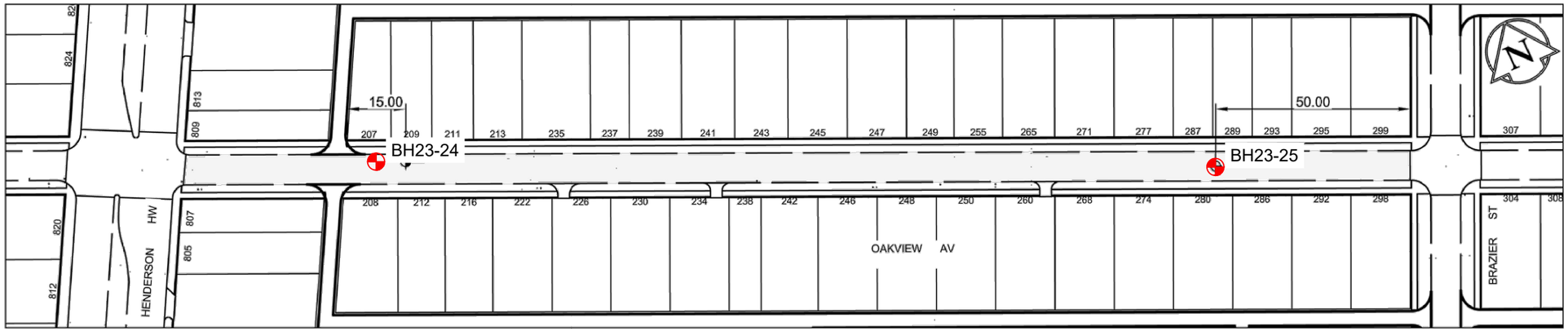
Figure No.
HELMSDALE

Title
BOREHOLE LOCATION PLAN



NOTE: -DRILL PAVEMENT CORE ONLY EACH TEST HOLE LOCATION
-MINOR REHABILITATION

EXACT LOCATIONS OF TEST HOLES TO BE MARKED IN FIELD BY CONTRACT ADMINISTRATOR.

TESTHOLE

DATE:	DRAWING NO.:
17/05/2021	1
DRAWN BY: M.A.D.	SCALE: N.T.S.

2023 LOCAL STREET RENEWAL PROGRAM

CORING DRAWING
OAKVIEW AVE : FROM HENDERSON HW TO BRAZIER ST

ORIGINAL SHEET - ISO 11x17 - v17.05

2023-01-24
123316298

\\CA0196-PPFSS01.WorkGroup\1233\active\123316298\field_data\drawings\16298_BHLP.dwg OAKVIEW
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APPROXIMATE BOREHOLE LOCATION

Scale

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CITY OF WINNIPEG
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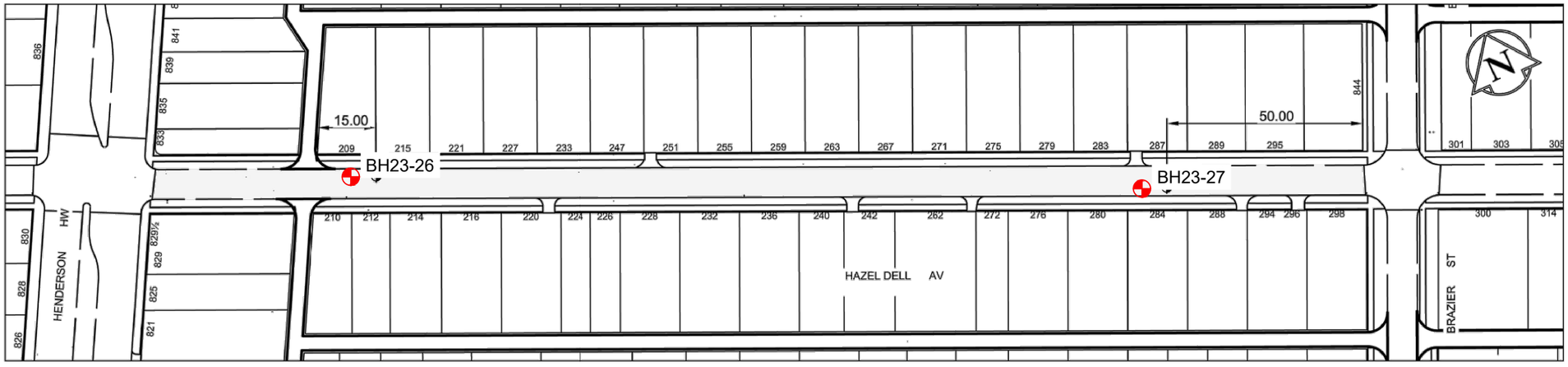
Figure No.
OAKVIEW

Title
BOREHOLE LOCATION PLAN



NOTE: -DRILL PAVEMENT CORE ONLY EACH TEST HOLE LOCATION
-MINOR REHABILITATION

EXACT LOCATIONS OF TEST HOLES TO BE MARKED IN FIELD BY CONTRACT ADMINISTRATOR.

TESTHOLE

DATE:	DRAWING NO.:
17/05/2021	1
DRAWN BY: M.A.D.	SCALE: N.T.S.

2023 LOCAL STREET RENEWAL PROGRAM

CORING DRAWING
HAZEL DELL AVE : FROM HENDERSON HW TO BRAZIER ST

ORIGINAL SHEET - ISO 11x17 - v17.05

2023-01-25
123316298

\\CA0196-PPFSS01\WorkGroup\1233\active\123316298\field_data\drawings\16298_BHLP.dwg HAZEL DELL
2023/01/31 11:22 AM By: Boughton, Lee

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APPROXIMATE BOREHOLE LOCATION

