



V. A. WOOD ASSOCIATES LIMITED

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***GEOTECHNICAL INVESTIGATION
NORTH OSHAWA CATHOLIC ELEMENTARY SCHOOL
COLDSTREAM DRIVE/GRANDVIEW STREET NORTH
OSHAWA, ONTARIO***

Ref. No. 6332-13-9

September 2013

Prepared for:

*Durham Catholic District School Board
c/o Walterfedy
675 Queen Street South, Suite 111
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1.0 **INTRODUCTION**

V.A. Wood Associates Limited was retained by Walterfedy on behalf of the Durham Catholic District School Board to carry out a geotechnical investigation for the proposed North Oshawa Catholic Elementary School at the southeast corner of Coldstream Drive and Grandview Street North in Oshawa, Ontario.

The site is a 2± hectare vacant land located within a newly developed residential area. The proposed school building will be a two storey structure with a slab on grade. Paved driveways, parking and play areas and a sodded playing field are also proposed.

The purpose of the investigation was to reveal the subsurface conditions and to determine the relevant soil properties for the design and construction of the foundations of the school building, the associated site services, the pavements and the play areas. Soil chemical analysis and soil infiltration assessment were also to be carried out.

2.0 **FIELD WORK**

The field work was carried out on September 19 and 20, 2013 and consisted of sixteen (16) boreholes at the locations shown on Enclosure 1. The boreholes were advanced to the sampling depths by means of a power-auger machine equipped for soil sampling. Standard Penetration tests were carried out at frequent intervals of depth and the results are shown on the Borehole Logs as N-values.

The field work was supervised by a soils technician and the soil samples were logged by a soils engineer. All samples were transported to our soils laboratory for further examination, classification and testing. The ground elevation at each borehole location was referred to temporary benchmark located on top of an electrical metal box located on Coldstream Drive as shown in Enclosure 1. It is understood that this benchmark has an elevation of 189.45 m above the geodetic datum.

3.0 **SUBSURFACE CONDITIONS**

Full details of the soils encountered in each borehole are given on the Borehole Logs, Enclosures 2 to 36 inclusive, and the following notes are intended to summarize this data.

*All of the boreholes encountered a surficial layer **topsoil** 40 to 50 mm thick.*

*The topsoil was underlain by **fill** which extended to a depth of between 0.2 and 0.9 m below grade. This fill is comprised generally of sand and silt with mixed topsoil and organics, and is likely disturbed or reworked surficial soil during the clearing of the site. Standard Penetration tests on the fill gave N-values between 5 and 29 blows/300mm, and its moisture content varied between 3 and 8%.*

Based on the test results, the fill is considered to be in a loose to compact condition.

*The fill was underlain by a native deposit of **silty sand till** which extended to a depth of more than 5 m below grade (maximum depth investigated). This glacial deposit is comprised of a silty sand matrix which contained traces to some gravel and occasional seams of sand. Standard Penetration tests gave N-values between 23 and more than 100 blows/300mm, and its natural moisture content varied between 3 and 11%.*

Based on the test results, the silty sand till is considered to have a compact to very dense

relative density. Pyrite crystals were observed within crushed gravel fragments in the till in Boreholes 8 and 13 at a depth of between 4 and 5 m.

The silty sand till in Boreholes 11, 13 and 14 was underlain by a deposit of silty sand which extended to a depth of more than 5 m below grade (maximum depth investigated). This deposit is comprised of fine sand with silt, and is generally wet. Standard Penetration tests in this deposit gave N-values between 62 and more than 100 blows/300mm, and its moisture content varied between 16 and 18%.

Based on the test results, the silty sand is considered to have a very dense relative density.

4.0 **GROUNDWATER CONDITIONS**

A free water surface was encountered in Boreholes 11 and 13 at a depth of between 4.4 and 4.6 m. The remaining boreholes were open and dry (except Borehole 14 which caved in at 4 m) to the full depth upon completion of the fieldwork. It is noted that the water level measurement was carried out immediately after completion of drilling, and it is likely that the ground water had not yet stabilized in the boreholes.

An examination of the soil samples revealed that the fill and glacial till were damp to moist, and the silty sand was wet. A change in the colour of the native soil samples from brown to grey was observed at a depth of between 2.2 and 4.5 m below grade in some of the boreholes.

Based on the foregoing, the permanent groundwater table is considered to be located at a depth of at least 2.2 m below grade in most locations. However, perched water conditions may occur in wet sand seams within the glacial till deposit.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 General

The boreholes encountered a surficial layer of topsoil and fill 200 to 900 mm thick , followed by competent deposits of silty sand till and silty sand. The permanent groundwater table is considered to be located at a depth of at least 2.2 m below grade in most locations, although perched water conditions may occur in wet sand seams within the till deposit.

The anticipated that the proposed building will be a two storey structure with a slab on grade. The structure will likely have load bearing masonry walls on strip footings and internal columns on shallow spread footings.

Full details of the proposed structure were not available at the time of this report and, therefore, the following recommendations should be reviewed when these details are available.

5.2 Foundations

The footings should extend through the fill and onto the compact to dense native silty sand till. This stratum is considered capable of supporting normal footings designed to a bearing pressure in SLS of up to 300 kPa (450 kPa in ULS).

It is estimated that the total and differential settlements of footings designed to the above bearing pressures will be less than 25 and 20 mm respectively. These are normally considered to be acceptable for the proposed structure.

All exterior footings or footings in unheated areas should be located at least 1.2 metres below finished grade for adequate frost protection. The minimum footing sizes should not be less than those specified in the Ontario Building Code. The slopes between footings should be inclined such that elevation differences between adjacent footings are not more than one half of the horizontal distance between them.

It is noted that a significant amount of pyrite crystals were observed in Boreholes 8 and 13, and these appear to be included within the granitic gravel. They were encountered at a depth of between 4 and 5 m, however, it is possible that similar materials exist at shallower levels. When exposed to moisture, pyrite turns to limonite and releases sulfuric acid which have detrimental effects on concrete and steel. Pyrite containing soil should be removed from the foundation subgrade.

All foundation excavations should be inspected by geotechnical personnel from V.A. Wood Associates Limited to ensure that the founding soils are similar to those identified in the Borehole Logs and that they are capable of supporting the design loads.

Based on the Ontario Building Code of 2006, the classification of soils for seismic site response should be based on the average soil properties of the top 30 m of the soil profile.

The deepest boreholes were only 5 m deep and were terminated in very dense silty sand till of silty sand. These very dense deposits are expected to extend to depth and, in this case, the site maybe classified as Site Class 'C' , and a foundation factor of 1.0 may be used for F_a and F_v in the calculation of seismic forces.

