

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 – Burrows Avenue and Various Locations

Stantec Consulting Ltd. (Stantec) was retained to undertake a factual geotechnical investigation for the 2023 Local Street Renewals Program (Burrows 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 9 to January 15, 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 2.5 m (Hartford Ave) and 2.0 m (Powers St) 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
- ASTM D698 Laboratory Compaction Characteristics of Soil Using Standard Effort
- ASTM D1883 California Bearing Ratio (CBR) of Laboratory-Compacted Soils
- CSA A23.2-14C Obtaining and testing drilled cores for compressive strength testing

The CBR tests were performed at 95% maximum dry density and under soaked conditions, and 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 – Burrows Avenue and Various Locations

Regards,

STANTEC CONSULTING LTD.

Guillaume Beauce P.Eng.

Field Supervisor, Materials Testing Services

Phone: 204-928-7618 Mobile: 204-898-8290

guillaume.beauce@stantec.com

Attachment: Appendix A – Statement of General Conditions Appendix B – Borehole Location Plan

Appendix B – Borehole Location Plan Appendix C – Borehole Records Appendix D – Core Photographs Appendix E – Laboratory Test Reports Jason Thompson C.E.T.

Manager, Materials Testing Services

Phone: 204-928-4004 Mobile: 204-981-8445

jason.thompson@stantec.com

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.

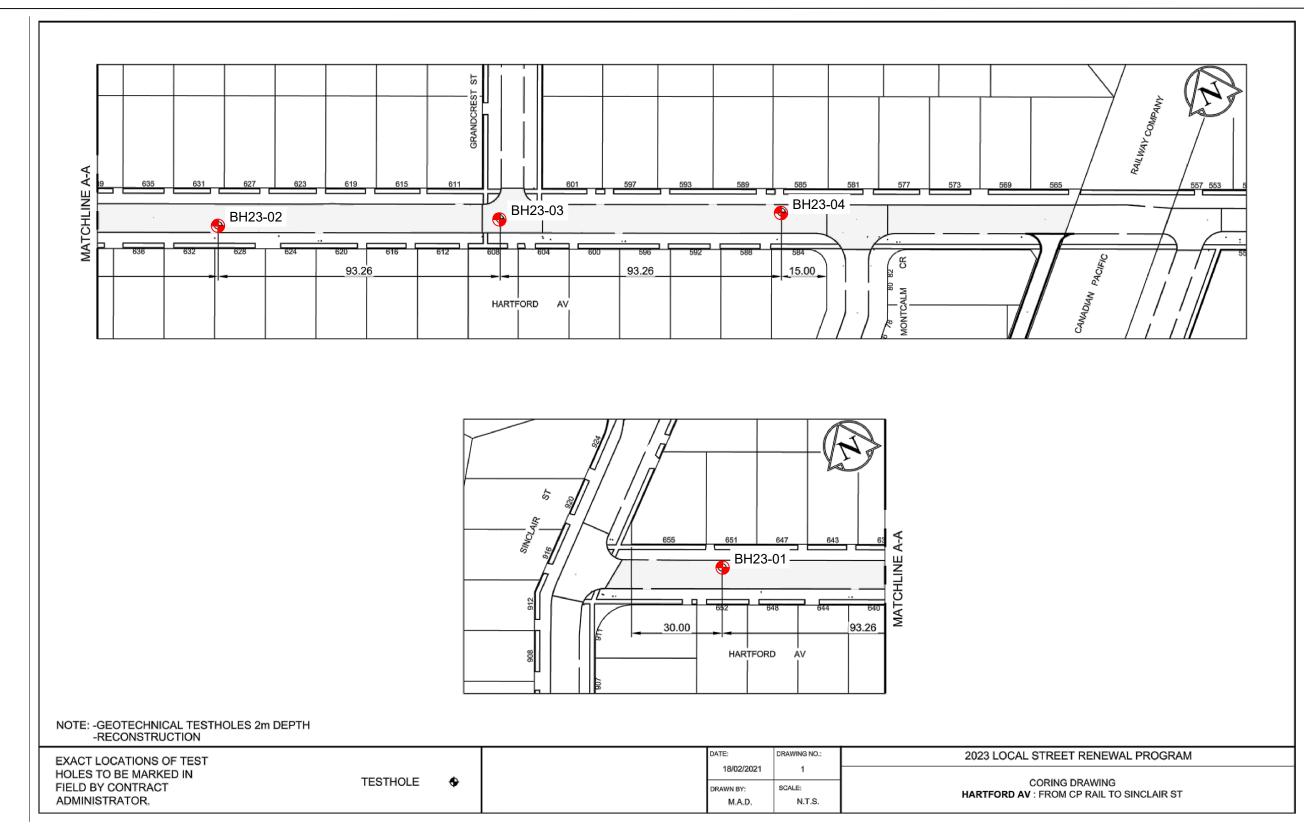
PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Stantec, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc.), to confirm that this report completely addresses the elaborated project specifics 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





2023-01-24 123316298



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Winnipeg MB Canada R3B 2B9
Tel. 204.489.5900 Fax. 204.453.9012
www.stantec.com

Legend

APPROXIMATE BOREHOLE LOCATION

Scale

Client/Project

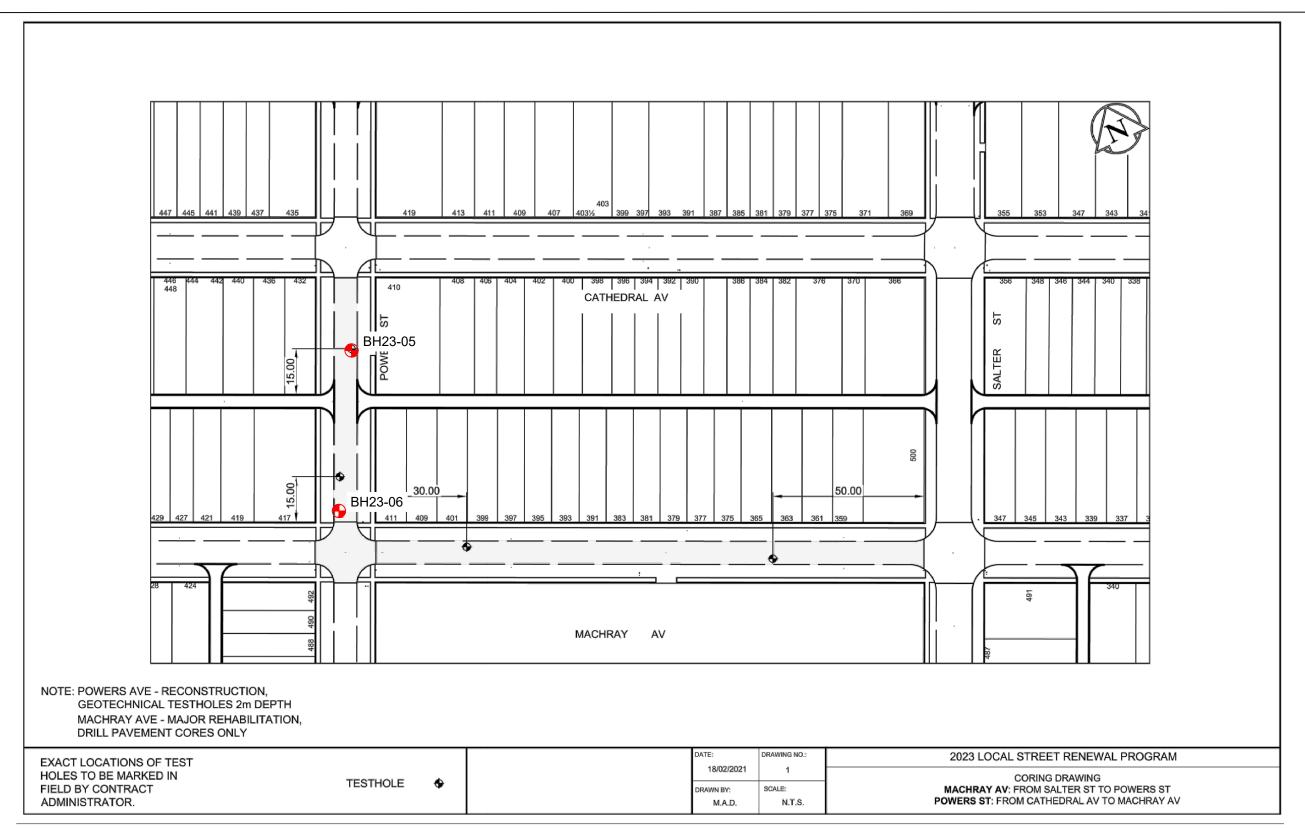
CITY OF WINNIPEG

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Figure No.

<u>HARTFORD</u>





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APPROXIMATE BOREHOLE LOCATION