Scale

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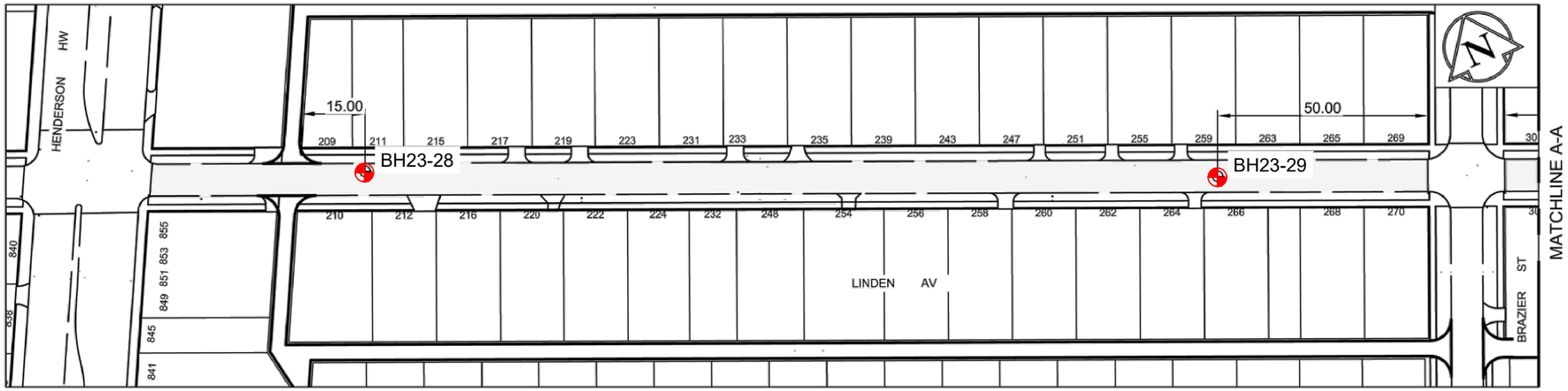
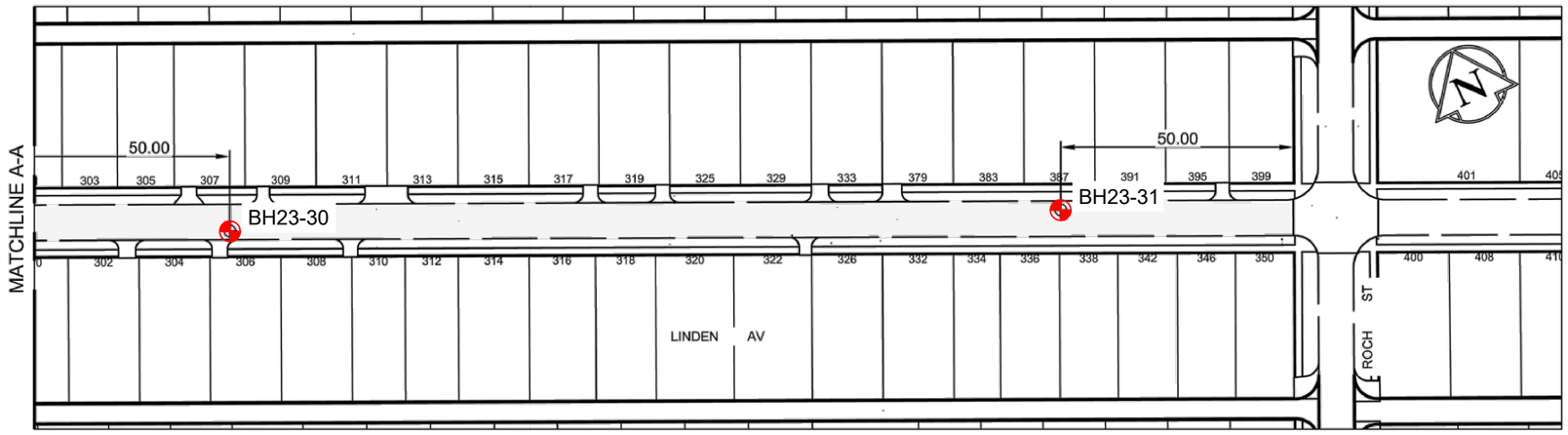
2023 LOCAL STREET RENEWALS PROGRAM
WINNIPEG, MB

Figure No.
HAZEL DELL

Title
BOREHOLE LOCATION PLAN





NOTE: -DRILL PAVEMENT CORE ONLY EACH TEST HOLE LOCATION
-MINOR REHABILITATION

EXACT LOCATIONS OF TEST HOLES TO BE MARKED IN FIELD BY CONTRACT ADMINISTRATOR.

TESTHOLE

DATE:	DRAWING NO.:	2023 LOCAL STREET RENEWAL PROGRAM
17/05/2021	1	CORING DRAWING **LINDEN AVE** : FROM HENDERSON HW TO ROCH ST
DRAWN BY: M.A.D.	SCALE: N.T.S.	

ORIGINAL SHEET - ISO 11x17 - v17.05

2023-01-24
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2023/01/25 11:06 AM By: Boughton, Lee

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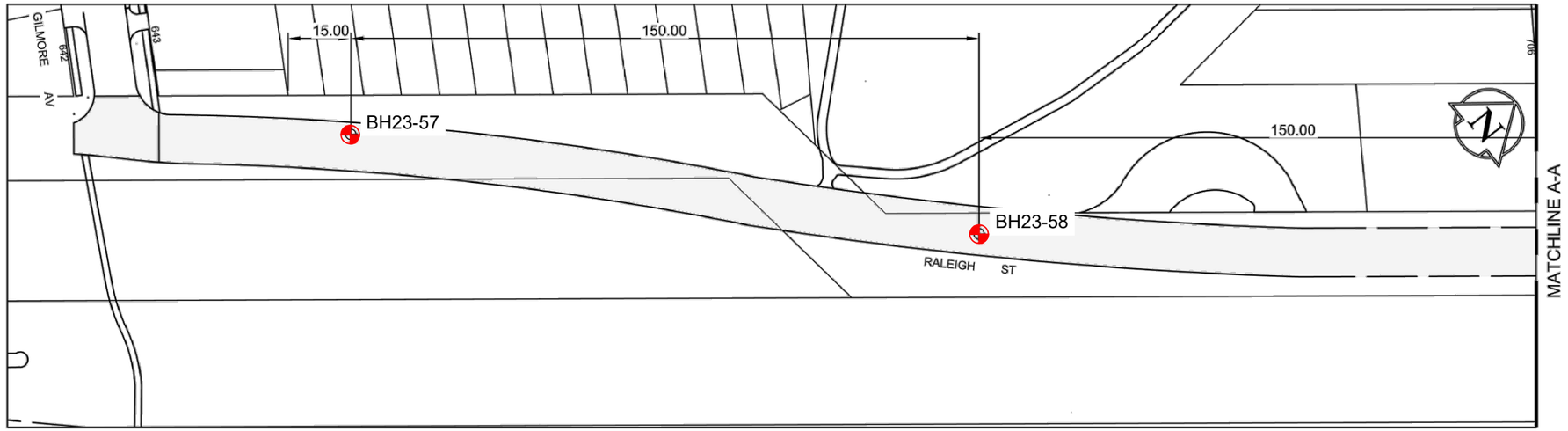
APPROXIMATE BOREHOLE LOCATION