For the design of members resisting lateral loads, the recommended soil parameters are as follows:

<i>Soil Parameter</i>	<i>Loose Fill</i>	<i>Compact to Dense Native Silty Sand Till</i>
<i>Unit Weight</i>	<i>18 kN/m³</i>	<i>21 kN/m³</i>
<i>Friction Angle</i>	<i>28°</i>	<i>33°</i>
<i>Cohesion</i>	<i>0</i>	<i>0</i>
<i>Coeff. of At Rest Earth Pressure</i>	<i>0.53</i>	<i>0.46</i>
<i>Coeff. of Active Pressure</i>	<i>0.36</i>	<i>0.29</i>
<i>Coeff. of Passive Pressure</i>	<i>2.8</i>	<i>3.4</i>
<i>Coefficient of Friction</i>	<i>--</i>	<i>0.4</i>

5.3 Slab On Grade

It is anticipated that the finished ground floor of the building will be slightly above the existing grade, that all of the topsoil and loose fill will removed and that any backfill will be engineered. In this case, the subgrade of the slab on grade will likely be comprised of engineered fill or native silty sand till, which are considered to be generally suitable for slab on grade construction.

All loose and wet soil, any organics and deleterious materials should be removed from within the building footprint. The exposed subgrade should be inspected and proof-rolled and any soft or wet areas identified should be sub-excavated and replaced with compacted approved fill. Any additional fill required should be placed in 150 to 200 mm thick lifts and compacted to at least 98% Standard Proctor maximum dry density.

A layer of well-graded free-draining granular material, at least 150 mm thick and compacted to 98% of its Standard Proctor maximum dry density, should be placed under the floor slab to provide a uniform bearing surface and to act as a vapour barrier.

Perimeter foundation drains and sub-floor drains are considered not necessary, except for the elevator pit (if one is required).

5.4 Service Trenches

It is anticipated that the service trenches will generally be less than 3± m below finished grade. Reference to the Borehole Logs indicates that the subgrade will likely be composed of dense to very dense silty sand till, which will generally provide adequate support for the pipes and allow the use of normal Class 'B' bedding using Granular 'A' material.

Clear crushed stone should not be used as bedding, otherwise the fines from the surrounding silty subsoil may migrate into the voids of the stone and cause undesirable settlements.

If there is local softening of the trench grade, then the bedding thickness may have to be increased. The backfill around manholes should consist of well compacted granular soil.

5.5 Excavation and Groundwater Control

No major construction problems, due to water, are anticipated with excavations to a depth of less than 3 m below grade in most locations. Provision should, however, be made for the control of any surface water run-off and possible perched water seepage by pumping from local sumps, as and where required.

Excavations of more than 1.2 metres in depth should be cut back to a side slope of 1:1. Steeper slopes may be used within the dense silty sand till as long as the excavation is kept dry and there is no significant surcharge above the slope. Alternatively, the excavation may be supported using adequately braced sheeting.

It is noted that large cobbles and boulders are not uncommon in glacial till deposits.

It is anticipated that the excavated soils (except any fill with significant topsoil or organics) will generally be suitable as backfill (except in trenches), provided that their moisture content is kept to within 3% of the optimum value. Backfill should be placed in horizontal layers 150 to 200mm thick and compacted to at least 98% of its Standard Proctor maximum dry density.

To minimize potential problems, backfilling operations should follow closely after excavation so that only a minimal length of trench slope is exposed. Should construction be carried out in the winter season, particular attention should be given to make sure frozen material is not used as backfill.

5.6 Pavements

It is anticipated that the finished grade of the pavements will be close to the existing grade. In this case, the subgrade of the pavements will likely be comprised of compact to dense native till.

All topsoil, organics, loose or wet soil and any deleterious materials should be removed from the areas to be paved. Any additional backfill required should be comprised of approved on-site or imported material and placed in horizontal lifts not exceeding 200 mm thick and compacted to at least 98% of its Standard Proctor maximum dry density.

Considering the traffic requirements and subsoil conditions, the following pavement designs are recommended:

	<i>Car Parking Areas (Light Duty Asphalt)</i>	<i>Fire Route/Driveways (Heavy Duty Asphalt)</i>
	<u>(mm)</u>	<u>(mm)</u>
<i>HL-3 Asphaltic Concrete</i>	50	40
<i>HL-8 Asphaltic Concrete</i>	--	75
<i>Granular 'A' or 20 mm crusher run limestone</i>	150	150
<i>Granular 'B' or 50 mm crusher run limestone</i>	200	300

The base and sub-base granular materials should be compacted to at least 98% Standard Proctor maximum dry density and the asphaltic concrete to 96% Marshall density. The thicknesses shown above are compacted thicknesses. The top course asphalt should not be placed until the base course asphalt has been in place for one winter season.

If the City of Oshawa has stricter specifications than shown above, then the City's requirements should be followed.

Frequent inspection by geotechnical personnel from V.A. Wood Associates Limited should be carried out during construction to verify the compaction of the subgrade, base courses and asphaltic concrete by in-situ density testing using nuclear gauges.

5.7 Soil Permeability

The permeability of the shallow native subsoils at the north and south sides of the site has been assessed based on their grain size distribution, density, and the amount of clay and organics. Grain size analyses were carried out on samples of the native till in Boreholes 2 and 16 (BH2/SS2 and BH16/SS2).

The grain size distribution curves are shown on Enclosures 18 and 19, and reference to these indicate that the native till is comprised of well graded sand and silt with some clay, and is classified as SM. The deposit is generally compact to dense, has 10 to 12% clay fraction and has no organic content.

Based on the findings and observations, the shallow native subsoils are considered to have a low permeability, and this should be taken into consideration in the regrading and drainage design of the proposed soccer field/ play area and in the design of any infiltration system. For preliminary design purposes the following soil parameters are recommended:

Coefficient of Permeability (k) = 10^{-5} cm/sec

Percolation Time (T) = 20 min/cm (equiv. Infiltration Rate = 30 mm/hr)

5.8 Soil Chemical Analyses

Two representative samples of the fill within the building area were submitted to ALS Environmental for chemical analyses general and inorganic parameters. The test results are shown in Appendix A, and reference to this shows that all of the parameters tested meet Table 2 standards (Full Depth Generic Site Condition in a Non-Potable Groundwater Condition) under O/Reg 511/11 for residential/park/institutional property use.

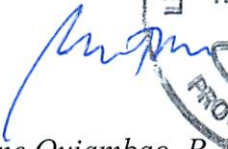
Based on the test results, the fill may be considered as ordinary fill for offsite disposal purposes.


6.0 STATEMENT OF LIMITATIONS

The Statement of Limitation presented on Appendix 'B' is an integral part of this report.