Scale

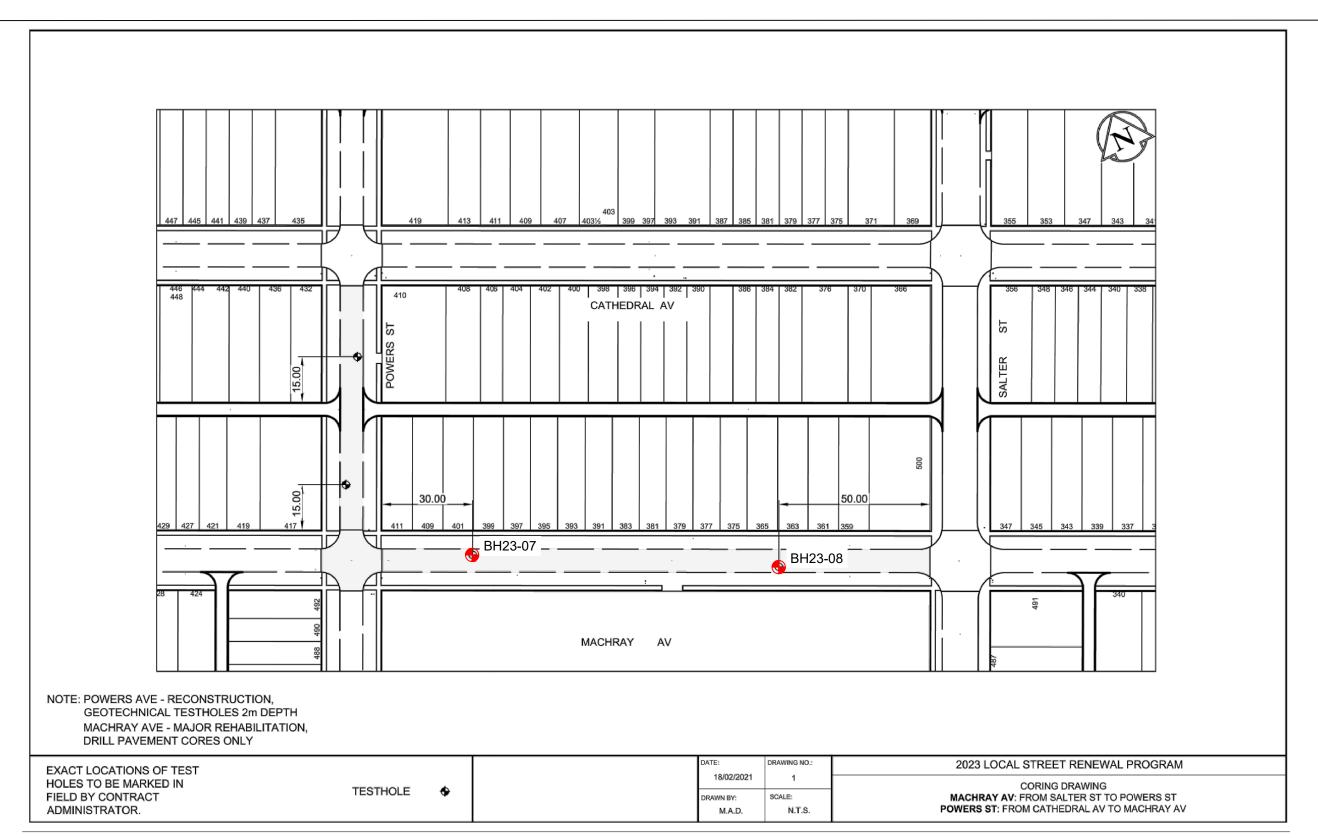
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Figure No.

POWERS



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APPROXIMATE BOREHOLE LOCATION

Scale

Client/Project

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Figure No.

<u>MACHRAY</u>

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Legend

APPROXIMATE BOREHOLE LOCATION

Scale

Client/Project

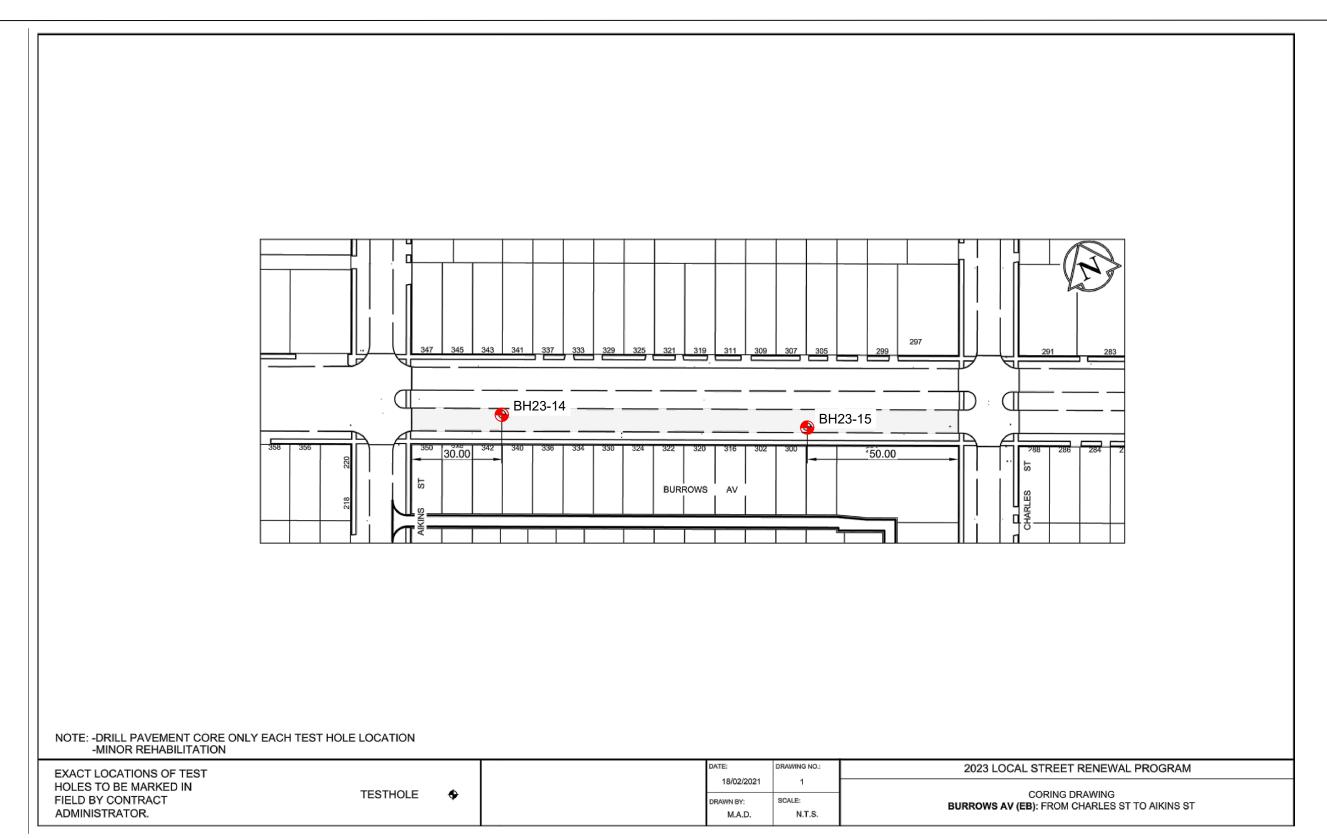
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Figure No.

MATCHLINE A-A





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Legend

APPROXIMATE BOREHOLE LOCATION

Scale

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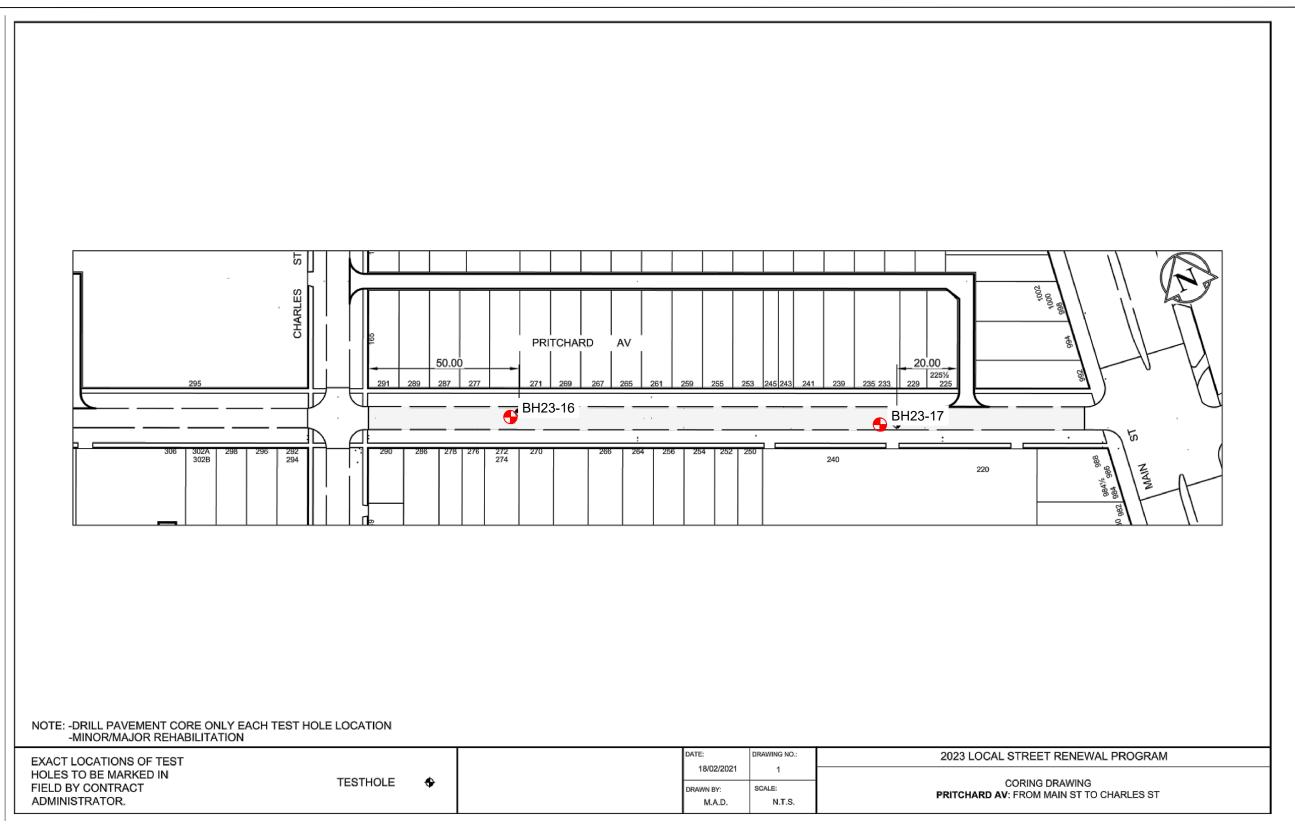
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2023 LOCAL STREET RENEWALS PROGRAM WINNIPEG, MB

Figure No.

BURROWS





2023-01-24 123316298



APPROXIMATE BOREHOLE LOCATION

Legend

Scale

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Figure No.