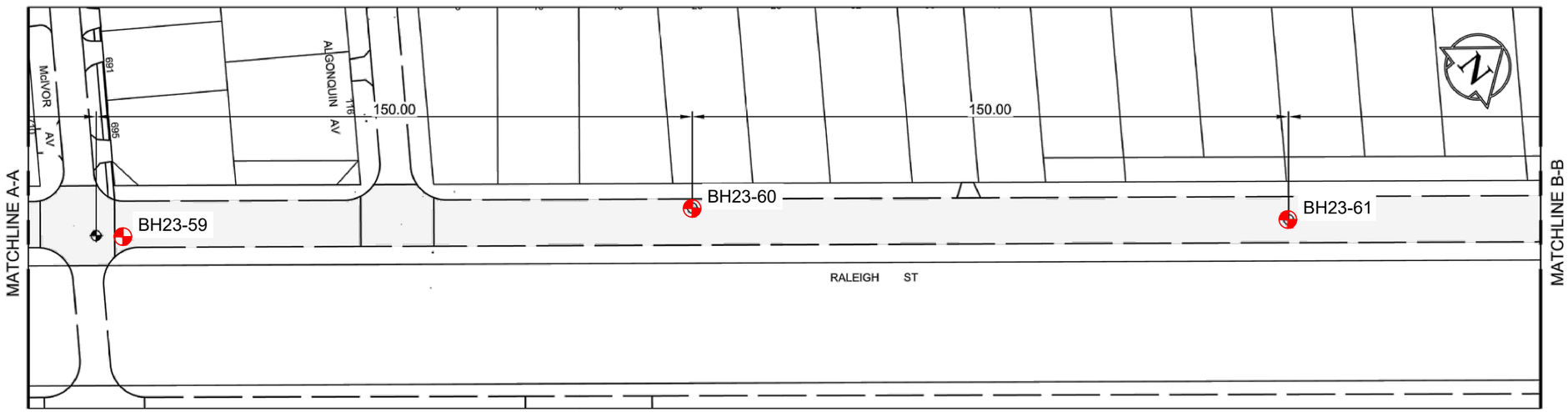
Scale

Client/Project
CITY OF WINNIPEG
2023 LOCAL STREET RENEWALS PROGRAM
WINNIPEG, MB

Figure No.
LINDEN

Title
BOREHOLE LOCATION PLAN





NOTE: -GEOTECHNICAL TESTHOLES 1m DEPTH
-AC RESURFACE

EXACT LOCATIONS OF TEST HOLES TO BE MARKED IN FIELD BY CONTRACT ADMINISTRATOR.

TESTHOLE

DATE:	DRAWING NO.:
17/05/2021	1
DRAWN BY: M.A.D.	SCALE: N.T.S.

2023 LOCAL STREET RENEWAL PROGRAM

CORING DRAWING
RALEIGH ST : FROM GILMORE ST TO GLENWAY ST

ORIGINAL SHEET - ISO 11x17 - v17.05

2023-01-24
123316298

\\CA0196-PFSS01\WorkGroup\1233\active\123316298\field_data\drawings\16298_BHLP.dwg RALEIGH 1
2023/01/25 11:03 AM By: Boughton, Lee

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APPROXIMATE BOREHOLE LOCATION

Scale

Client/Project
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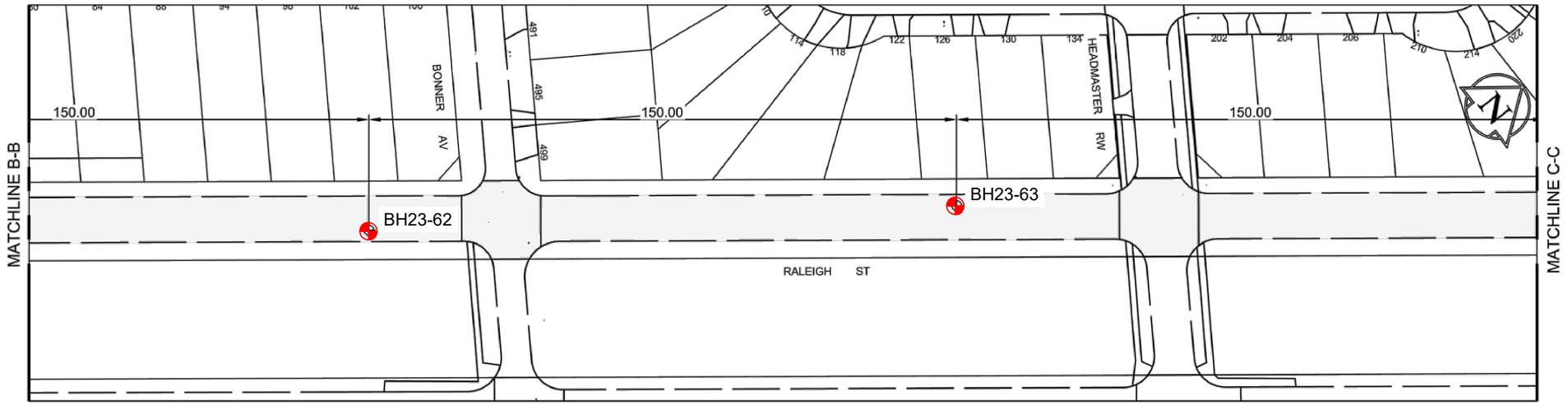
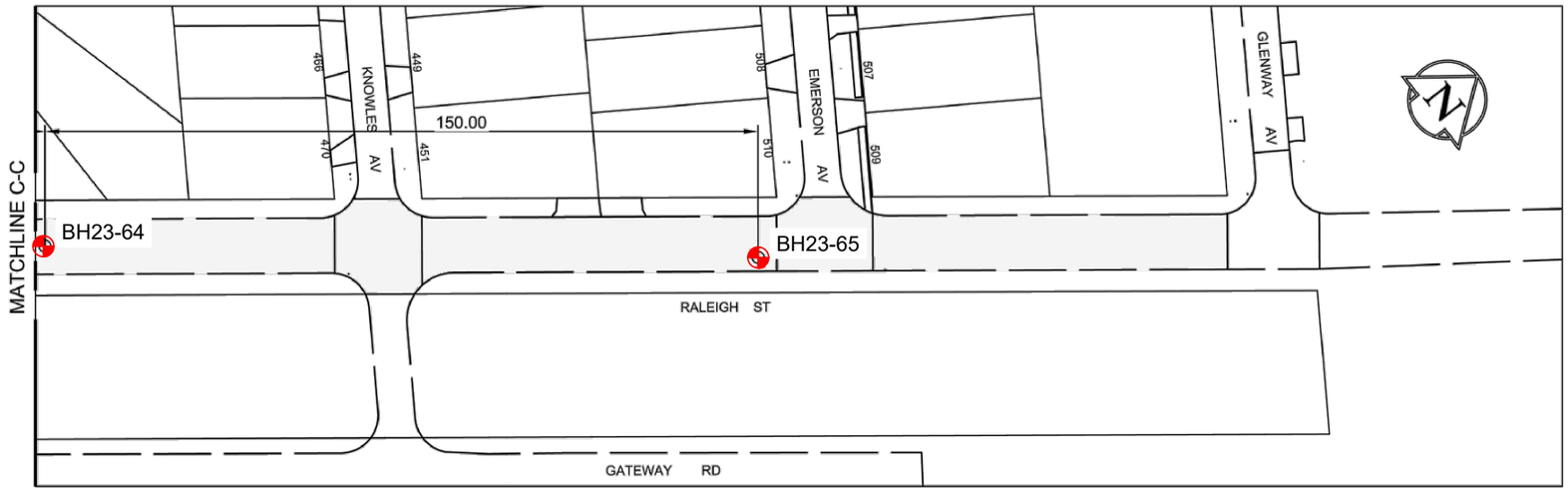
2023 LOCAL STREET RENEWALS PROGRAM
WINNIPEG, MB