V.A. WOOD ASSOCIATES LIMITED


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Reviewed by:


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RQ/VW

A P P E N D I X ' A '

Soil Chemical Analysis



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Date Received: 23-SEP-13
Report Date: 25-SEP-13 13:51 (MT)
Version: FINAL

Client Phone: 416-292-2868

Certificate of Analysis

Lab Work Order #: L1367074
Project P.O. #: NOT SUBMITTED
Job Reference: 6332
C of C Numbers: 128006
Legal Site Desc:

Mathumai Ganeshkumar
Account Manager

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25-SEP-13 13:51 (MT)

Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L1367074-1	6332-BH11/1									
Sampled By: LEONARD on 19-SEP-13										
Matrix: SOIL										
Physical Tests										
Conductivity		0.164		0.0040	mS/cm	25-SEP-13	1.4	1.4	0.7	0.7
% Moisture		12.5		0.10	%	23-SEP-13				
pH		7.48		0.10	pH units	24-SEP-13				
Cyanides										
Cyanide, Weak Acid Diss		<0.050		0.050	ug/g	24-SEP-13	0.051	0.051	0.051	0.051
Saturated Paste Extractables										
SAR		<0.10		0.10	SAR	25-SEP-13	12	12	5	5
Calcium (Ca)		31.5		1.0	mg/L	25-SEP-13				
Magnesium (Mg)		1.3		1.0	mg/L	25-SEP-13				
Sodium (Na)		2.1		1.0	mg/L	25-SEP-13				
Metals										
Antimony (Sb)		<1.0		1.0	ug/g	24-SEP-13	40	50	7.5	7.5
Arsenic (As)		2.5		1.0	ug/g	24-SEP-13	18	18	18	18
Barium (Ba)		93.9		1.0	ug/g	24-SEP-13	670	670	390	390
Beryllium (Be)		0.55		0.50	ug/g	24-SEP-13	8	10	4	5
Boron (B)		10.8		5.0	ug/g	24-SEP-13	120	120	120	120
Boron (B), Hot Water Ext.		0.19		0.10	ug/g	25-SEP-13	2	2	1.5	1.5
Cadmium (Cd)		<0.50		0.50	ug/g	24-SEP-13	1.9	1.9	1.2	1.2
Chromium (Cr)		25.2		1.0	ug/g	24-SEP-13	160	160	160	160
Cobalt (Co)		7.0		1.0	ug/g	24-SEP-13	80	100	22	22
Copper (Cu)		11.7		1.0	ug/g	24-SEP-13	230	300	140	180
Lead (Pb)		8.2		1.0	ug/g	24-SEP-13	120	120	120	120
Mercury (Hg)		0.032		0.010	ug/g	24-SEP-13	3.9	20	0.27	1.8
Molybdenum (Mo)		<1.0		1.0	ug/g	24-SEP-13	40	40	6.9	6.9
Nickel (Ni)		13.6		1.0	ug/g	24-SEP-13	270	340	100	130
Selenium (Se)		<1.0		1.0	ug/g	24-SEP-13	5.5	5.5	2.4	2.4
Silver (Ag)		<0.20		0.20	ug/g	24-SEP-13	40	50	20	25
Thallium (Tl)		<0.50		0.50	ug/g	24-SEP-13	3.3	3.3	1	1
Uranium (U)		<1.0		1.0	ug/g	24-SEP-13	33	33	23	23
Vanadium (V)		37.4		1.0	ug/g	24-SEP-13	86	86	86	86
Zinc (Zn)		47.5		5.0	ug/g	24-SEP-13	340	340	340	340
Speciated Metals										
Chromium, Hexavalent		<0.20		0.20	ug/g	24-SEP-13	8	10	8	10
L1367074-2	6332-BH9/1									
Sampled By: LEONARD on 20-SEP-13										
Matrix: SOIL										
Physical Tests										
Conductivity		0.146		0.0040	mS/cm	25-SEP-13	1.4	1.4	0.7	0.7
% Moisture		11.2		0.10	%	23-SEP-13				
pH		7.50		0.10	pH units	24-SEP-13				
Cyanides										
Cyanide, Weak Acid Diss		<0.050		0.050	ug/g	24-SEP-13	0.051	0.051	0.051	0.051
Saturated Paste Extractables										

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T2-RPI-ICC-C/F-SOIL

#1: T2-Soil-Ind/Com/Commu Property Use (Coarse)

#2: T2-Soil-Ind/Com/Commu Property Use (Fine)

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Res/Park/Inst. Property Use (Fine)



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ANALYTICAL GUIDELINE REPORT

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Sample Details		Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
Grouping	Analyte						#1	#2	#3	#4
L1367074-2	6332-BH9/1									
Sampled By:	LEONARD on 20-SEP-13									
Matrix:	SOIL									
Saturated Paste Extractables										
SAR		0.12	SAR:Q	0.10	SAR	25-SEP-13	12	12	5	5
Calcium (Ca)		31.6		1.0	mg/L	25-SEP-13				
Magnesium (Mg)		<1.0		1.0	mg/L	25-SEP-13				
Sodium (Na)		2.4		1.0	mg/L	25-SEP-13				
Metals										
Antimony (Sb)		<1.0		1.0	ug/g	24-SEP-13	40	50	7.5	7.5
Arsenic (As)		2.4		1.0	ug/g	24-SEP-13	18	18	18	18
Barium (Ba)		74.8		1.0	ug/g	24-SEP-13	670	670	390	390
Beryllium (Be)		<0.50		0.50	ug/g	24-SEP-13	8	10	4	5
Boron (B)		9.5		5.0	ug/g	24-SEP-13	120	120	120	120
Boron (B), Hot Water Ext.		0.15		0.10	ug/g	25-SEP-13	2	2	1.5	1.5
Cadmium (Cd)		<0.50		0.50	ug/g	24-SEP-13	1.9	1.9	1.2	1.2
Chromium (Cr)		20.3		1.0	ug/g	24-SEP-13	160	160	160	160
Cobalt (Co)		5.6		1.0	ug/g	24-SEP-13	80	100	22	22
Copper (Cu)		13.0		1.0	ug/g	24-SEP-13	230	300	140	180
Lead (Pb)		7.1		1.0	ug/g	24-SEP-13	120	120	120	120
Mercury (Hg)		0.018		0.010	ug/g	24-SEP-13	3.9	20	0.27	1.8
Molybdenum (Mo)		<1.0		1.0	ug/g	24-SEP-13	40	40	6.9	6.9
Nickel (Ni)		11.8		1.0	ug/g	24-SEP-13	270	340	100	130
Selenium (Se)		<1.0		1.0	ug/g	24-SEP-13	5.5	5.5	2.4	2.4
Silver (Ag)		<0.20		0.20	ug/g	24-SEP-13	40	50	20	25
Thallium (Tl)		<0.50		0.50	ug/g	24-SEP-13	3.3	3.3	1	1
Uranium (U)		<1.0		1.0	ug/g	24-SEP-13	33	33	23	23
Vanadium (V)		33.5		1.0	ug/g	24-SEP-13	86	86	86	86
Zinc (Zn)		40.1		5.0	ug/g	24-SEP-13	340	340	340	340
Speciated Metals										
Chromium, Hexavalent		<0.20		0.20	ug/g	24-SEP-13	8	10	8	10

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.

* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Regulation 153/04 - April 15, 2011 Standards = [Suite] - ON-511-T2-RPI-ICC-C/F-SOIL

#1: T2-Soil-Ind/Com/Commu Property Use (Coarse)

#2: T2-Soil-Ind/Com/Commu Property Use (Fine)

#3: T2-Soil-Res/Park/Inst. Property Use (Coarse)

#4: T2-Soil-Res/Park/Inst. Property Use (Fine)

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
CINT	Cooling initiated. Samples were packaged with ice or ice packs upon receipt.