PRITCHARD

BOREHOLE LOCATION PLAN

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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 Sh	ear Strength	Approximate
Consistency	kips/sq.ft.	kPa	SPT N-Value
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

Clay

Organics Asphalt

Igneous Bedrock morphic Bedrock

Sedimentary Bedrock

SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
₽	Direct-Push sample (small diameter tube
DF	sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use
TIQ, NQ, BQ, EIC.	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
Н	Hydrometer analysis
k	Laboratory permeability
Υ	Unit weight
Gs	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore
CU	pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
С	Consolidation
Qυ	Unconfined compression
	Point Load Index (Ip on Borehole Record equals
Ιp	I_p (50) in which the index is corrected to a
	reference diameter of 50 mm)

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

DATE BORED: January 15, 2023 to January 9 SAN SOIL DESCRIPTION (USCS) ASPHALT: 20 mm CONCRETE: 135 mm Brown, moist, silty CLAY (CL-ML) AS AS AS AS AS AS AS AS AS A	RECOVERY (mm) Or TCR % OF TCR	WATER CONTENT & ATTERBERG LIMITS SPT (N-value) BLOWS/0.3m ■ **Mater Content (%) and Blow Count* 10 20 30 40 50 60 70 8 **O **O **O **O **O **O **O *	ASACKFILL/ NITOR WELL/ IEZOMETER
SOIL DESCRIPTION (USCS) ASPHALT: 20 mm CONCRETE: 135 mm Brown, moist, silty CLAY (CL-ML) AS AS AS - grey at 1.8 m	RECOVERY (mm) OF TCR % N-VALUE OF RQD % OF RQD %	LABORATORY TEST POCKET SHEAR VANE POCKET PEN. POCKET SHEAR VANE SON PA 100 KPA 150 KPA 200 WATER CONTENT & ATTERBERG LIMITS SPT (N-value) BLOWS/0.3m 10 20 30 40 50 60 70 8 10.8 m 10.8 m	
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2 -				X AS										O						
-		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 2.1 m.																		
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ACI	KFILL S	symbol Rasphalt	GR	OUT	\mathcal{D}	CO1	NCRE UGH	TE Drilling Me	thod:	125 n	nm S	SA						R	eviev	ved By:

	IENT:	Stantec City of Winnipeg T: 2023 Local Street Renew	rale !	Pro ~	ra				_									.: <u>12</u>	H23- 331629	
		ON: Powers St, Winnipeg, MB	ais i	rog	ram				_								ATION N. M.		N/A	_
		ORED: January 9, 2023 to	o Ja	nuar	v 11	. 20	23		— W.A	ATER L	.EVEL	: N/A	4		D/	XI O / V I.				_
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						E						Water Co	ntent (%				70	00		l
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		symbol M asphalt		OUT	<u></u>	1001	NCRE	TE Drilling Met	thad:	105 0	am ss	٠,					-	a da .	ved By:	(

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		CT: <u>2023 Local Street Ren</u> ON: <u>Machray Ave, Winnip</u>		_	<u>ram</u>														N/A	
		DRED: <u>January 12, 20</u> 2							_			_	N/A							
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DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	TYPE	NUMBER	OVERY (mn or TCR %	N-VALUE or RQD %	OTHER TESTS / REMARKS	W	/ATE	kPa 			0 kPa	150 k RG LIMITS	\W/-		kPa W _L −	BACKFILL/ MONITOR WELL/ PIEZOMETER	
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DOTE BORDE January 12, 2023 Solid DESCRIPTION (USCS) Mark	PR	LIENT:	City of Winnipeg 2023 Local Street Ren		_				OLE RECO	_								ВН	ELE	/ATI	ON:	: <u>12</u>	33162 N/A	98
SOIL DESCRIPTION (USCS) VANIL A BOOK OF A CONCRETE 150 mm CONCRETE 150										— _V	. /ΔΤ	ED I	E\/E	:ı • !	NI / A			DA	MUT	:	N/A	١		
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End of Borehole Diffling Contractor Startlec Lagged By: LB) –						2			ļ	10	2	20				and B			70	8	0		L
End of Borehole Drilling Contractor: Stantec Logged By. LB			CONCRETE: 150 mm	D																				
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ACKFILL SYMBOL ASPHALT GROUT CONCRETE Drilling Method: Coring Reviewed By: G BENTONITE Drilling Method: Coring Reviewed By: G Completion Depth: 0.15 m Page 1 of 1	ACI	KFILL :	symbol T asphalt	GR	OUT		.]CO1	NCRET																

DATUM: N/A DATE BORED: January 11, 2023 WATER LEVEL: N/A UNDRAINED SHEAR STRENGTH, Cu (kPa) LABORATORY TEST A FIELD VANE TEST POCKET PEN. ** POCKET SHEAR VANE OTHER TESTS / SOIL DESCRIPTION (USCS) WATER CONTENT & ATTERBERG LIMITS WP W W WATER CONTENT & ATTERBERG LIMITS WP W W Water Content (%) and Blow Count Water Content (%) and Blow Count OTHER TESTS / SPT (N-value) BLOWS/0.3m Water Content (%) and Blow Count OTHER TESTS / SPT (N-value) BLOWS/0.3m Water Content (%) and Blow Count OTHER TESTS / SPT (N-value) BLOWS/0.3m Water Content (%) and Blow Count OTHER TESTS / SPT (N-value) BLOWS/0.3m OTHER TESTS / SPT (N-value) BLOW	BH23 NO.: 123316 JION: <u>N/A</u>		_	E RECOR			roai	newals P	Stantec City of Winnipeg T: 2023 Local Street Ren	IENT:	
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CONCRETE: 160 mm	•	and Blow Count	SPT (N-value) BLOWS/0.3m Water Content (%) and		N-VAL or RQE	NUMB RECOVER)	TYPE	STRA		ELEV	٥
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	.IENT:	Stantec City of Winnipeg T: 2023 Local Street Ren	a a wala l	Dro ~				LE RECOF	_								: <u>12</u>	H23-1	8
		ON: College Ave, Winnipe		riog	ram				_									N/A	
		DRED: <u>January 11, 20</u>							_	ater Li									_
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DE	ELEV,	(03C3)	STRAT	TYPE	NUMBER	RECOVERY (mm) or TCR %	N-VALU or RQD	KEMPARO	SPT	ATER CC (N-value	e) BLOV w	VS/0.3m /ater Conte	nt (%) and	d Blow Cou	nt .	•	\w_L -1	BA MONI PIEZ	
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PR	OJEC	City of Winnipeg CT: 2023 Local Street Ren ON: College Ave, Winnipe	eg, MB	Prog	ram				_					BH EI	LEVA1	ION:	123316 N/A	
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DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION (USCS)	STRATA PLOT	TYPE	NUMBER	RECOVERY (mm) 37	N-VALUE or RQD %	OTHER TESTS / REMARKS	LA PC	BORAT OCKET F 50 ATER C	ORY TI PEN. kPa 	100 NT & AT	F P) kPa 	CU (kPa FIELD VAN POCKET S 150 k G LIMITS	NE TEST HEAR Pa		BACKFI IONITOR	PIEZOMETER
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Under Control &	PR	IENT: OJEC	City of Winnipeg 2023 Local Street Ren CN: College Ave, Winnipe		Prog	ram				_					вн Е	LEVA	MOIT	: <u>12</u> : : <u> </u>	H23- 331629 N/A
CONCRETE: 140 mm Solid Borehole So	DA	ATE BO	DRED: <u>January 11, 202</u>	23															
CONCRETE: 140 mm End of Borehole End of Borehole Diffling Contractor: Stantec Logged By: US Diffling Contractor: Stantec Logged By: US	DEPTH (m)	LEVATION (m)		RATA PLOT	YPE			ALUE QD %		LA PC	ABORA DCKET 5	FORY PEN. O kPa	TEST .	≜ F 00 kPa	FIELD VAI POCKET S 150 k	NE TES SHEAR Pa	200	kPa 	BACKFILL/ ONITOR WELL/ PIEZOMETER
Drilling Contractor: Stantee Logged By: LB		В		S	-	N	ECOV or 1	- Z 9					.0WS/0.	3m		Ė	•		×
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		T: 2023 Local Street Rei		Prog	ram				_									I/A	
		ON: <u>College Ave, Winniper</u> DRED: <u>January 11, 20</u>	_						_ \//Δ	TER I	EVEL:	N/A		DAT	UM:	N/A	Α		_
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<u> </u>	<u>N</u>	SOIL DESCRIPTION	PLO			(mr		THER TESTS /	POO	CKET P 50	EN. kPa	*	Pi kPa	OCKET 150			kPa	KFILL OR W	
DEРТН (m)	ELEVATION (m)	(USCS)	STRATA PLOT	TYPE	NUMBER	RECOVERY (mm) or TCR %	N-VALUE or RQD %	REMARKS		TER CO	 DNTENT	& ATT	ERBERG	G LIMIT:	W	, W	-	BACKFILL/ MONITOR WELL/ PIEZOMETER	
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PR	LIENT: ROJEC	City of Winnipeg City of Winnipeg City of Winnipeg City of Winnipeg City of Winnipeg City of Winnipeg		Prog				OLE RECO	_								ВІ	H EL	EVA	10IT	. : <u>12</u> l:	H23- 331629 N/A	98
		ORED: January 10, 20	-						— ,	WA	TER I	LEV	EL:	N/A	A		D	AIU)/VI.	_IN/	Α		
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PR	IENT: OJEC	City of Winnipeg T: 2023 Local Street Rel		Prog				OLE RECO	_								ВНІ	ELEV	AOITA	.: <u>12</u> l:	6 H23- 331629 N/A	78
		ON: <u>Burrows Ave, Winniper</u> DRED: <u>January 10, 20</u>	_						– w	/ATF	R I I	FVF	1: 1	N/A	١		DAI	UM:	_N/	Α		_
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PR	LIENT:	City of Winnipeg 2023 Local Street Ren		_				OLE RECO	_								ВН	ELE	/ATI	ON:	<u>12</u>	H23- 331629 N/A	98
		ON: <u>Pritchard Ave, Winnip</u> DRED: <u>January 11, 20</u>							— _\	NA ⁻	TER L	FVI	= ·	N/A			DA	MUT	: _	N/A	\		_
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CLIENT: City of Winnipeg PROJECT: 2023 Local Street Renewals Program											PROJECT NO.: 123316298											78	
		ON: <u>Pritchard Ave, Winnip</u> DRED: <u>January 10, 20</u> 2								DATUM: N/A													
O DEPTH (m)	ELEVATION (m)				SAM	1		OTHER TESTS / REMARKS	U						Cu (kPa) ELD VANE TEST OCKET SHEAR VANE					EL EVATION (m)			
		SOIL DESCRIPTION (USCS)	STRATA PLOT	TYPE	NUMBER	RECOVERY (mm) or TCR %	N-VALUE or RQD %			50 kPa 100 kPa 150 kPa 200 kPa 150 kPa 150 kPa 200 kPa 150 kP						W _L							
		CONCRETE 100 mm	<u> </u>	<u></u>					<u> </u>	10 20 30				er Content (%) and Blow Count 40 50 60 70) ;	80		Ļ	
		CONCRETE: 120 mm	V V V																				
			A V A																				
			A V A																				
			V A V																				
		End of Borehole																					
-																							_
	Drilling Control									::I icto	r: St	u:: ant	ec ec	• • • •	:1::		L	1::	::1	L	ogge	d By: LB	_
	KFILL S ENTOI	SYMBOL ASPHALT VITE ØDRILL CUTTINGS	∭GR ∭SAI		D	CO1 SLO	E Drilling Me Completio	ethod: Coring									Reviewed By: GB						