Figure No.
RALEIGH (1 OF 2)

Title
BOREHOLE LOCATION PLAN





NOTE: -GEOTECHNICAL TESTHOLES 1m DEPTH
-AC RESURFACE

EXACT LOCATIONS OF TEST HOLES TO BE MARKED IN FIELD BY CONTRACT ADMINISTRATOR.

TESTHOLE

DATE:	DRAWING NO.:	2023 LOCAL STREET RENEWAL PROGRAM
17/05/2021	2	CORING DRAWING **RALEIGH ST** : FROM GILMORE ST TO GLENWAY ST
DRAWN BY: M.A.D.	SCALE: N.T.S.	

ORIGINAL SHEET - ISO 11x17 - v17.05

2023-01-24
123316298

\\CA0196-PFFSS01\WorkGroup\1233\active\123316298\field_data\drawings\16298_BHLP.dwg RALEIGH 2
2023/01/25 11:03 AM By: Boughton, Lee

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APPROXIMATE BOREHOLE LOCATION

Scale

Client/Project
CITY OF WINNIPEG
2023 LOCAL STREET RENEWALS PROGRAM
WINNIPEG, MB

Figure No.
RALEIGH (2 OF 2)

Title
BOREHOLE LOCATION PLAN

APPENDIX C

Borehole Records

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Rootmat	- vegetation, roots and moss with organic matter and topsoil typically forming a mattress at the ground surface
Topsoil	- mixture of soil and humus capable of supporting vegetative growth
Peat	- mixture of visible and invisible fragments of decayed organic matter
Till	- unstratified glacial deposit which may range from clay to boulders
Fill	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	- having cracks, and hence a blocky structure
Varved	- composed of regular alternating layers of silt and clay
Stratified	- composed of alternating successions of different soil types, e.g. silt and sand
Layer	- > 75 mm in thickness
Seam	- 2 mm to 75 mm in thickness
Parting	- < 2 mm in thickness

Terminology describing soil types:
The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488) which excludes particles larger than 75 mm. For particles larger than 75 mm, and for defining percent clay fraction in hydrometer results, definitions proposed by Canadian Foundation Engineering Manual, 4th Edition are used. The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):
Terminology describing materials outside the USCS, (e.g. particles larger than 75 mm, visible organic matter, and construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	> 20%

Terminology describing compactness of cohesionless soils:
The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test (SPT) N-Value - also known as N-Index. The SPT N-Value is described further on page 3. A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
Very Loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>50

Terminology describing consistency of cohesive soils:
The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests. Consistency may be crudely estimated from SPT N-Value based on the correlation shown in the following table (Terzaghi and Peck, 1967). The correlation to SPT N-Value is used with caution as it is only very approximate.

Consistency	Undrained Shear Strength		Approximate SPT N-Value
	kips/sq.ft.	kPa	
Very Soft	<0.25	<12.5	<2
Soft	0.25 - 0.5	12.5 - 25	2-4
Firm	0.5 - 1.0	25 - 50	4-8
Stiff	1.0 - 2.0	50 – 100	8-15
Very Stiff	2.0 - 4.0	100 - 200	15-30
Hard	>4.0	>200	>30

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.

Boulders Cobbles Gravel | Sand | Silt | Clay | Organics | Asphalt | Concrete | Fill | Igneous Bedrock | Meta-morphic Bedrock | Sedi-mentary Bedrock

SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.

WATER LEVEL MEASUREMENT

measured in standpipe, piezometer, or well

inferred

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

N-VALUE

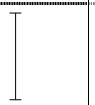
Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (63.5 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (300 mm) into the soil. In accordance with ASTM D1586, the N-Value equals the sum of the number of blows (N) required to drive the sampler over the interval of 6 to 18 in. (150 to 450 mm). However, when a 24 in. (610 mm) sampler is used, the number of blows (N) required to drive the sampler over the interval of 12 to 24 in. (300 to 610 mm) may be reported if this value is lower. For split spoon samples where insufficient penetration was achieved and N-Values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N-values corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to 'A' size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (300 mm) into the soil. The DCPT is used as a probe to assess soil variability.

OTHER TESTS

S	Sieve analysis
H	Hydrometer analysis
k	Laboratory permeability
γ	Unit weight
G_s	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
C	Consolidation
Q_u	Unconfined compression
I_p	Point Load Index (I_p on Borehole Record equals $I_p(50)$ in which the index is corrected to a reference diameter of 50 mm)

	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer

Stantec

BOREHOLE RECORD

BH23-18

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Bronx Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 195 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)
LABORATORY TEST ▲ FIELD VANE TEST ◆
POCKET PEN. ★ POCKET SHEAR VANE ◘
50 kPa 100 kPa 150 kPa 200 kPa
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
SPT (N-value) BLOWS/0.3m ●
Water Content (%) and Blow Count
10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB
Drilling Method: Coring | Reviewed By: GB
Completion Depth: 0.195 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-19

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Bronx Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 155 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)
LABORATORY TEST ▲ FIELD VANE TEST ◆
POCKET PEN. ★ POCKET SHEAR VANE ◘
50 kPa 100 kPa 150 kPa 200 kPa
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
SPT (N-value) BLOWS/0.3m ●
Water Content (%) and Blow Count
10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB
Drilling Method: Coring | Reviewed By: GB
Completion Depth: 0.155 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-20

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Bronx Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 135 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB

Drilling Method: Coring | Reviewed By: GB

Completion Depth: 0.135 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-21

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Bronx Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 147 mm								
		End of Borehole								

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB

Drilling Method: Coring | Reviewed By: GB

Completion Depth: 0.147 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-22

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Hemsdale Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 155 mm								
		End of Borehole								

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB

Drilling Method: Coring | Reviewed By: GB

Completion Depth: 0.155 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-23

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Hemsdale Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 160 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)
LABORATORY TEST ▲ FIELD VANE TEST ◆
POCKET PEN. ★ POCKET SHEAR VANE ◘
50 kPa 100 kPa 150 kPa 200 kPa
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
SPT (N-value) BLOWS/0.3m ●
Water Content (%) and Blow Count
10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB
Drilling Method: Coring | Reviewed By: GB
Completion Depth: 0.16 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-24