Sample Parameter Qualifier key listed:

Qualifier	Description
SAR:Q	Qualified SAR value: actual SAR is lower but is incalculable due to Na, Ca or Mg below detection limit.

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
B-HWS-R511-WT	Soil	Boron-HWE-O.Reg 153/04 (July 2011)	HW EXTR, EPA 6010B
A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
CN-WAD-R511-WT	Soil	Cyanide (WAD)-O.Reg 153/04 (July 2011)	MOE 3015/APHA 4500CN I-WAD
The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
CR-CR6-IC-R511-WT	Soil	Hex Chrom-O.Reg 153/04 (July 2011)	SW846 3060A/7199 R511
Soil sample undergoes a alkaline digestion process where the sample is acidified and derivatized with 1,5-diphenylcarbazide (DPC) using ion chromatography.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
EC-R511-WT	Soil	Conductivity-O.Reg 153/04 (July 2011)	MOEE E3138
A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
HG-R511-WT	Soil	Mercury-O.Reg 153/04 (July 2011)	SW846 3050B/7471
Solid sample is digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
MET-UG/G-CCMS-WT	Soil	Metal Scan Collision Cell ICPMS	EPA 200.2/6020A
Sample is vigorously digested with nitric and hydrochloric acid. Analysis is conducted by ICP/MS.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).			
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
PH-R511-WT	Soil	pH-O.Reg 153/04 (July 2011)	MOEE E3137A
A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C
A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

Reference Information

128006

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.



Workorder: L1367074

Report Date: 25-SEP-13

Page 1 of 6

Client: V.A. WOOD ASSOCIATES LIMITED

1080 Tapscott Rd Unit 24

Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT		Soil						
Batch	R2700215							
WG1754137-4	DUP	WG1754137-3						
Boron (B), Hot Water Ext.		0.19	0.21		ug/g	6.6	40	25-SEP-13
WG1754137-2	LCS							
Boron (B), Hot Water Ext.			94.2		%		70-130	25-SEP-13
WG1754137-1	MB							
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	25-SEP-13
WG1754137-5	MS	WG1754137-3						
Boron (B), Hot Water Ext.			92.7		%		60-140	25-SEP-13
CN-WAD-R511-WT		Soil						
Batch	R2700458							
WG1753216-3	DUP	L1367074-1						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	24-SEP-13
WG1753216-2	LCS							
Cyanide, Weak Acid Diss			105		%		80-120	24-SEP-13
WG1753216-1	MB							
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	24-SEP-13
WG1753216-4	MS	L1367074-1						
Cyanide, Weak Acid Diss			96.2		%		70-130	24-SEP-13
CR-CR6-IC-R511-WT		Soil						
Batch	R2699121							
WG1753217-5	CRM	WT-SQC012						
Chromium, Hexavalent			95.2		%		80-120	24-SEP-13
WG1753217-3	DUP	L1367074-1						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	24-SEP-13
WG1753217-2	LCS							
Chromium, Hexavalent			90.0		%		80-120	24-SEP-13
WG1753217-1	MB							
Chromium, Hexavalent			<0.20		ug/g		0.2	24-SEP-13
EC-R511-WT		Soil						
Batch	R2700245							
WG1754138-2	DUP	L1367074-2						
Conductivity		0.146	0.142		mS/cm	3.3	20	25-SEP-13
WG1754384-2	LCS							
Conductivity			99.1		%		90-110	25-SEP-13
WG1754138-1	MB							
Conductivity			<0.0040		mS/cm		0.004	25-SEP-13
HG-R511-WT		Soil						

Quality Control Report

Workorder: L1367074

Report Date: 25-SEP-13

Page 2 of 6

Client: V.A. WOOD ASSOCIATES LIMITED

1080 Tapscott Rd Unit 24

Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-R511-WT	Soil							
Batch	R2699401							
WG1753233-2	CRM	WT-SS-1						
Mercury (Hg)			92.3		%		70-130	24-SEP-13
WG1753233-6	DUP	WG1753233-5						
Mercury (Hg)		0.032	0.031		ug/g	2.8	30	24-SEP-13
WG1753233-4	LCS							
Mercury (Hg)			93.0		%		80-120	24-SEP-13
WG1753233-1	MB							
Mercury (Hg)			<0.010		ug/g		0.01	24-SEP-13
WG1753233-7	MS	WG1753233-5						
Mercury (Hg)			87.4		%		70-130	24-SEP-13
MET-UG/G-CCMS-WT	Soil							
Batch	R2699278							
WG1753280-2	CVS							
Antimony (Sb)			97.4		%		70-130	24-SEP-13
Arsenic (As)			101.7		%		70-130	24-SEP-13
Barium (Ba)			103.6		%		70-130	24-SEP-13
Beryllium (Be)			98.7		%		70-130	24-SEP-13
Boron (B)			95.4		%		70-130	24-SEP-13
Cadmium (Cd)			102.9		%		70-130	24-SEP-13
Chromium (Cr)			104.3		%		70-130	24-SEP-13
Cobalt (Co)			104.0		%		70-130	24-SEP-13
Copper (Cu)			106.4		%		70-130	24-SEP-13
Lead (Pb)			98.1		%		70-130	24-SEP-13
Molybdenum (Mo)			96.2		%		70-130	24-SEP-13
Nickel (Ni)			106.7		%		70-130	24-SEP-13
Selenium (Se)			100.6		%		70-130	24-SEP-13
Silver (Ag)			98.5		%		70-130	24-SEP-13
Thallium (Tl)			96.9		%		70-130	24-SEP-13
Uranium (U)			95.8		%		70-130	24-SEP-13
Vanadium (V)			104.1		%		70-130	24-SEP-13
Zinc (Zn)			99.8		%		70-130	24-SEP-13
WG1753233-6	DUP	WG1753233-5						
Antimony (Sb)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	24-SEP-13
Arsenic (As)		3.75	3.64		ug/g	2.9	30	24-SEP-13
Barium (Ba)		55.3	55.3		ug/g	0.1	40	24-SEP-13
Beryllium (Be)		<0.50	<0.50					

Quality Control Report

Workorder: L1367074

Report Date: 25-SEP-13

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Client: V.A. WOOD ASSOCIATES LIMITED