APPENDIX D

Core Photographs





Figure 1 – Core No. 1 (Hartford Ave)



Figure 3 – Core No. 3 (Hartford Ave)



Figure 2 - Core No. 2 (Hartford Ave)



Figure 4 – Core No. 4 (Hartford Ave)





Figure 5 – Core No. 5 (Powers St)



Figure 7 – Core No. 7 (Machray Ave)





Figure 8 – Core No. 8 (Machray Ave)





Figure 9 – Core 9 (College Ave)







Figure 12 - Core 12 (College Ave)





Figure 13 – Core 13 (College Ave)



Figure 15 – Core 15 (Burrows Ave)



Figure 14 – Core 14 (Burrows Ave)



Figure 16 – Core 16 (Pritchard Ave)





Figure 17 – Core 17 (Pritchard Ave)

APPENDIX E

Laboratory Test Reports



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 DATE RECEIVED: 2023.Jan.17 DATE TESTED: 2023.Jan.25 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Donald Eliazar

SAMPLE ID: BH23-01, 2.8' (Hartford Ave)

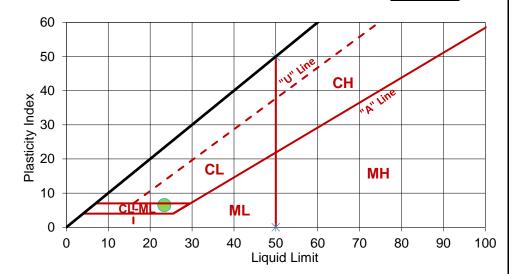
LIQUID LIMIT

TRIAL BLOWS MC (%) Corr. MC (%)

LIQUID LIMIT		
1	2	
25	27	
23	23	
23	24	

	PLASTIC LIMIT		
TRIAL	1	2	
MC (%)	17	17	

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



COMMENTS:

REPORT DATE 2023.Jan.30

REVIEWED BY

Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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



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)

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 DATE RECEIVED: 2023.Jan.17 DATE TESTED: 2023.Jan.26 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Blair Dawson

SAMPLE ID: BH23-02, 2.9' (Hartford Ave)

LIQUID LIMIT

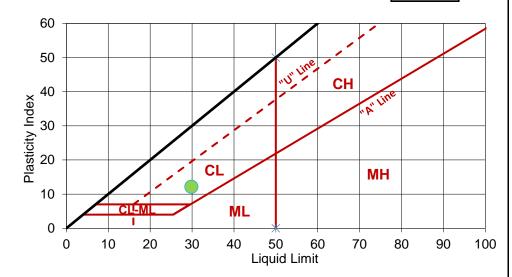
TRIAL BLOWS MC (%) Corr. MC (%)

LIQUID LIMIT		
1	2	
21	21	
30	31	
30	30	

	PLASTIC LIMIT		
TRIAL	1	2	
MC (%)	18	18	

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

30 18 12 21.5



COMMENTS:

REPORT DATE 2023.Jan.30

REVIEWED BY

Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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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)

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. 3

DATE SAMPLED: 2023.Jan.17 DATE RECEIVED: 2023.Jan.17 DATE TESTED: 2023.Jan.26 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Blair Dawson

SAMPLE ID: BH23-03, 2.8' (Hartford Ave)

TRIAL

BLOWS MC (%) Corr. MC (%)

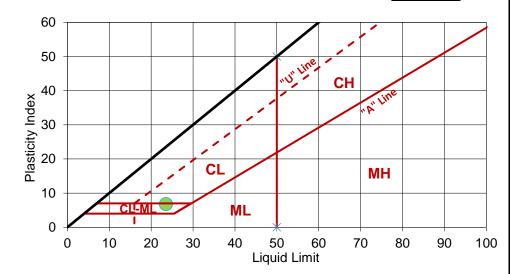
1	2
25	24
25	23
25	22

LIQUID LIMIT

	PLASTIC LIMIT		
TRIAL	1	2	
NAC (0/)	17	17	

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

24 17 7 20.7



COMMENTS:

REPORT DATE 2023.Jan.30

REVIEWED BY

Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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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. 4

DATE SAMPLED: 2023.Jan.17 DATE RECEIVED: 2023.Jan.17 DATE TESTED: 2023.Jan.25 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Donald Eliazar

SAMPLE ID: BH23-04, 2.9' (Hartford Ave)

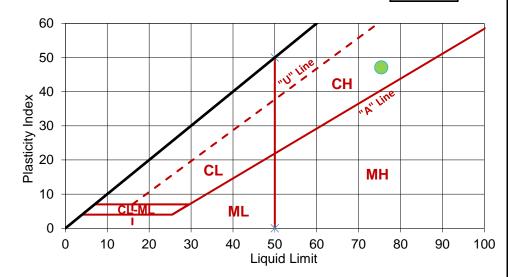
LIQUID LIMIT

TRIAL
BLOWS
MC (%)
Corr. MC (%)

LIGOID LIMIT		
1	2	
24	26	
75	76	
75	76	

	PLASTIC LIMIT		
TRIAL	1	2	
MC (%)	28	29	

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



COMMENTS:

REPORT DATE 2023.Jan.30

REVIEWED BY Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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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)

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. 5

DATE SAMPLED: 2023.Jan.17 DATE RECEIVED: 2023.Jan.17 DATE TESTED: 2023.Jan.26 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Blair Dawson

SAMPLE ID: BH23-05, 2.9' (Powers St)

LIQUID LIMIT

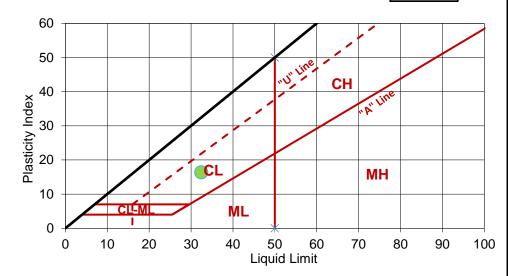
TRIAL BLOWS MC (%) Corr. MC (%)

LIQUID LIMIT		
1	2	
23	25	
32	33	
32	33	

	PLASTIC LIMIT		
TRIAL	1	2	
MC (%)	15	17	

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

32 16 16 29.1



COMMENTS:

REPORT DATE 2023.Jan.30

REVIEWED BY

Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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



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)

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. 6

DATE SAMPLED: 2023.Jan.17 DATE RECEIVED: 2023.Jan.17 DATE TESTED: 2023.Jan.27 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Larry Presado

SAMPLE ID: BH23-06, 2.9' (Powers St)

LIQUID LIMIT

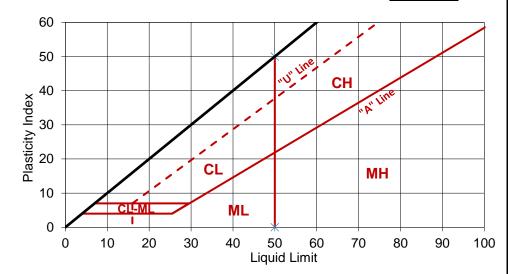
TRIAL BLOWS MC (%) Corr. MC (%)

1	2	
24	23	
93	94	
93	93	

	PLASTIC LIMIT		
TRIAL	1	2	
MC (%)	29	28	

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

93 28 1 65 34.4



COMMENTS:

REPORT DATE 2023.Jan.30

REVIEWED BY Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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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 **PROJECT**

2023 Local Streets Renewals Program

104 - 1155 Pacific Avenue

Winnipeg, Manitoba

R3E 3P1

PROJECT NO.

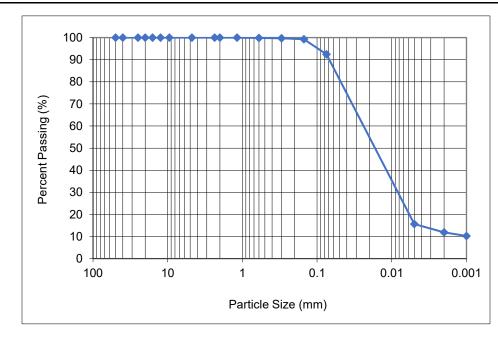
123316298

1

ATTN: Erik Hansen REPORT NO.

DATE SAMPLED: 2023.Jan.17 DATE RECEIVED 2023.Jan.17 DATE TESTED: 2023.Jan.22 Donald Eliazar TESTED BY:

Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. SAMPLED BY:



Gravel		Sand		Silt	Clay	Colloids
Graver	Coarse	Medium	Fine	SIIL	Clay	Colloids
0.0	0.0	0.2	7.4	80.5	11.9	10.2

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	100.0
0.600	99.8
0.300	99.7
0.150	99.3
0.075	92.4
0.005	15.7
0.002	11.9
0.001	10.2
	•

COMMENTS:

Material tested was identified as BH23-01, 2.8' (Hartford Ave).

REPORT DATE 2023.Jan.30 REVIEWED BY

Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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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 **PROJECT**

2023 Local Streets Renewals Program

104 - 1155 Pacific Avenue

Winnipeg, Manitoba

R3E 3P1

PROJECT NO.

123316298

ATTN: Erik Hansen REPORT NO.

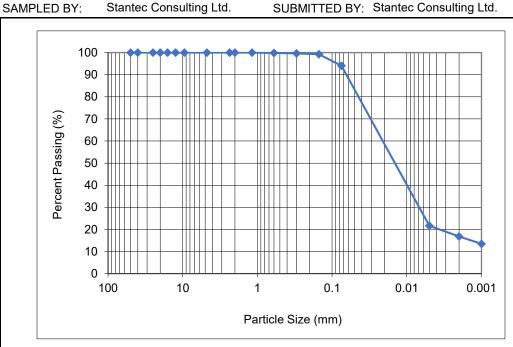
DATE SAMPLED: 2023.Jan.17

DATE RECEIVED 2023.Jan.17

DATE TESTED: 2023.Jan.23

SUBMITTED BY: Stantec Consulting Ltd.

Donald Eliazar TESTED BY:



Gravel		Sand		Silt	Silt Clay Co	
Glavei	Coarse	Medium	Fine	5111	Clay	Colloids
0.0	0.0	0.2	5.8	77.2	16.8	13.5

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	99.9
0.600	99.8
0.300	99.6
0.150	99.2
0.075	94.1
0.005	21.7
0.002	16.8
0.001	13.5

COMMENTS:

Material tested was identified as BH23-02, 2.9' (Hartford Ave).