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Oakview Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 185 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)
LABORATORY TEST ▲ FIELD VANE TEST ◆
POCKET PEN. ★ POCKET SHEAR VANE ◘
50 kPa 100 kPa 150 kPa 200 kPa
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
SPT (N-value) BLOWS/0.3m ●
Water Content (%) and Blow Count
10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB
Drilling Method: Coring | Reviewed By: GB
Completion Depth: 0.185 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-25

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Oakview Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 155 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)
LABORATORY TEST ▲ FIELD VANE TEST ◆
POCKET PEN. ★ POCKET SHEAR VANE ◘
50 kPa 100 kPa 150 kPa 200 kPa
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
SPT (N-value) BLOWS/0.3m ●
Water Content (%) and Blow Count
10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB
Drilling Method: Coring | Reviewed By: GB
Completion Depth: 0.155 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-26

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Hazel Dell Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 13, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 160 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)
LABORATORY TEST ▲ FIELD VANE TEST ◆
POCKET PEN. ★ POCKET SHEAR VANE ◘
50 kPa 100 kPa 150 kPa 200 kPa
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
SPT (N-value) BLOWS/0.3m ●
Water Content (%) and Blow Count
10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB
Drilling Method: Coring | Reviewed By: GB
Completion Depth: 0.16 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-27

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Hazel Dell Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 13, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 150 mm								
		End of Borehole								

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB

Drilling Method: Coring | Reviewed By: GB

Completion Depth: 0.15 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-28

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Linden Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 13, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 147 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)
LABORATORY TEST ▲ FIELD VANE TEST ◆
POCKET PEN. ★ POCKET SHEAR VANE ◘
50 kPa 100 kPa 150 kPa 200 kPa
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
SPT (N-value) BLOWS/0.3m ●
Water Content (%) and Blow Count
10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB
Drilling Method: Coring | Reviewed By: GB
Completion Depth: 0.147 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-29

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Linden Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 13, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 140 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)
LABORATORY TEST ▲ FIELD VANE TEST ◆
POCKET PEN. ★ POCKET SHEAR VANE ◘
50 kPa 100 kPa 150 kPa 200 kPa
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
SPT (N-value) BLOWS/0.3m ●
Water Content (%) and Blow Count
10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB
Drilling Method: Coring | Reviewed By: GB
Completion Depth: 0.14 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-30

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Linden Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 13, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 150 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)
LABORATORY TEST ▲ FIELD VANE TEST ◆
POCKET PEN. ★ POCKET SHEAR VANE ◘
50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L
SPT (N-value) BLOWS/0.3m ●
Water Content (%) and Blow Count
10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB
Drilling Method: Coring | Reviewed By: GB
Completion Depth: 0.15 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-31

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Linden Ave, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 13, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS	UNDRAINED SHEAR STRENGTH, Cu (kPa) / WATER CONTENT & ATTERBERG LIMITS / SPT (N-value) BLOWS/0.3m	BACKFILL/ MONITOR WELL/ PIEZOMETER	ELEVATION (m)
0		**CONCRETE:** 150 mm									
		End of Borehole									

UNDRAINED SHEAR STRENGTH, Cu (kPa)
LABORATORY TEST ▲ FIELD VANE TEST ◆
POCKET PEN. ★ POCKET SHEAR VANE ◘
50 kPa 100 kPa 150 kPa 200 kPa
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
SPT (N-value) BLOWS/0.3m ●
Water Content (%) and Blow Count
10 20 30 40 50 60 70 80

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Stantec | Logged By: LB
Drilling Method: Coring | Reviewed By: GB
Completion Depth: 0.15 m | Page 1 of 1

BOREHOLE RECORD

BH23-57

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Raleigh St, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 6, 2023 to January 11, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or TCR %	SAMPLES N-VALUE or RQD %	OTHER TESTS / REMARKS
0		**ASPHALT:** 150 mm						
		Granular FILL		AS				
		Black, moist, fat CLAY FILL (CH)		AS				
				AS				
1				AS				
		End of Borehole • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed upon completion of drilling. • Borehole stopped at a depth of 1.2 m.						

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL/ MONITOR WELL/ PIEZOMETER

ELEVATION (m)

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Maple Leaf Drilling Ltd. | Logged By: LB

Drilling Method: 125 mm SSA | Reviewed By: GB

Completion Depth: 1.2 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-58

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Raleigh St, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 6, 2023 to January 16, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or TCR %	SAMPLES N-VALUE or RQD %	OTHER TESTS / REMARKS
0		**ASPHALT:** 190 mm						
		Granular FILL		AS				
		Black, moist, fat CLAY FILL (CH), trace organics		AS				
1				AS				
		End of Borehole • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed upon completion of drilling. • Borehole stopped at a depth of 1.2 m.						

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL/ MONITOR WELL/ PIEZOMETER

ELEVATION (m)

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Maple Leaf Drilling Ltd. | Logged By: LB

Drilling Method: 125 mm SSA | Reviewed By: GB

Completion Depth: 1.2 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-59

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Raleigh St, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 6, 2023 to January 11, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or TCR %	SAMPLES N-VALUE or RQD %	OTHER TESTS / REMARKS
0		**ASPHALT:** 140 mm						
		Granular FILL		AS				
		Black, moist, fat CLAY FILL (CH), trace organics		AS				
				AS				Sieve/Hydro at 0.8 m G 0% S 1% M 32% C 67%
1		Grey, moist, silty CLAY (CL-ML)		AS				
		End of Borehole • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed upon completion of drilling. • Borehole stopped at a depth of 1.2 m.						

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL/ MONITOR WELL/ PIEZOMETER

ELEVATION (m)

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Maple Leaf Drilling Ltd. | Logged By: LB

Drilling Method: 125 mm SSA | Reviewed By: GB

Completion Depth: 1.2 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-60

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Raleigh St, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES: TYPE	SAMPLES: NUMBER	SAMPLES: RECOVERY (mm) or TCR %	SAMPLES: N-VALUE or RQD %	OTHER TESTS / REMARKS
0		**ASPHALT:** 159 mm						
		Granular FILL		AS				
		Black, moist, fat CLAY FILL (CH), trace organics		AS				
1				AS				
				AS				
		End of Borehole • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed upon completion of drilling. • Borehole stopped at a depth of 1.2 m.						