1080 Tapscott Rd Unit 24

Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT		Soil						
Batch	R2699278							
WG1753233-6	DUP	WG1753233-5						
Beryllium (Be)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	24-SEP-13
Boron (B)		6.1	6.8		ug/g	11	30	24-SEP-13
Cadmium (Cd)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	24-SEP-13
Chromium (Cr)		14.2	13.8		ug/g	2.8	30	24-SEP-13
Cobalt (Co)		4.6	4.4		ug/g	4.7	30	24-SEP-13
Copper (Cu)		12.0	11.8		ug/g	1.8	30	24-SEP-13
Lead (Pb)		26.9	25.6		ug/g	4.7	40	24-SEP-13
Molybdenum (Mo)		<1.0	<1.0	RPD-NA	ug/g	N/A	40	24-SEP-13
Nickel (Ni)		8.6	8.6		ug/g	0.3	30	24-SEP-13
Selenium (Se)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	24-SEP-13
Silver (Ag)		<0.20	<0.20	RPD-NA	ug/g	N/A	40	24-SEP-13
Thallium (Tl)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	24-SEP-13
Uranium (U)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	24-SEP-13
Vanadium (V)		28.3	26.9		ug/g	5.0	30	24-SEP-13
Zinc (Zn)		84.9	83.8		ug/g	1.3	30	24-SEP-13
WG1753233-3	LCS							
Antimony (Sb)			93.1		%		80-120	24-SEP-13
Arsenic (As)			102.7		%		80-120	24-SEP-13
Barium (Ba)			108.5		%		80-120	24-SEP-13
Beryllium (Be)			95.4		%		80-120	24-SEP-13
Boron (B)			92.6		%		80-120	24-SEP-13
Cadmium (Cd)			104.1		%		80-120	24-SEP-13
Chromium (Cr)			106.1		%		80-120	24-SEP-13
Cobalt (Co)			103.6		%		80-120	24-SEP-13
Copper (Cu)			105.5		%		80-120	24-SEP-13
Lead (Pb)			104.4		%		80-120	24-SEP-13
Molybdenum (Mo)			90.3		%		80-120	24-SEP-13
Nickel (Ni)			105.2		%		80-120	24-SEP-13
Selenium (Se)			107.2		%		80-120	24-SEP-13
Silver (Ag)			92.4		%		80-120	24-SEP-13
Thallium (Tl)			102.6		%		80-120	24-SEP-13
Uranium (U)			107.4		%		80-120	24-SEP-13
Vanadium (V)			105.3		%		80-120	24-SEP-13

Quality Control Report

Workorder: L1367074

Report Date: 25-SEP-13

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Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT Soil								
Batch R2699278								
WG1753233-3 LCS								
Zinc (Zn)			101.2		%		80-120	24-SEP-13
WG1753233-1 MB								
Antimony (Sb)			<1.0		ug/g		1	24-SEP-13
Arsenic (As)			<0.20		ug/g		0.2	24-SEP-13
Barium (Ba)			<1.0		ug/g		1	24-SEP-13
Beryllium (Be)			<0.50		ug/g		0.5	24-SEP-13
Boron (B)			<5.0		ug/g		5	24-SEP-13
Cadmium (Cd)			<0.50		ug/g		0.5	24-SEP-13
Chromium (Cr)			<1.0		ug/g		1	24-SEP-13
Cobalt (Co)			<1.0		ug/g		1	24-SEP-13
Copper (Cu)			<1.0		ug/g		1	24-SEP-13
Lead (Pb)			<1.0		ug/g		1	24-SEP-13
Molybdenum (Mo)			<1.0		ug/g		1	24-SEP-13
Nickel (Ni)			<1.0		ug/g		1	24-SEP-13
Selenium (Se)			<1.0		ug/g		1	24-SEP-13
Silver (Ag)			<0.20		ug/g		0.2	24-SEP-13
Thallium (Tl)			<0.50		ug/g		0.5	24-SEP-13
Uranium (U)			<1.0		ug/g		1	24-SEP-13
Vanadium (V)			<1.0		ug/g		1	24-SEP-13
Zinc (Zn)			<5.0		ug/g		5	24-SEP-13
WG1753233-7 MS WG1753233-5								
Antimony (Sb)			84.7		%		70-130	24-SEP-13
Arsenic (As)			N/A	MS-B	%		-	24-SEP-13
Barium (Ba)			N/A	MS-B	%		-	24-SEP-13
Beryllium (Be)			123.3		%		70-130	24-SEP-13
Boron (B)			115.1		%		70-130	24-SEP-13
Cadmium (Cd)			129.4		%		70-130	24-SEP-13
Chromium (Cr)			N/A	MS-B	%		-	24-SEP-13
Cobalt (Co)			N/A	MS-B	%		-	24-SEP-13
Copper (Cu)			N/A	MS-B	%		-	24-SEP-13
Lead (Pb)			N/A	MS-B	%		-	24-SEP-13
Molybdenum (Mo)			107.6		%		70-130	24-SEP-13
Nickel (Ni)			N/A	MS-B	%		-	24-SEP-13
Selenium (Se)			120.0		%		70-130	24-SEP-13

Quality Control Report

Workorder: L1367074

Report Date: 25-SEP-13

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Client: V.A. WOOD ASSOCIATES LIMITED

1080 Tapscott Rd Unit 24

Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT								
Batch	R2699278							
WG1753233-7	MS	WG1753233-5						
Silver (Ag)			97.5		%		70-130	24-SEP-13
Thallium (Tl)			108.2		%		70-130	24-SEP-13
Uranium (U)			120.0		%		70-130	24-SEP-13
Vanadium (V)			N/A	MS-B	%		-	24-SEP-13
Zinc (Zn)			N/A	MS-B	%		-	24-SEP-13
MOISTURE-WT								
Batch	R2699084							
WG1752901-3	DUP	L1366699-4						
% Moisture		18.4	17.4		%	5.8	30	23-SEP-13
WG1752901-2	LCS							
% Moisture			91.2		%		70-130	23-SEP-13
WG1752901-1	MB							
% Moisture			<0.10		%		0.1	23-SEP-13
PH-R511-WT								
Batch	R2699846							
WG1752690-1	DUP	L1365685-6						
pH		8.08	8.06	J	pH units	0.02	0.3	24-SEP-13
WG1753787-1	LCS							
pH			7.01		pH units		6.7-7.3	24-SEP-13
WG1753787-2	LCS							
pH			7.00		pH units		6.7-7.3	24-SEP-13
SAR-R511-WT								
Batch	R2700217							
WG1754138-2	DUP	L1367074-2						
Calcium (Ca)		31.6	32.5		mg/L	3.0	40	25-SEP-13
Sodium (Na)		2.4	2.5		mg/L	3.2	40	25-SEP-13
Magnesium (Mg)		<1.0	<1.0	RPD-NA	mg/L	N/A	40	25-SEP-13
WG1754138-1	MB							
Calcium (Ca)			<1.0		mg/L		1	25-SEP-13
Sodium (Na)			<1.0		mg/L		1	25-SEP-13
Magnesium (Mg)			<1.0		mg/L		1	25-SEP-13

Quality Control Report

Workorder: L1367074

Report Date: 25-SEP-13

Client: V.A. WOOD ASSOCIATES LIMITED
1080 Tapscott Rd Unit 24
Scarborough ON M1X 1E7
Contact: Vic Wood

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

28006

of C # 00000

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8

Phone: (519) 886-6910

Fax: (519) 886-9047

Toll Free: 1-800-668-9878



CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM Page 1 of 1

Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date
required

Service requested

5 day (regular)

3-4 day (25%)

2 day TAT (50%)

Next day TAT (100%)

Same day TAT (200%)

COMPANY NAME Vanvor Advocate 1

CRITERIA

Criteria on report YES ☒ NO ☐OFFICE 1 Carbonado 68Reg 153/04 ☐Reg 511/09 ☒Table 1 (2) 3 4 5 6 7 8 9