REPORT DATE 2023.Jan.30

REVIEWED BY

Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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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 **PROJECT**

2023 Local Streets Renewals Program

104 - 1155 Pacific Avenue Winnipeg, Manitoba

R3E 3P1

PROJECT NO.

123316298

ATTN: Erik Hansen

3 REPORT NO.

DATE SAMPLED: 2023.Jan.17

DATE RECEIVED 2023.Jan.17

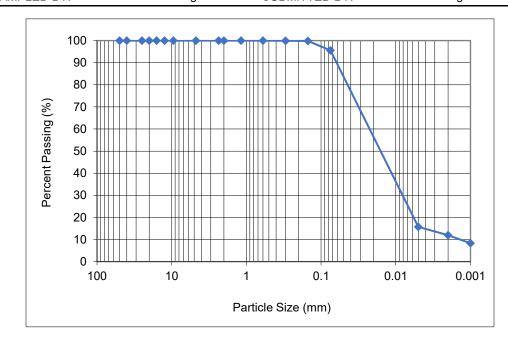
DATE TESTED: 2023.Jan.23

SAMPLED BY:

Stantec Consulting Ltd.

SUBMITTED BY: Stantec Consulting Ltd.

Donald Eliazar TESTED BY:



Gravel		Sand		Qil t	Silt Clay C	
Glavei	Coarse	Medium	Fine	5111	Clay	Colloids
0.0	0.0	0.0	4.4	83.6	12.0	8.3

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	100.0
0.600	100.0
0.300	99.9
0.150	99.8
0.075	95.6
0.005	15.7
0.002	12.0
0.001	8.3

COMMENTS:

Material tested was identified as BH23-03, 2.8' (Hartford Ave).

REPORT DATE 2023.Jan.30 REVIEWED BY

Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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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 **PROJECT**

2023 Local Streets Renewals Program

104 - 1155 Pacific Avenue

Winnipeg, Manitoba

R3E 3P1

DATE SAMPLED: 2023.Jan.17

PROJECT NO.

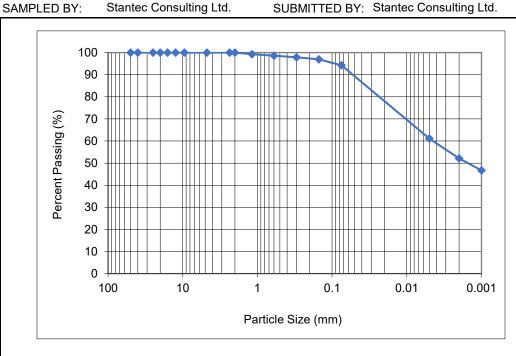
123316298

ATTN: Erik Hansen REPORT NO.

DATE RECEIVED 2023.Jan.17 DATE TESTED: 2023.Jan.23

SUBMITTED BY: Stantec Consulting Ltd.

Donald Eliazar TESTED BY:



Gravel		Sand		Silt	Clay	Colloids
Graver	Coarse	Medium	Fine	SIII	Clay	Colloids
0.0	0.0	1.4	4.4	42.1	52.1	46.7

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	99.2
0.600	98.6
0.300	97.9
0.150	96.9
0.075	94.3
0.005	61.1
0.002	52.1
0.001	46.7

COMMENTS:

Material tested was identified as BH23-04, 2.9' (Hartford Ave).

REPORT DATE 2023.Jan.30 REVIEWED BY

Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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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 **PROJECT**

2023 Local Streets Renewals Program

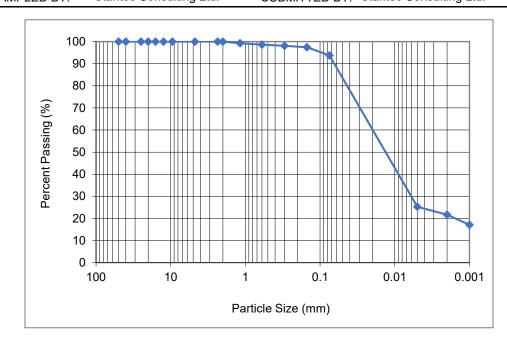
104 - 1155 Pacific Avenue Winnipeg, Manitoba

R3E 3P1

123316298 PROJECT NO.

5 ATTN: Erik Hansen REPORT NO.

DATE SAMPLED: 2023.Jan.17 DATE RECEIVED 2023.Jan.17 DATE TESTED: 2023.Jan.23 Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. Donald Eliazar SAMPLED BY: TESTED BY:



Gravel		Sand		Silt	Clay	Colloids
Glavei	Coarse	Medium	Fine	5111	Clay	Colloius
0.0	0.0	1.3	4.9	72.2	21.6	17.1

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	99.3
0.600	98.6
0.300	98.1
0.150	97.5
0.075	93.8
0.005	25.3
0.002	21.6
0.001	17.1

COMMENTS:

Material tested was identified as BH23-05, 2.9' (Powers St).

REPORT DATE 2023.Jan.30 REVIEWED BY

Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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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

PROJECT

2023 Local Streets Renewals Program

104 - 1155 Pacific Avenue

Winnipeg, Manitoba

R3E 3P1

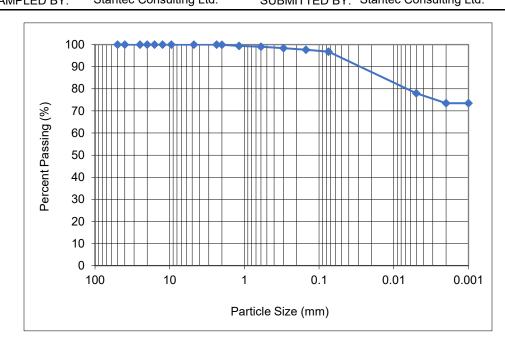
PROJECT NO.

123316298

ATTN: Erik Hansen

REPORT NO. 6

DATE SAMPLED: 2023.Jan.17 DATE RECEIVED 2023.Jan.17 DATE TESTED: 2023.Jan.23 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Donald Eliazar



Gravel		Sand		Silt Clay		Colloids
Glavei	Coarse	Medium	Fine	5111	Clay	Colloius
0.0	0.1	0.9	2.2	23.3	73.5	73.5

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	99.9
1.18	99.4
0.600	99.0
0.300	98.4
0.150	97.7
0.075	96.8
0.005	78.0
0.002	73.5
0.001	73.5

COMMENTS:

Material tested was identified as BH23-06, 2.9' (Powers St).

REPORT DATE 2023.Jan.30

REVIEWED BY

Guillaume Beauce, P.Eng.

Geotechnical Engineer - Materials Testing Services

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PROCTOR TEST REPORT

City of Winnipeg Public Works
Department
104-1155 Pacific Ave.
Winnipeg, MB
R3E 2P1

CLIENT City of Winnipeg Public Works Department

C.C.

ATTN: ErikHansen

PROJECT 2023 Local Street Renewals Program

PROJECT NO. 123316298-2

PROCTOR NO. 1 DATE SAMPLED 2023.Jan.16 DATE RECEIVED 2023.Jan.16 DATE TESTED 2023.Jan.19

INSITU MOISTURE 20.7 % COMPACTION STANDARD Standard Proctor,

TESTED BY Donald Eliazar ASTM D698

MATERIAL IDENTIFICATION COMPACTION PROCEDURE A: 101.6mm Mold,
MATERIAL USE Subgrade Passing 4.75mm

MAX. NOMINAL SIZE

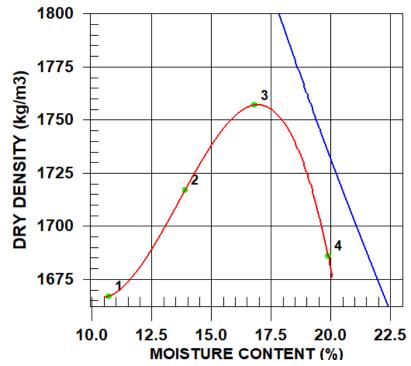
MAX. NOMINAL SIZE

RAMMER TYPE

Manual

MAX. NOMINAL SIZERAMMER TYPEManualMATERIAL TYPEClayPREPARATIONDrySUPPLIERExisting MaterialOVERSIZE CORRECTION METHODNone

SOURCE BH23-01, Hartford Ave RETAINED 4.75mm SCREEN



TRIAL NUMBER	WET DENSITY (kg/m3)	DRY DENSITY (kg/m3)	MOISTURE CONTENT (%)
1	1845	1667	10.7
2	1956	1717	13.9
3	2052	1757	16.8
4	2021	1686	19.9

	MAXIMUM DRY DENSITY (kg/m3)	OPTIMUM MOISTURE CONTENT (%)
CALCULATED	1760	17.0
OVERSIZE CORRECTED		

COMMENTS

REVIEWED BY Jason Thompson, C.E.T.





PROCTOR TEST REPORT

City of Winnipeg Public Works
Department
104-1155 Pacific Ave.
Winnipeg, MB
R3E 2P1

CLIENT City of Winnipeg Public Works Department

C.C.

ATTN: ErikHansen

PROJECT 2023 Local Street Renewals Program

PROJECT NO. 123316298-2

INSITU MOISTURE

MATERIAL USE

PROCTOR NO. 2 DATE SAMPLED 2023. Jan. 16 DATE RECEIVED 2023. Jan. 16 DATE TESTED 2023. Jan. 20

27.7 % COMPACTION STANDARD Standard Proctor,

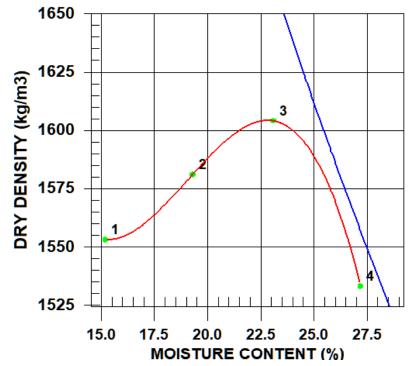
TESTED BY Donald Eliazar ASTM D698

MATERIAL IDENTIFICATION COMPACTION PROCEDURE A: 101.6mm Mold,

Passing 4.75mm

MAX. NOMINAL SIZERAMMER TYPEManualMATERIAL TYPEClayPREPARATIONMoistSUPPLIERExisting MaterialsOVERSIZE CORRECTION METHODNone

SOURCE BH23-02, Hartford Ave RETAINED 4.75mm SCREEN



Subgrade

TRIAL NUMBER	WET DENSITY (kg/m3)	DRY DENSITY (kg/m3)	MOISTURE CONTENT (%)
1	1789	1553	15.2
2	1886	1581	19.3
3	1975	1604	23.1
4	1950	1533	27.2

	MAXIMUM DRY DENSITY (kg/m3)	OPTIMUM MOISTURE CONTENT (%)
CALCULATED	1600	23.0
OVERSIZE CORRECTED		

COMMENTS

REVIEWED BY Jason Thompson, C.E.T.