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL/ MONITOR WELL/ PIEZOMETER

ELEVATION (m)

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Maple Leaf Drilling Ltd. | Logged By: LB

Drilling Method: 125 mm SSA | Reviewed By: GB

Completion Depth: 1.2 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-61

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Raleigh St, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or TCR %	SAMPLES N-VALUE or RQD %	OTHER TESTS / REMARKS
0		**ASPHALT:** 165 mm						
		Granular FILL		AS				
		Black, moist, fat CLAY FILL (CH), trace organics		AS				
				AS				
1		Grey, moist, silty CLAY (CL-ML)		AS				
		End of Borehole • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed upon completion of drilling. • Borehole stopped at a depth of 1.2 m.						

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL/ MONITOR WELL/ PIEZOMETER

ELEVATION (m)

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Maple Leaf Drilling Ltd. | Logged By: LB

Drilling Method: 125 mm SSA | Reviewed By: GB

Completion Depth: 1.2 m | Page 1 of 1

BOREHOLE RECORD

BH23-62

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Raleigh St, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or TCR %	SAMPLES N-VALUE or RQD %	OTHER TESTS / REMARKS
0		**ASPHALT:** 190 mm						
		Granular FILL		AS				
		Black, moist, fat CLAY FILL (CH), trace organics		AS				
1				AS				
		End of Borehole • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed upon completion of drilling. • Borehole stopped at a depth of 1.2 m.						

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL/ MONITOR WELL/ PIEZOMETER

ELEVATION (m)

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Maple Leaf Drilling Ltd. | Logged By: LB

Drilling Method: 125 mm SSA | Reviewed By: GB

Completion Depth: 1.2 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-63

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Raleigh St, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or TCR %	SAMPLES N-VALUE or RQD %	OTHER TESTS / REMARKS
0		**ASPHALT:** 171 mm						
		Granular FILL		AS				
		Black, moist, fat CLAY FILL (CH), trace organics		AS				
				AS				Sieve/Hydro at 0.8 m G 0% S 3% M 24% C 74%
1				AS				
		End of Borehole • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed upon completion of drilling. • Borehole stopped at a depth of 1.2 m.						

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL/ MONITOR WELL/ PIEZOMETER

ELEVATION (m)

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Maple Leaf Drilling Ltd. | Logged By: LB

Drilling Method: 125 mm SSA | Reviewed By: GB

Completion Depth: 1.2 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-64

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Raleigh St, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or TCR %	SAMPLES N-VALUE or RQD %	OTHER TESTS / REMARKS
0		**ASPHALT:** 159 mm						
		Granular FILL		AS				
		Black, moist, fat CLAY FILL (CH), trace organics		AS				
				AS				
1				AS				
		End of Borehole • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed upon completion of drilling. • Borehole stopped at a depth of 1.2 m.						

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL/ MONITOR WELL/ PIEZOMETER

ELEVATION (m)

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Maple Leaf Drilling Ltd. | Logged By: LB

Drilling Method: 125 mm SSA | Reviewed By: GB

Completion Depth: 1.2 m | Page 1 of 1

Stantec

BOREHOLE RECORD

BH23-65

CLIENT: **City of Winnipeg** PROJECT NO. : **123316298**

PROJECT: **2023 Local Street Renewals Program** BH ELEVATION: **N/A**

LOCATION: **Raleigh St, Winnipeg, MB** DATUM: **N/A**

DATE BORED: **January 12, 2023** WATER LEVEL: **N/A**

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm) or TCR %	SAMPLES N-VALUE or RQD %	OTHER TESTS / REMARKS
0		**ASPHALT:** 171 mm						
		Granular FILL		AS				
		Black, moist, fat CLAY FILL (CH), trace organics		AS				
1				AS				
				AS				
		End of Borehole • The soil was frozen to a depth of 0.9 m. • No groundwater seepage or soil sloughing was observed upon completion of drilling. • Borehole stopped at a depth of 1.2 m.						

UNDRAINED SHEAR STRENGTH, Cu (kPa)

LABORATORY TEST ▲ FIELD VANE TEST ◆

POCKET PEN. ★ POCKET SHEAR VANE ◘

50 kPa 100 kPa 150 kPa 200 kPa

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

SPT (N-value) BLOWS/0.3m ●

Water Content (%) and Blow Count

10 20 30 40 50 60 70 80

BACKFILL/ MONITOR WELL/ PIEZOMETER

ELEVATION (m)

BACKFILL SYMBOL: ASPHALT, GROUT, CONCRETE, BENTONITE, DRILL CUTTINGS, SAND, SLOUGH

Drilling Contractor: Maple Leaf Drilling Ltd. | Logged By: LB

Drilling Method: 125 mm SSA | Reviewed By: GB

Completion Depth: 1.2 m | Page 1 of 1

APPENDIX D

Core Photographs

Figure 1 – Core No. 18 (Bronx Ave)

Figure 2 – Core No. 19 (Bronx Ave)

Figure 3 – Core No. 20 (Bronx Ave)

Figure 4 – Core No. 21 (Bronx Ave)

Figure 5 – Core No. 22 (Hemsdale)

Figure 6 – Core No. 23 (Hemsdale)

Figure 7 – Core No. 24 (Oakview Ave)

Figure 8 – Core No. 25 (Oakview Ave)

Figure 9 – Core 26 (Hazel Dell Ave)

Figure 10 – Core 27 (Hazel Dell Ave)

Figure 11 – Core 28 (Linden Ave)

Figure 12 – Core 29 (Linden Ave)

Figure 13 – Core 30 (Linden Ave)

Figure 14 – Core 31 (Linden Ave)

Figure 15 – Core 57 (Raleigh St)

Figure 16 – Core 58 (Raleigh St)

Figure 17 – Core 59 (Raleigh St)

Figure 18 – Core 60 (Raleigh St)

Figure 19 – Core 61 (Raleigh St)

Figure 20 – Core 62 (Raleigh St)

Figure 21 – Core 63 (Raleigh St)

Figure 22 – Core 64 (Raleigh St)

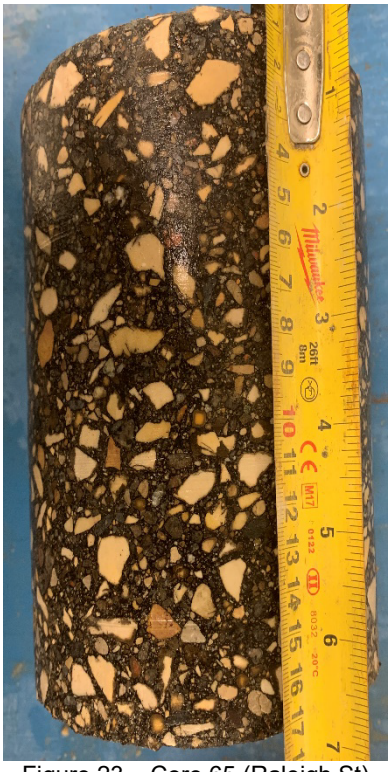


Figure 23 – Core 65 (Raleigh St)

APPENDIX E

Laboratory Test Reports

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

ASTM D4318 - LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS (LL METHOD B - ONE-POINT)

TO City of Winnipeg, Public Works Department
104 - 1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

ATTN: Erik Hansen

PROJECT 2023 Local Streets Renewals Program

PROJECT NO. 123316298

REPORT NO. 1

DATE SAMPLED: 2023.Jan.17
SAMPLED BY: Stantec Consulting Ltd.