PROJECT MANAGER

TCLP _____ MISA _____ PWQO _____

ODWS _____ OTHER _____

PROJECT # 6332

PHONE _____ FAX _____

REPORT FORMAT/DISTRIBUTION

ACCOUNT #

EMAIL _____ FAX _____ BOTH _____

QUOTATION # _____ PO # _____

SELECT: PDF _____ DIGITAL _____ BOTH _____

EMAIL 1 vanvor@66llm.caEMAIL 2 vanvor@66llm.ca

SAMPLING INFORMATION

Sample Date/Time TYPE MATRIX

Date (dd-mm-yy)	Time (24hr) (hh mm)	COMP	GRAB	WATER	SOIL	OTHER
19/09/13	am				<input checked="" type="checkbox"/>	
20/09/13	am				<input checked="" type="checkbox"/>	

SAMPLE DESCRIPTION TO APPEAR ON REPORT

6332 - BH 11/16332 - BH 9/1

NUMBER OF CONTAINERS

Metals & heavy metals

ANALYSIS REQUEST

PLEASE INDICATE FILTERED

PRESERVED OR BOTH

<--- (F, P, F/P)

SUBMISSION #:

L1367074ENTERED BY: JK

DATE/TIME ENTERED:

23 Sep - 0

BIN #:

212

COMMENTS

LAB ID



L1367074-COFC

SPECIAL INSTRUCTIONS/COMMENTS

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)

SAMPLE CONDITION

Are any samples taken from a regulated DW System?

Yes ☐ No ☐

If yes, an authorized drinking water COC MUST be used for this submission.

Is the water sampled intended to be potable for human consumption?

Yes ☐ No ☐

FROZEN

☐

COLD

☐

COOLING INITIATED

☒

AMBIENT

☐

OBSERVATIONS

Yes ☐ No ☐

If yes add SIF

INIT

MEAN TEMP

20.3°CSAMPLED BY: Leonard 19+20/09/13

DATE & TIME

RECEIVED BY: D. Dennie

DATE & TIME

23/9/13 12:35

RELINQUISHED BY:

DATE & TIME

RECEIVED AT LAB BY: JK

DATE & TIME

12/3/09/13

Notes

1. Quote number must be provided to ensure proper pricing

2. TAT may vary dependent on complexity of analysis and lab workload at time of submission.

Please contact the lab to confirm TATs.

3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

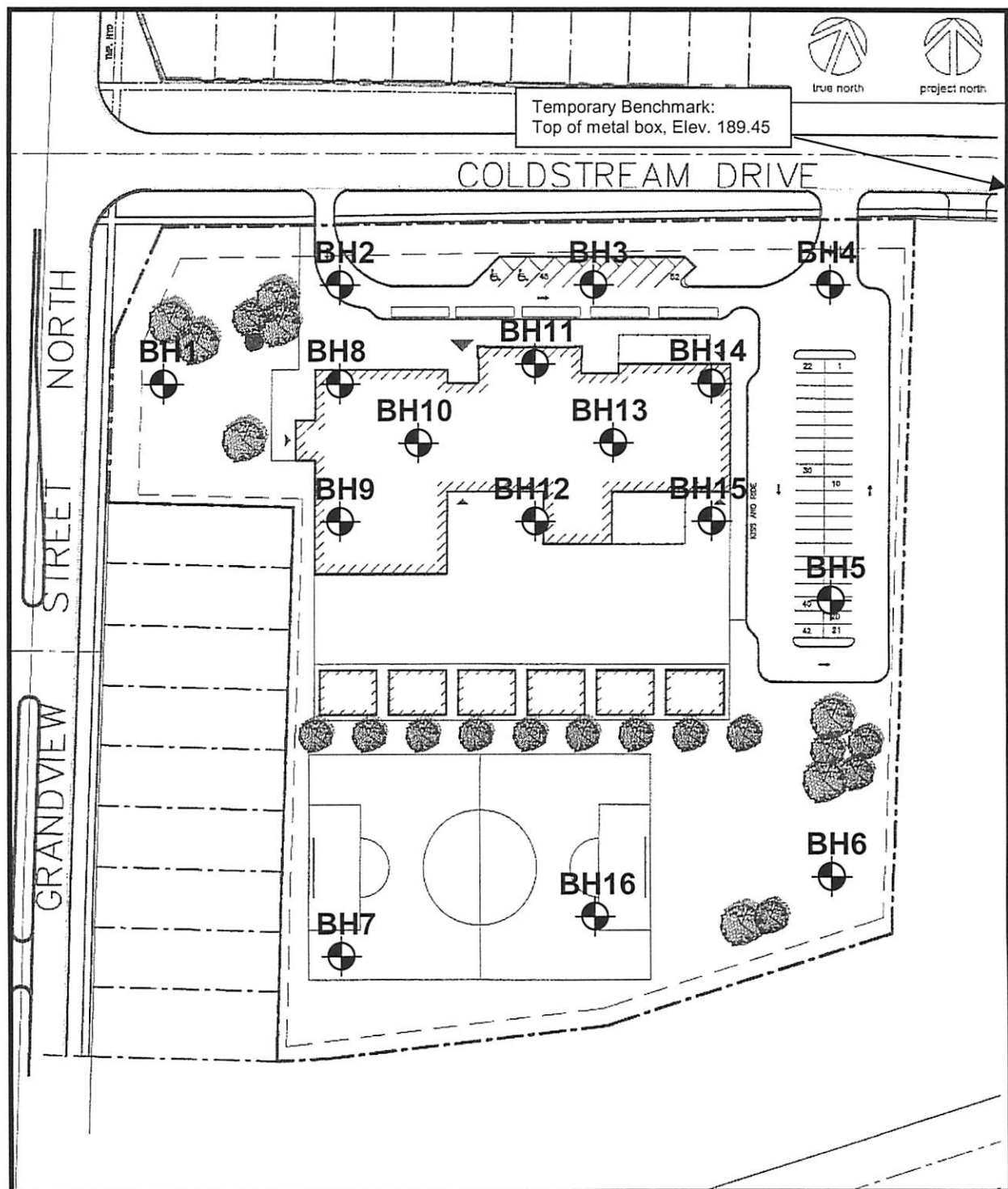
STATEMENT OF LIMITATIONS

The conclusions and recommendations in this report are based on information determined at the borehole locations and on geological data of a general nature which may be available for the area investigated. Soil and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations and conditions may become apparent during construction which would not be detected or anticipated at the time of the soil investigation.

We recommend that we be retained to ensure that all necessary stripping, subgrade preparation and compaction requirements are met, and to confirm that the soil conditions do not deviate materially from those encountered in the boreholes. In cases where this recommendation is not followed, the company's responsibility is limited to interpreting accurately the information encountered at the borehole locations.

This report is applicable only to the project described in the introduction, constructed substantially in accordance with details of alignment and elevations quoted in the text.