PROCTOR TEST REPORT

City of Winnipeg Public Works
Department
104-1155 Pacific Ave.
Winnipeg, MB
R3E 2P1

CLIENT City of Winnipeg Public Works Department

C.C.

ATTN: ErikHansen

PROJECT 2023 Local Street Renewals Program

PROJECT NO. 123316298-2

PROCTOR NO. 3 DATE SAMPLED 2023.Jan.16 DATE RECEIVED 2023.Jan.16 DATE TESTED 2023.Jan.19

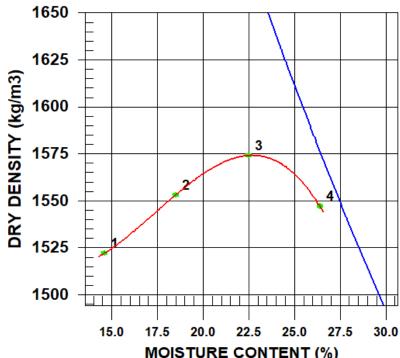
INSITU MOISTURE 28.4 % COMPACTION STANDARD Standard Proctor, TESTED BY Donald Eliazar ASTM D698

MATERIAL IDENTIFICATION COMPACTION PROCEDURE A: 101.6mm Mold, MATERIAL USE Subgrade Passing 4.75mm

MAX. NOMINAL SIZE RAMMER TYPE Manual

MATERIAL TYPE Clay PREPARATION Dry
SUPPLIER Exsiting Material OVERSIZE CORRECTION METHOD None

SOURCE BH23-03, Hartford Ave RETAINED 4.75mm SCREEN



TRIAL NUMBER	WET DENSITY (kg/m3)	DRY DENSITY (kg/m3)	MOISTURE CONTENT (%)
1	1744	1522	14.6
2	1840	1553	18.5
3	1928	1574	22.5
4	1955	1547	26.4

	MAXIMUM DRY DENSITY (kg/m3)	OPTIMUM MOISTURE CONTENT (%)
CALCULATED	1570	22.5
OVERSIZE CORRECTED		

COMMENTS

REVIEWED BY Jason Thompson, C.E.T.





PROCTOR TEST REPORT

City of Winnipeg Public Works Department 104-1155 Pacific Ave. Winnipeg, MB R3E 2P1

CLIENT City of Winnipeg Public Works Department

C.C.

ATTN: ErikHansen

PROJECT 2023 Local Street Renewals Program

123316298-2 PROJECT NO.

PROCTOR NO. DATE SAMPLED 2023. Jan. 16 DATE RECEIVED 2023. Jan. 16 DATE TESTED 2023. Jan. 19

> 30.0 % COMPACTION STANDARD Standard Proctor.

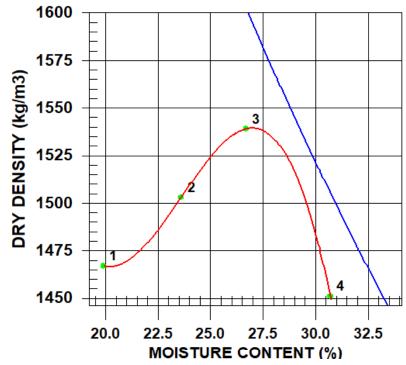
INSITU MOISTURE ASTM D698 **TESTED BY** Donald Eliazar

MATERIAL IDENTIFICATION A: 101.6mm Mold, COMPACTION PROCEDURE

Subgrade Passing 4.75mm MATERIAL USE

MAX. NOMINAL SIZE RAMMER TYPE Manual MATERIAL TYPE **PREPARATION** Clay Dry **SUPPLIER** Existing Material OVERSIZE CORRECTION METHOD None

SOURCE BH23-04, Hartford Ave **RETAINED 4.75mm SCREEN**



TRIAL NUMBER	WET DENSITY (kg/m3)	DRY DENSITY (kg/m3)	MOISTURE CONTENT (%)
1	1759	1467	19.9
2	1858	1503	23.6
3	1950	1539	26.7
4	1897	1451	30.7

	MAXIMUM DRY DENSITY (kg/m3)	OPTIMUM MOISTURE CONTENT (%)
CALCULATED	1540	27.0
OVERSIZE CORRECTED		

COMMENTS

REVIEWED BY √son Thompson, C.E.T.





PROCTOR TEST REPORT

City of Winnipeg Public Works Department 104-1155 Pacific Ave. Winnipeg, MB R3E 2P1

C.C.

ATTN: ErikHansen

PROJECT 2023 Local Street Renewals Program

CLIENT City of Winnipeg Public Works Department

123316298-2 PROJECT NO.

PROCTOR NO. DATE SAMPLED 2023. Jan. 16 DATE RECEIVED 2023. Jan. 16 DATE TESTED 2023. Jan. 20

INSITU MOISTURE 25.3 % COMPACTION STANDARD Standard Proctor.

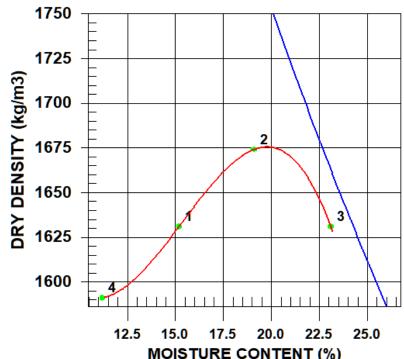
ASTM D698 **TESTED BY** Donald Eliazar

MATERIAL IDENTIFICATION COMPACTION PROCEDURE A: 101.6mm Mold, Subgrade Passing 4.75mm MATERIAL USE

RAMMER TYPE

MAX. NOMINAL SIZE Manual MATERIAL TYPE **PREPARATION** Moist Clay **SUPPLIER** Existing Materials OVERSIZE CORRECTION METHOD None

BH23-05, Powers St **SOURCE RETAINED 4.75mm SCREEN**



TRIAL NUMBER	WET DENSITY (kg/m3)	DRY DENSITY (kg/m3)	MOISTURE CONTENT (%)
1	1879	1631	15.2
2	1994	1674	19.1
3	2008	1631	23.1
4	1769	1591	11.2

	MAXIMUM DRY DENSITY (kg/m3)	OPTIMUM MOISTURE CONTENT (%)
CALCULATED	1680	20.0
OVERSIZE CORRECTED		

COMMENTS

REVIEWED BY √son Thompson, C.E.T.





PROCTOR TEST REPORT

City of Winnipeg Public Works
Department
104-1155 Pacific Ave.
Winnipeg, MB
R3E 2P1

CLIENT City of Winnipeg Public Works Department

C.C.

ATTN: ErikHansen

PROJECT 2023 Local Street Renewals Program

PROJECT NO. 123316298-2

INSITU MOISTURE

PROCTOR NO. 6 DATE SAMPLED 2023. Jan. 16 DATE RECEIVED 2023. Jan. 16 DATE TESTED 2023. Jan. 20

26.1 % COMPACTION STANDARD Standard Proctor,

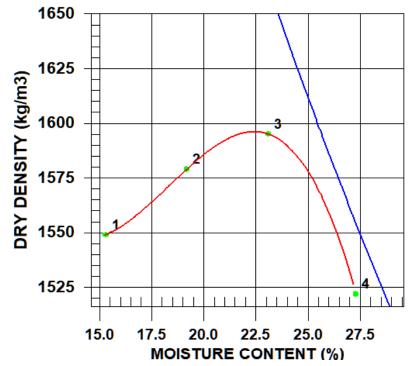
TESTED BY Donald Eliazar ASTM D698

MATERIAL IDENTIFICATION COMPACTION PROCEDURE A: 101.6mm Mold,

MATERIAL USE Subgrade Passing 4.75mm

MAX. NOMINAL SIZE RAMMER TYPE Manual MATERIAL TYPE Clay PREPARATION Moist SUPPLIER Existing Materials OVERSIZE CORRECTION METHOD None

SOURCE BH23-06, Powers St RETAINED 4.75mm SCREEN



TRIAL NUMBER	WET DENSITY (kg/m3)	DRY DENSITY (kg/m3)	MOISTURE CONTENT (%)
1	1786	1549	15.3
2	1882	1579	19.2
3	1964	1595	23.1
4	1937	1522	27.3

	MAXIMUM DRY DENSITY (kg/m3)	OPTIMUM MOISTURE CONTENT (%)
CALCULATED	1600	22.5
OVERSIZE CORRECTED		

COMMENTS

REVIEWED BY Jason Thompson, C.E.T.



199 Henlow Bay, Winnipeg, MB R3Y 1G4

Tel: (204) 488-6999

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

O City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

Winnipeg, Manitoba

104 - 1155 Pacific Avenue

willingeg, Mariitoba

R3E 3P1

PROJECT NO. 12

123316298

ATTN: Erik Hansen

REPORT NO.

(Data page - see Page 2 for Chart)

DATE SAMPLED: 2023.Jan.16 DATE RECEIVED: 2023.Jan.16 DATE TESTED: 2023.Jan.25 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Ryan Bremner

MATERIAL IDENTIFICATION

MATERIAL USE Subgrade S

SUPPLIER Existing Material

MAX. NOMINAL SIZE < 4.75 mm

SOURCE

BH23-01, Hartford Avenue

MATERIAL TYPE Clay

SAMPLE LOCATION

BH23-01, Hartford Avenue

SPECIFICATION Not Applicable

STANTEC SAMPLE NO. 4894

IMMERSION PERIOD	96 ± 2 hr	TARGET MAX. DRY DENSITY	1760 kg/m ³
		TARGET OPTIMUM MOISTURE	17.0 %
CONDITION OF SAMPLE	Soaked		
		AS-COMPACTED MAX. DRY DENSITY	1673 kg/m³
SURCHARGE MASS	4.54 kg	AS-COMPACTED MOISTURE CONTENT	17.0 %
SWELL OF SAMPLE	2.9%	POST-TEST MOISTURE CONTENT	26.4 %
		(TOP 25 mm)	

CBR VALUE AT 2.54 mm PENETRATION	3.0
CBR VALUE AT 5.08 mm PENETRATION	3.0

COMMENTS:

Sample prepared to 95% of the maximum dry density at the optimum moisture content as determined from ASTM D698.

REPORT DATE 2023.Jan.27

REVIEWED BY Jason Thompson, C.E.T.