DATE RECEIVED: 2023.Jan.17
SUBMITTED BY: Stantec Consulting Ltd.

DATE TESTED: 2023.Jan.27
TESTED BY: Larry Presado

SAMPLE ID: BH23-59, 2.8' (Raleigh St)

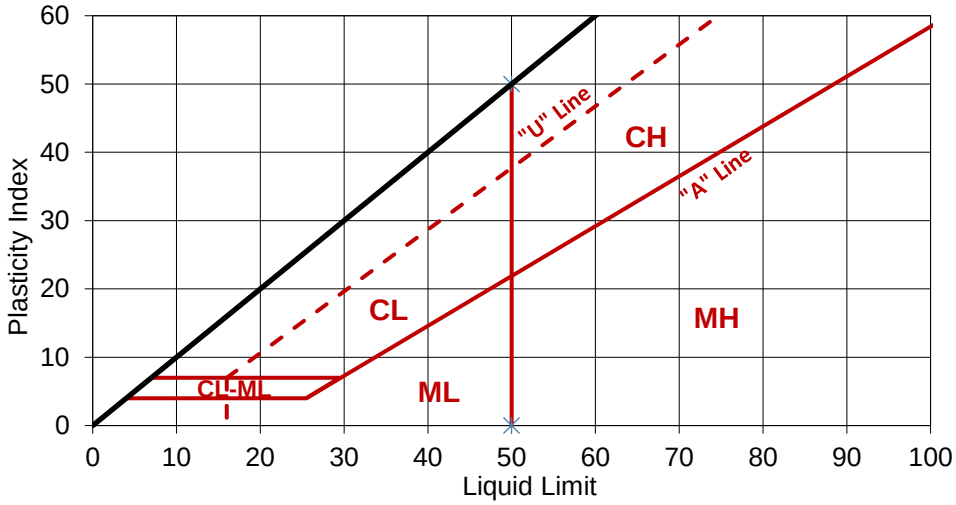
LIQUID LIMIT

TRIAL	1	2
BLOWS	25	25
MC (%)	87	87
Corr. MC (%)	87	87

PLASTIC LIMIT

TRIAL	1	2
MC (%)	21	21

LIQUID LIMIT, LL	87
PLASTIC LIMIT, PL	21
PLASTICITY INDEX, PI	66
AS REC'D MC (%)	30.2



COMMENTS:

REPORT DATE 2023.Jan.30

REVIEWED BY Guillaume Beauce, P.Eng.
Geotechnical Engineer - Materials Testing Services

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

ASTM D4318 - LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS (LL METHOD B - ONE-POINT)

TO City of Winnipeg, Public Works Department
104 - 1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

ATTN: Erik Hansen

PROJECT 2023 Local Streets Renewals Program

PROJECT NO. 123316298

REPORT NO. 2

DATE SAMPLED: 2023.Jan.17
SAMPLED BY: Stantec Consulting Ltd.

DATE RECEIVED: 2023.Jan.17
SUBMITTED BY: Stantec Consulting Ltd.

DATE TESTED: 2023.Jan.26
TESTED BY: Blair Dawson

SAMPLE ID: BH23-63, 2.9' (Raleigh St)

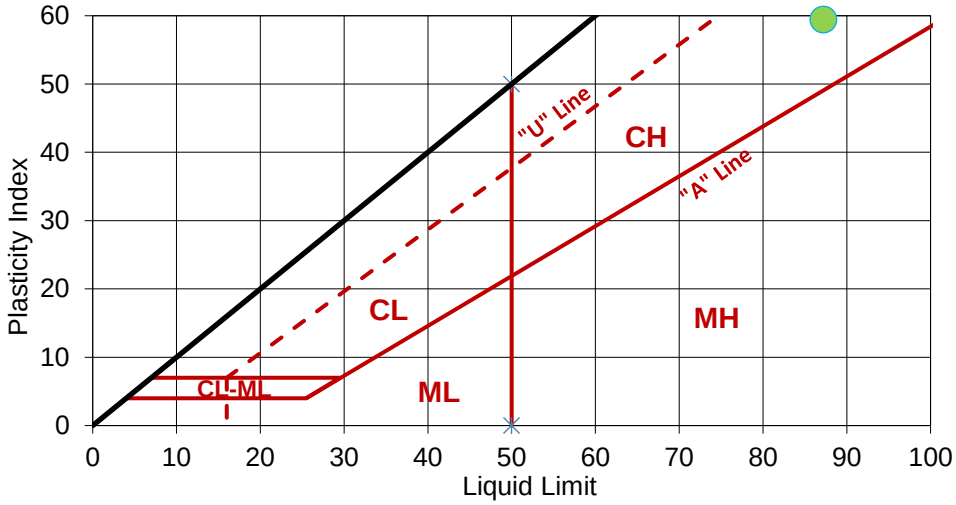
LIQUID LIMIT

TRIAL	1	2
BLOWS	25	27
MC (%)	87	87
Corr. MC (%)	87	88

PLASTIC LIMIT

TRIAL	1	2
MC (%)	28	28

LIQUID LIMIT, LL	87
PLASTIC LIMIT, PL	28
PLASTICITY INDEX, PI	59
AS REC'D MC (%)	36.1



COMMENTS:

REPORT DATE 2023.Jan.30

REVIEWED BY Guillaume Beauce, P.Eng.
Geotechnical Engineer - Materials Testing Services

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

ASTM D7928 - PARTICLE-SIZE DISTRIBUTION OF FINE-GRAINED SOILS USING THE SEDIMENTATION ANALYSIS

TO City of Winnipeg, Public Works Department
104 - 1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