ENCLOSURES



BOREHOLE LOCATION PLAN

Reference No : 6332-13-9

Borehole No : 1

Enclosure No : 2

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School












Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 19, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm 20 40 60 80	Moisture Content, % 10 30 50			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value					
	0	Ground Surface										Borehole open and dry on completion
		Topsoil 50 mm thick FILL Sandy silt, trace organic stains, loose to compact			1	SS	29					
	1				2	SS	76					
					3	SS	61					
	2											
		SILTY SAND TILL Very dense, silty fine to medium sand till, trace to some gravel, iron oxide stained, brown, moist			4	SS	100+					
	3											
					5	SS	100+					
	4											
		End of Borehole										
	5											
	6											

V.A. WOOD ASSOCIATES LIMITED

Disk :

Sheet : 1 of 1

Reference No : 6332-13-9

Borehole No : 2

Enclosure No : 3

Client : DCDSB c/o Walterfedy

Project : North Oshawa Catholic Elementary School













Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 19, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm 20 40 60 80				Moisture Content, % 10 30 50			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value								
	0	Ground Surface		D R Y										Borehole open and dry on completion	
		Topsoil 50 mm thick FILL			1	SS	16								
		Sandy silt, some organics, loose													
	1	SILTY SAND TILL Dense to very dense, silty fine to medium sand till, trace to some gravel, iron oxide stained, brown then grey, moist			2	SS	81								
					3	SS	100+								
					4	SS	100+								
	2														
	3					5	SS	46							
		End of Borehole													
	4														
	5														
	6														

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Disk :














Sheet : 1 of 1

Enclosure No : 4

Method : Auger

Diameter : 110 mm

Date : September 19, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value								
186.35	0	Ground Surface													Borehole open and dry on completion
		Topsoil 40 mm thick FILL			1	SS	27								
185.95		Sandy silt, trace organics, loose													
		SILTY SAND TILL													
	1	Dense to very dense, silty fine to medium sand till, trace to some gravel, iron oxide stained, brown then grey, moist, wet at the bottom			2	SS	64								
					3	SS	100+								
	2														
		brown grey			4	SS	100+								
	3														
					5	SS	100+								
182.85															
		End of Borehole													
	4														
	5														
	6														

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Reference No : 6332-13-9

Borehole No : 5

Enclosure No : 6

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School

Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 20, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value								
188.08	0	Ground Surface													Borehole open and dry on completion
187.68		Topsoil 50 mm thick FILL			1	SS	21	○				●			
		Sandy silt, some topsoil and organics, loose to compact													
	1				2	SS	59	○							
		SILTY SAND TILL			3	SS	58	○				●			
	2	Compact to very dense, silty fine to medium sand till, trace to some gravel, iron oxide stained, brown, moist													
					4	SS	100+					○			
	3														
184.73					5	SS	100+					○	●		
		End of Borehole													
	4														
	5														
	6														

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Sheet : 1 of 1

Reference No : 6332-13-9

Borehole No : 6

Enclosure No : 7

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School

Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 20, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value	20	40	60	80	10	30	50	
187.48	0	Ground Surface													
187.28		Topsoil 50 mm thick FILL													Borehole open and dry on completion
		Sandy silt, trace organics, compact			1	SS	38								
	1				2	SS	45								
		SILTY SAND TILL													
	2	Compact to very dense, silty fine to medium sand till, trace to some gravel, iron oxide stained, brown, moist			3	SS	23								
					4	SS	48								
184.18	3				5	SS	100+								
		End of Borehole													
	4														
	5														
	6														

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Reference No : 6332-13-9

Borehole No : 7

Enclosure No : 8

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School

Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 20, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value								
184.35	0	Ground Surface													Borehole open and dry on completion
184.05		Topsoil 50 mm thick FILL			1	SS	36								
		Sandy silt, trace organics, compact													
	1				2	SS	67								
	2				3	SS	48								
	3				4	SS	56								
180.85					5	SS	100+								
	4														
	5														
	6														

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Reference No : 6332-13-9

Borehole No : 8

Enclosure No : 9

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School


Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 19, 2013

SUBSURFACE PROFILE					SAMPLE										Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value	Standard Penetration Test blows/300mm				Moisture Content, %			
								20	40	60	80	10	30	50	
	0	Ground Surface													Borehole open and dry on completion
		Topsoil 40 mm thick FILL			1	SS	71								
		Sandy silt, some topsoil and organics, compact													
	1	SILTY SAND TILL Very dense, silty fine to medium sand till, trace to some gravel, occasional seams of sand, iron oxide stained, brown then grey, moist 													

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Reference No : 6332-13-9

Borehole No : 9

Enclosure No : 10

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School














Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 20, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value								
184.75	0	Ground Surface													Borehole open and dry on completion
184.45		Topsoil 40 mm thick FILL			1	SS	22								
		Sandy silt, trace topsoil and organics, loose													
	1				2	SS	100+								
															
	2				3	SS	83								
		SILTY SAND TILL													
		Dense to very dense, silty fine to medium sand till, trace to some gravel, occasional seams of sand, iron oxide stained, brown, mixed brown and grey at the bottom, moist			4	SS	48								
	3														
					5	SS	75								
	4														
					6	SS	100+								
															
179.9		mixed brown and grey			7	SS	100+								
	5	End of Borehole													
	6														

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Sheet : 1 of 1

Reference No : 6332-13-9

Borehole No : 10

Enclosure No : 11

Client : DCDSB c/o Walterfedy

Project : North Oshawa Catholic Elementary School

Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 19, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value								
	0	Ground Surface													Borehole open and dry on completion
		Topsoil 40 mm thick FILL			1	SS	27	○							
		Sandy silt, trace organics, loose													
	1	SILTY SAND TILL Dense to very dense, silty fine to medium sand till, trace to some gravel, occasional seams of sand, iron oxide stained, brown then grey, moist		D R Y	2	SS	61	○							
					3	SS	56	○							
					4	SS	44	○							
					5	SS	100+	○							
	2														
					6	SS	100+	○							
					7	SS	100+	○							
	3														Borehole open and dry on completion
	4														Borehole open and dry on completion
	5	End of Borehole													Borehole open and dry on completion
	6														Borehole open and dry on completion

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Reference No : 6332-13-9

Borehole No : 11

Enclosure No : 12

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School

Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 19, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value								
185.69	0	Ground Surface													Borehole open on completion
		Topsoil 50 mm thick FILL			1	SS	8								
185.19		Mixed topsoil and sandy silt, trace organics, loose													
	1	SILTY SAND TILL			2	SS	100+								
		Very dense, silty fine to medium sand till, trace to some gravel, occasional seams of sand, iron oxide stained, brown then grey, moist, wet at the bottom			3	SS	66								
	2				4	SS	100+								
	3				5	SS	71								
	4				6	SS	100+								
					7	SS	100+								
180.89															
180.69	5	SILTY SAND													
		Very dense, silty fine sand, grey, wet													
		End of Borehole													
	6														

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Reference No : 6332-13-9

Borehole No : 12

Enclosure No : 13

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School










Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 19, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value								
186.55	0	Ground Surface													Borehole open and dry on completion
		Topsoil 40 mm thick FILL			1	SS	36								
186.15		Organic stained silty sand, loose													
	1	125mm sand seam			2	SS	75								
		SILTY SAND TILL			3	SS	100+								
	2	Very dense, silty fine to medium sand till, trace to some gravel, occasional seams of sand, iron oxide stained, brown then grey, moist			4	SS	93								
	3				5	SS	58								
	4				6	SS	100+								
					7	SS	100+								
181.75															
	5	End of Borehole													
	6														