Principal - Manager of Materials Testing Services

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Design with community in mind



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Tel: (204) 488-6999

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

City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

104 - 1155 Pacific Avenue Winnipeg, Manitoba

R3E 3P1

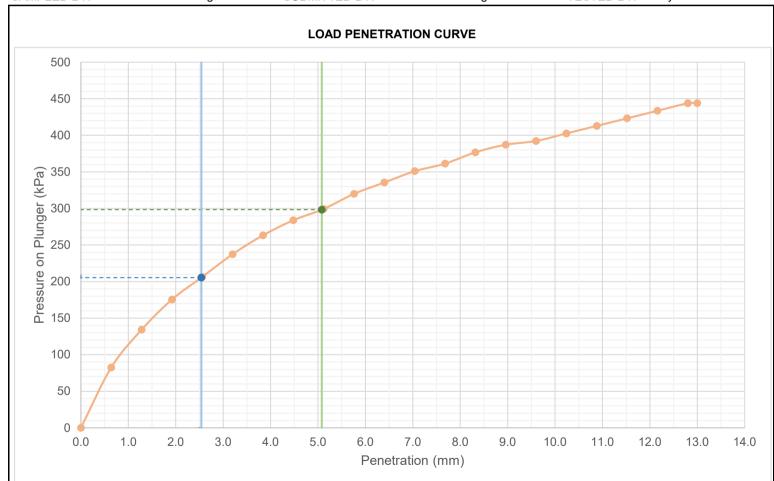
PROJECT NO.

123316298

ATTN: Erik Hansen REPORT NO.

(Chart page - See Page 1 for Data)

DATE SAMPLED: 2023.Jan.16 DATE RECEIVED: 2023.Jan.16 DATE TESTED: 2023.Jan.25 Stantec Consulting Ltd. SAMPLED BY: SUBMITTED BY: Stantec Consulting Ltd. Ryan Bremner TESTED BY:



REPORT DATE 2023.Jan.27

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

O City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

Winnipeg, Manitoba

104 - 1155 Pacific Avenue

R3E 3P1

PROJECT NO.

123316298

ATTN: Erik Hansen

REPORT NO.

2 (Data page - see Page 2 for Chart)

DATE SAMPLED: 2023.Jan.16 DATE RECEIVED: 2023.Jan.16 DATE TESTED: 2023.Jan.26 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Ryan Bremner

MATERIAL IDENTIFICATION

MATERIAL USE Subgrade SUPPLIER Existing Material

MAX. NOMINAL SIZE < 4.75 mm SOURCE BH23-02, Hartford Avenue MATERIAL TYPE Clay SAMPLE LOCATION BH23-02, Hartford Avenue

SPECIFICATION Not Applicable STANTEC SAMPLE NO. 4895

IMMERSION PERIOD	96 ± 2 hr	TARGET MAX. DRY DENSITY	1600 kg/m ³
		TARGET OPTIMUM MOISTURE	23.0 %
CONDITION OF SAMPLE	Soaked		
		AS-COMPACTED MAX. DRY DENSITY	1514 kg/m ³
SURCHARGE MASS	4.54 kg	AS-COMPACTED MOISTURE CONTENT	23.0 %
SWELL OF SAMPLE	3.9%	POST-TEST MOISTURE CONTENT	37.0 %
		(TOP 25 mm)	

CBR VALUE AT 2.54 mm PENETRATION	2.1	
CBR VALUE AT 5.08 mm PENETRATION	1.9	

COMMENTS:

Sample prepared to 95% of the maximum dry density at the optimum moisture content as determined from ASTM D698.

REPORT DATE 2023.Jan.27

REVIEWED By Jason Thompson, C.E.T.

Principal - Manager of Materials Testing Services

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Tel: (204) 488-6999

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

City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

104 - 1155 Pacific Avenue Winnipeg, Manitoba

R3E 3P1

PROJECT

ATTN: Erik Hansen

PROJECT NO. 123316298

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

DATE SAMPLED: 2023.Jan.16

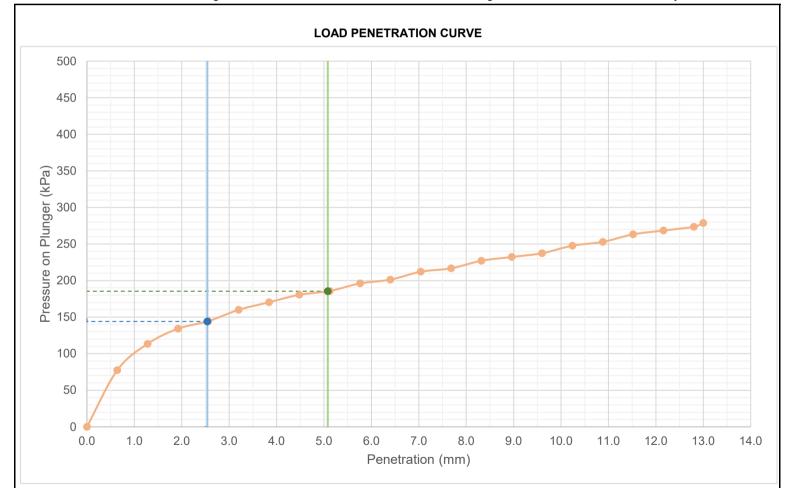
DATE RECEIVED: 2023.Jan.16

DATE TESTED: 2023.Jan.26

SAMPLED BY: Stantec Consulting Ltd.

SUBMITTED BY: Stantec Consulting Ltd.

TESTED BY: Ryan Bremner



REPORT DATE 2023.Jan.27

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199 Henlow Bay, Winnipeg, MB R3Y 1G4

Tel: (204) 488-6999

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

O City of Winnipeg, Public Works Department

Erik Hansen

PROJECT

REPORT NO.

2023 Local Streets & Pathway

(Data page - see Page 2 for Chart)

Renewals Program

123316298

Winnipeg, Manitoba

104 - 1155 Pacific Avenue

R3E 3P1

ATTN:

PROJECT NO.

DATE SAMPLED: 2023.Jan.16 DATE RECEIVED: 2023.Jan.16 DATE TESTED: 2023.Jan.25 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Ryan Bremner

MATERIAL IDENTIFICATION

MATERIAL USE Subgrade SUPPLIER Existing Material

MAX. NOMINAL SIZE < 4.75 mm SOURCE BH23-03, Hartford Avenue MATERIAL TYPE Clay SAMPLE LOCATION BH23-03, Hartford Avenue

SPECIFICATION Not Applicable STANTEC SAMPLE NO. 4896

IMMERSION PERIOD	96 ± 2 hr	TARGET MAX. DRY DENSITY	1570 kg/m ³
		TARGET OPTIMUM MOISTURE	22.5 %
CONDITION OF SAMPLE	Soaked		
		AS-COMPACTED MAX. DRY DENSITY	1496 kg/m ³
SURCHARGE MASS	4.54 kg	AS-COMPACTED MOISTURE CONTENT	22.3 %
SWELL OF SAMPLE	4.7%	POST-TEST MOISTURE CONTENT	36.3 %
		(TOP 25 mm)	

CBR VALUE AT 2.54 mm PENETRATION	2.2
CBR VALUE AT 5.08 mm PENETRATION	2.1

COMMENTS:

Sample prepared to 95% of the maximum dry density at the optimum moisture content as determined from ASTM D698.

REPORT DATE 2023.Jan.27

REVIEWED BY Jason Thompson, C.E.T.

Principal - Manager of Materials Testing Services

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

TO City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

104 - 1155 Pacific Avenue Winnipeg, Manitoba

R3E 3P1

PROJECT NO.

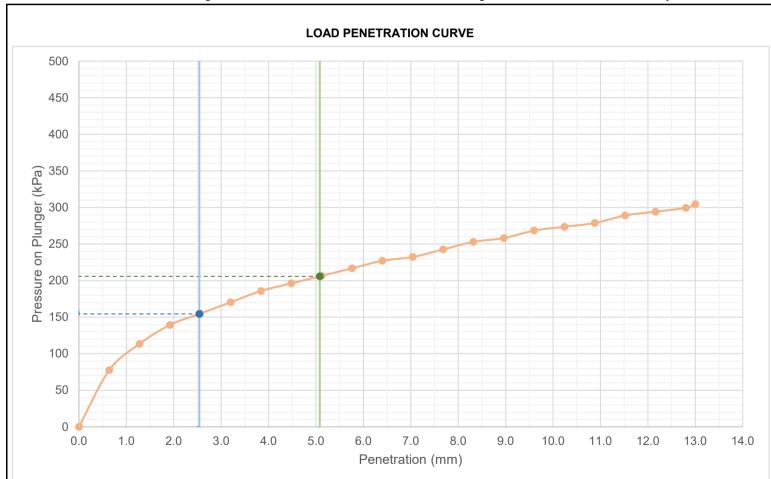
123316298

ATTN: Erik Hansen

REPORT NO. 3

(Chart page - See Page 1 for Data)

DATE SAMPLED: 2023.Jan.16 DATE RECEIVED: 2023.Jan.16 DATE TESTED: 2023.Jan.25 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Ryan Bremner



REPORT DATE 2023.Jan.27

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Tel: (204) 488-6999

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

O City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

Winnipeg, Manitoba

R3E 3P1

104 - 1155 Pacific Avenue

PROJECT NO.

123316298

ATTN: Erik Hansen REPORT NO. 4 (Data page - see Page 2 for Chart)

DATE SAMPLED: 2023.Jan.16

DATE RECEIVED: 2023.Jan.16

DATE TESTED: 2023.Jan.25

SAMPLED BY: Stantec Consulting Ltd.

SUBMITTED BY: Stantec Consulting Ltd.

TESTED BY: Ryan Bremner

MATERIAL IDENTIFICATION

MATERIAL USE Subgrade SUPPLIER Existing Material

MAX. NOMINAL SIZE < 4.75 mm SOURCE BH23-04, Hartford Avenue MATERIAL TYPE Clay SAMPLE LOCATION BH23-04, Hartford Avenue

SPECIFICATION Not Applicable STANTEC SAMPLE NO. 4897

IMMERSION PERIOD	96 ± 2 hr	TARGET MAX. DRY DENSITY	1540 kg/m ³
		TARGET OPTIMUM MOISTURE	27.0 %
CONDITION OF SAMPLE	Soaked		
		AS-COMPACTED MAX. DRY DENSITY	1464 kg/m ³
SURCHARGE MASS	4.54 kg	AS-COMPACTED MOISTURE CONTENT	27.0 %
SWELL OF SAMPLE	3.3%	POST-TEST MOISTURE CONTENT	40.6 %
		(TOP 25 mm)	

CBR VALUE AT 2.54 mm PENETRATION	2.5	
CBR VALUE AT 5.08 mm PENETRATION	2.1	

COMMENTS:

Sample prepared to 95% of the maximum dry density at the optimum moisture content as determined from ASTM D698.