ATTN: Erik Hansen

PROJECT 2023 Local Streets Renewals Program

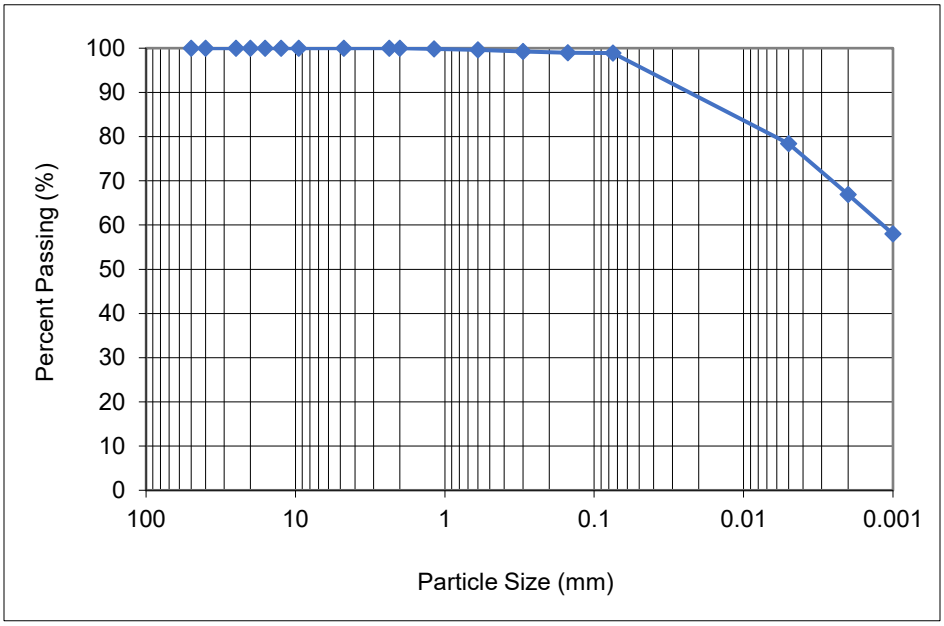
PROJECT NO. 123316298

REPORT NO. 1

DATE SAMPLED: 2023.Jan.17
SAMPLED BY: Stantec Consulting Ltd.

DATE RECEIVED 2023.Jan.17
SUBMITTED BY: Stantec Consulting Ltd.

DATE TESTED: 2023.Jan.23
TESTED BY: Donald Eliazar



SIEVE SIZE (mm)	% PASSING
50.0	100.0
40.0	100.0
25.0	100.0
20.0	100.0
16.0	100.0
12.5	100.0
9.5	100.0
4.75	100.0
2.36	100.0
2.00	100.0
1.18	99.8
0.600	99.6
0.300	99.3
0.150	99.0
0.075	98.9
0.005	78.4
0.002	66.9
0.001	58.0

Gravel	Sand			Silt	Clay	Colloids
	Coarse	Medium	Fine			
0.0	0.0	0.4	0.7	32.0	66.9	58.0

COMMENTS:
Material tested was identified as BH23-59, 2.8' (Raleigh St).

REPORT DATE 2023.Jan.30

REVIEWED BY Guillaume Beauce, P.Eng.
Geotechnical Engineer - Materials Testing Services

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

ASTM D7928 - PARTICLE-SIZE DISTRIBUTION OF FINE-GRAINED SOILS USING THE SEDIMENTATION ANALYSIS

TO City of Winnipeg, Public Works Department
104 - 1155 Pacific Avenue
Winnipeg, Manitoba
R3E 3P1

ATTN: Erik Hansen

PROJECT 2023 Local Streets Renewals Program

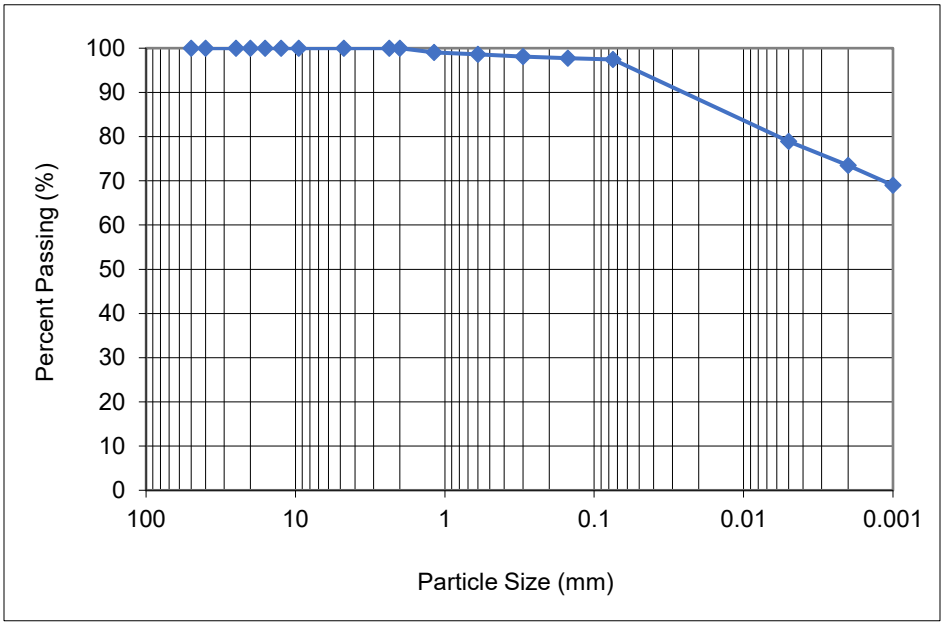
PROJECT NO. 123316298

REPORT NO. 2

DATE SAMPLED: 2023.Jan.17
SAMPLED BY: Stantec Consulting Ltd.

DATE RECEIVED 2023.Jan.17
SUBMITTED BY: Stantec Consulting Ltd.

DATE TESTED: 2023.Jan.23
TESTED BY: Donald Eliazar



SIEVE SIZE (mm)	% PASSING
50.0	100.0
40.0	100.0
25.0	100.0
20.0	100.0
16.0	100.0
12.5	100.0
9.5	100.0
4.75	100.0
2.36	100.0
2.00	100.0
1.18	99.0
0.600	98.6
0.300	98.1
0.150	97.7
0.075	97.4
0.005	78.9
0.002	73.5
0.001	69.0

Gravel	Sand			Silt	Clay	Colloids
	Coarse	Medium	Fine			
0.0	0.0	1.4	1.2	23.9	73.5	69.0

COMMENTS:
Material tested was identified as BH23-63, 2.9' (Raleigh St).

REPORT DATE 2023.Jan.30

REVIEWED BY Guillaume Beauce, P.Eng.
Geotechnical Engineer - Materials Testing Services

Stantec Consulting Ltd.
199 Henlow Bay, Winnipeg MB R3Y 1G4

Table 1 - Compressive Strength Test Data

Test No.	Core Identification	Diameter (mm)	Length (mm)	L/D Ratio	Correction Factor	Peak Load (kN)	Compressive Strength (MPa)	
							Measured	Corrected
1	BH-23-19	100	168	1.68	0.974	435.73	53.8	52.4
2	BH-23-23	100	172	1.72	0.978	334.62	41.3	40.4
3	BH-23-24	100	192	1.92	0.994	482.12	59.5	59.1
4	BH-23-26	100	169	1.69	0.975	505.25	62.3	60.8
5	BH-23-30	100	158	1.58	0.966	524.69	64.7	62.5