REPORT DATE 2023.Jan.27

REVIEWED By Jason Thompson, C.E.T.

Principal - Manager of Materials Testing Services

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199 Henlow Bay, Winnipeg, MB R3Y 1G4

Tel: (204) 488-6999

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

City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

104 - 1155 Pacific Avenue Winnipeg, Manitoba

winnipeg, Manitoba

R3E 3P1

PROJECT NO.

123316298

ATTN: Erik Hansen

REPORT NO.

(Chart page - See Page 1 for Data)

DATE SAMPLED: 2023.Jan.16

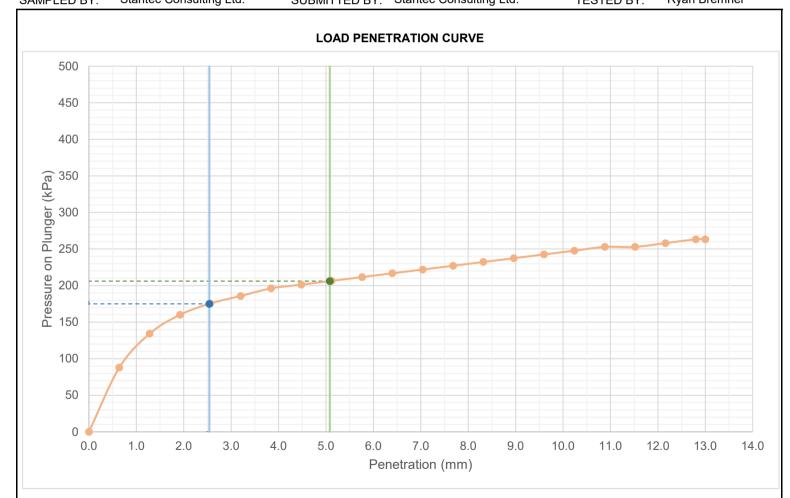
DATE RECEIVED: 2023.Jan.16

DATE TESTED: 2023.Jan.25

SAMPLED BY: Stantec Consulting Ltd.

SUBMITTED BY: Stantec Consulting Ltd.

TESTED BY: Ryan Bremner



REPORT DATE 2023.Jan.27

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

O City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

Winnipeg, Manitoba

R3E 3P1

ATTN:

SAMPLED BY:

NOL OI I

104 - 1155 Pacific Avenue

PROJECT NO.

123316298

Erik Hansen REPORT NO. 5 (Data page - see Page 2 for Chart)

DATE SAMPLED: 2023.Jan.16

DATE RECEIVED: 2023.Jan.16

DATE TESTED: 2023.Jan.26

Stantec Consulting Ltd.

SUBMITTED BY: Stantec Consulting Ltd.

TESTED BY: Ryan Bremner

MATERIAL IDENTIFICATION

MATERIAL USE Subgrade

SUPPLIER

Existing Material

MAX. NOMINAL SIZE < 4.75 mm

SOURCE

BH23-05, Powers Street

MATERIAL TYPE Clay

SAMPLE LOCATION

BH23-05, Powers Street

SPECIFICATION Not Applicable

STANTEC SAMPLE NO. 4898

IMMERSION PERIOD	96 ± 2 hr	TARGET MAX. DRY DENSITY	1680 kg/m ³
		TARGET OPTIMUM MOISTURE	20.0 %
CONDITION OF SAMPLE	Soaked		

SURCHARGE MASS 4.54 kg

AS-COMPACTED MAX. DRY DENSITY
AS-COMPACTED MOISTURE CONTENT

1594 kg/m³ 20.1 %

SWELL OF SAMPLE

1.3%

POST-TEST MOISTURE CONTENT

27.5 %

(TOP 25 mm)

CBR VALUE AT 2.54 mm PENETRATION 6 .

CBR VALUE AT **5.08 mm** PENETRATION **5.2**

COMMENTS:

Sample prepared to 95% of the maximum dry density at the optimum moisture content as determined from ASTM D698.

REPORT DATE 2023.Jan.27

EVIEWED BY Jason Thompson, C.E.T.

Principal - Manager of Materials Testing Services

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199 Henlow Bay, Winnipeg, MB R3Y 1G4

Tel: (204) 488-6999

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

City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

Winnipeg, Manitoba

PROJECT NO.

123316298

R3E 3P1

ATTN: Erik Hansen

104 - 1155 Pacific Avenue

REPORT NO.

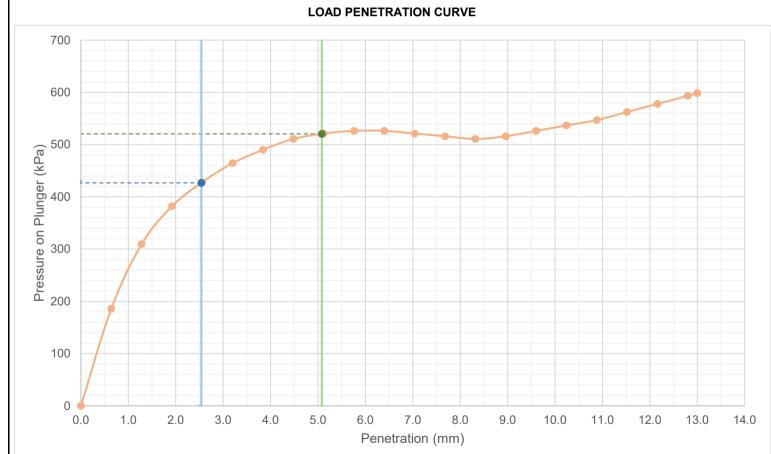
(Chart page - See Page 1 for Data)

DATE SAMPLED: 2023.Jan.16

DATE RECEIVED: 2023.Jan.16

DATE TESTED: 2023.Jan.26

Stantec Consulting Ltd. SAMPLED BY: SUBMITTED BY: Stantec Consulting Ltd. Ryan Bremner TESTED BY: LOAD PENETRATION CURVE



REPORT DATE 2023.Jan.27

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Tel: (204) 488-6999

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

O City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

Winnipeg, Manitoba

104 - 1155 Pacific Avenue

R3E 3P1

PROJECT NO.

123316298

ATTN:

Erik Hansen

REPORT NO.

(Data page - see Page 2 for Chart)

DATE SAMPLED: 2023.Jan.16 DATE RECEIVED: 2023.Jan.16 DATE TESTED: 2023.Jan.26 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Ryan Bremner

MATERIAL IDENTIFICATION

MAX. NOMINAL SIZE

MATERIAL USE Subgrade SUPF

SUPPLIER Existing Material

< 4.75 mm

SOURCE BH23-06, Powers Street

MATERIAL TYPE Clay

SAMPLE LOCATION

BH23-06, Powers Street

SPECIFICATION Not Applicable

STANTEC SAMPLE NO. 4899

IMMERSION PERIOD	96 ± 2 hr	TARGET MAX. DRY DENSITY	1600 kg/m ³
		TARGET OPTIMUM MOISTURE	22.5 %
CONDITION OF SAMPLE	Soaked		
		AS-COMPACTED MAX. DRY DENSITY	1521 kg/m ³
SURCHARGE MASS	4.54 kg	AS-COMPACTED MOISTURE CONTENT	22.5 %
SWELL OF SAMPLE	1.5%	POST-TEST MOISTURE CONTENT	31.0 %
		(TOP 25 mm)	

CBR VALUE AT 2.54 mm PENETRATION	4.6
CBR VALUE AT 5.08 mm PENETRATION	3.8

COMMENTS:

Sample prepared to 95% of the maximum dry density at the optimum moisture content as determined from ASTM D698.

REPORT DATE 2023.Jan.27

REVIEWED BY Jason Thompson, C.E.T.

Principal - Manager of Materials Testing Services

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

Design with community in mind



199 Henlow Bay, Winnipeg, MB R3Y 1G4

Tel: (204) 488-6999

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

City of Winnipeg, Public Works Department

PROJECT

2023 Local Streets & Pathway

Renewals Program

Winnipeg, Manitoba

R3E 3P1

PROJECT NO.

123316298

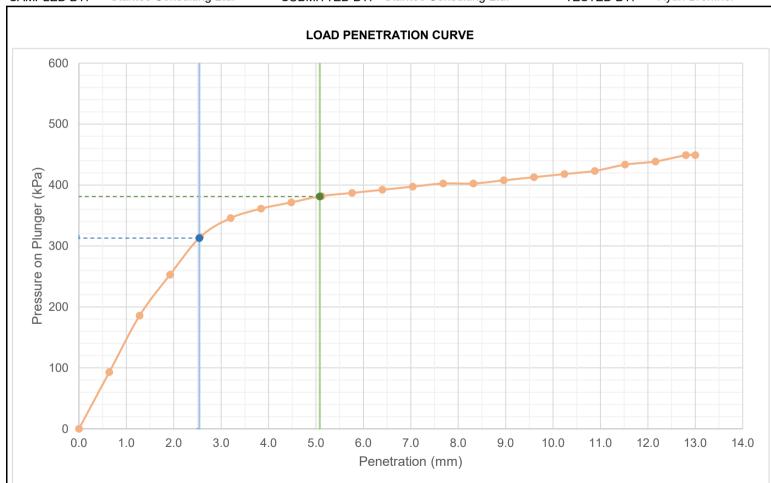
ATTN: Erik Hansen

104 - 1155 Pacific Avenue

REPORT NO. 6

(Chart page - See Page 1 for Data)

DATE SAMPLED: 2023.Jan.16 DATE RECEIVED: 2023.Jan.16 DATE TESTED: 2023.Jan.26 SAMPLED BY: Stantec Consulting Ltd. SUBMITTED BY: Stantec Consulting Ltd. TESTED BY: Ryan Bremner



REPORT DATE 2023.Jan.27

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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-23-07	100	175	1.75	0.980	460.19	56.8	55.6
2	BH-23-11	100	165	1.65	0.972	445.87	55.0	53.5
3	BH-23-15	146	235	1.61	0.969	725.47	39.8	38.5
4	BH-23-16	100	104	1.04	0.880	549.55	67.8	59.7
5	BH-23-19	100	168	1.68	0.974	435.73	53.8	52.4