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Reference No : 6332-13-9

Borehole No : 13

Enclosure No : 14

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School

Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 19, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value	20	40	60	80	10	30	50	
186.63	0	Ground Surface													Borehole open on completion
186.23		Topsoil 40 mm thick FILL			1	SS	33	○				●			
		Mixed topsoil and sandy silt, trace gravel, compact													
	1	SILTY SAND TILL Dense to very dense, silty fine to medium sand till, trace to some gravel, occasional seams of sand, iron oxide stained, brown then grey, moist			2	SS	77		○						
	2				3	SS	48		○			●			
					4	SS	100+			○					
	3				5	SS	100+				○	●			
	4	75mm thick sand seam with pyrite crystals			6	SS	100+				○				
182.33															
181.63	5	SILTY SAND Very dense, silty fine sand, grey, wet			7	SS	62		○			●			
	6	End of Borehole													

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Reference No : 6332-13-9

Borehole No : 14

Enclosure No : 15

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School

Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 19, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value	20	40	60	80	10	30	50	
187.1	0	Ground Surface													
186.7		Topsoil 40 mm thick FILL			1	SS	22	○							Borehole dry down to cave in depth
		Mixed topsoil and sandy silt, trace gravel, compact													
	1	SILTY SAND TILL			2	SS	43	○				●			cave in at 4 m
		Dense to very dense, silty fine to medium sand till, trace to some gravel, occasional seams of sand, iron oxide stained, brown, moist													
	2				3	SS	100+				○				
					4	SS	100+				○	●			
	3				5	SS	100+				○				
183.1	4			cave in	6	SS	100+				○				cave in at 4 m
		SILTY SAND													
		Very dense, silty fine sand, grey, wet													cave in at 4 m
182.1	5				7	SS	100+				○	●			
		End of Borehole													cave in at 4 m
	6														

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Reference No : 6332-13-9

Borehole No : 16

Enclosure No : 17

Client : DCDSB c/o Walterfeddy

Project : North Oshawa Catholic Elementary School

Method : Auger

Location : Coldstream Dr/Grandview St N, Oshawa

Diameter : 110 mm

Datum Elevation : Geodetic

Date : September 20, 2013

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value								
186.63	0	Ground Surface													Borehole open and dry on completion
186.33		Topsoil 50 mm thick FILL			1	SS	27								
		Sandy silt, some topsoil and organics, compact													
	1				2	SS	81								
		SILTY SAND TILL			3	SS	100+								
		Dense to very dense, silty fine to medium sand till, trace to some gravel, iron oxide stained, brown, moist													
	2				4	SS	74								
	3				5	SS	100+								
183.33		End of Borehole													
	4														
	5														
	6														

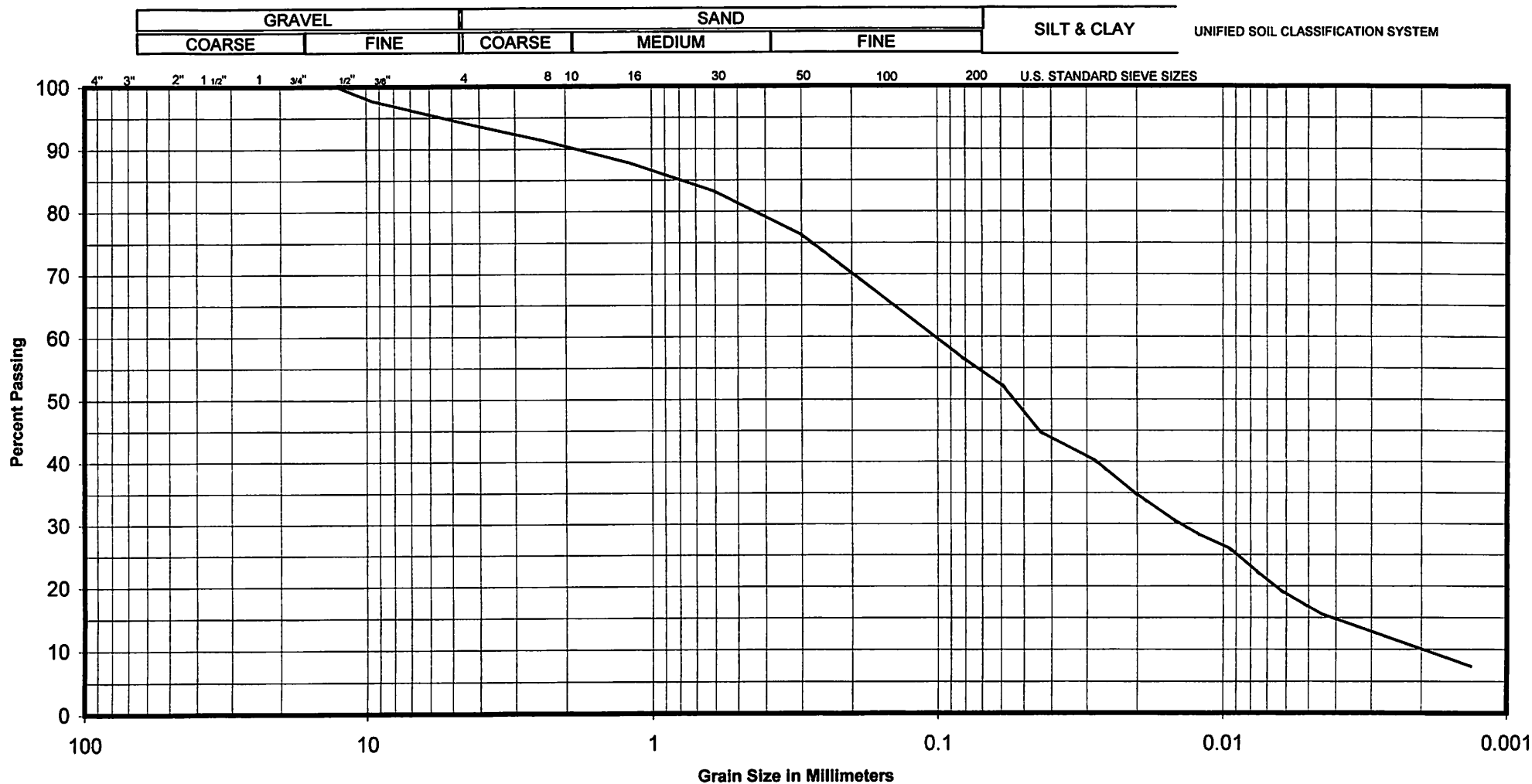
V.A. WOOD ASSOCIATES LIMITED

Disk :

Sheet : 1 of 1

GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 6332-13-9



PROJECT: North Oshawa Catholic Elementary School

LOCATION: Coldstream Drive/ Grandview Street North, Oshawa, ON

BOREHOLE: BH2

SAMPLE: SS2

DATE: September 2013

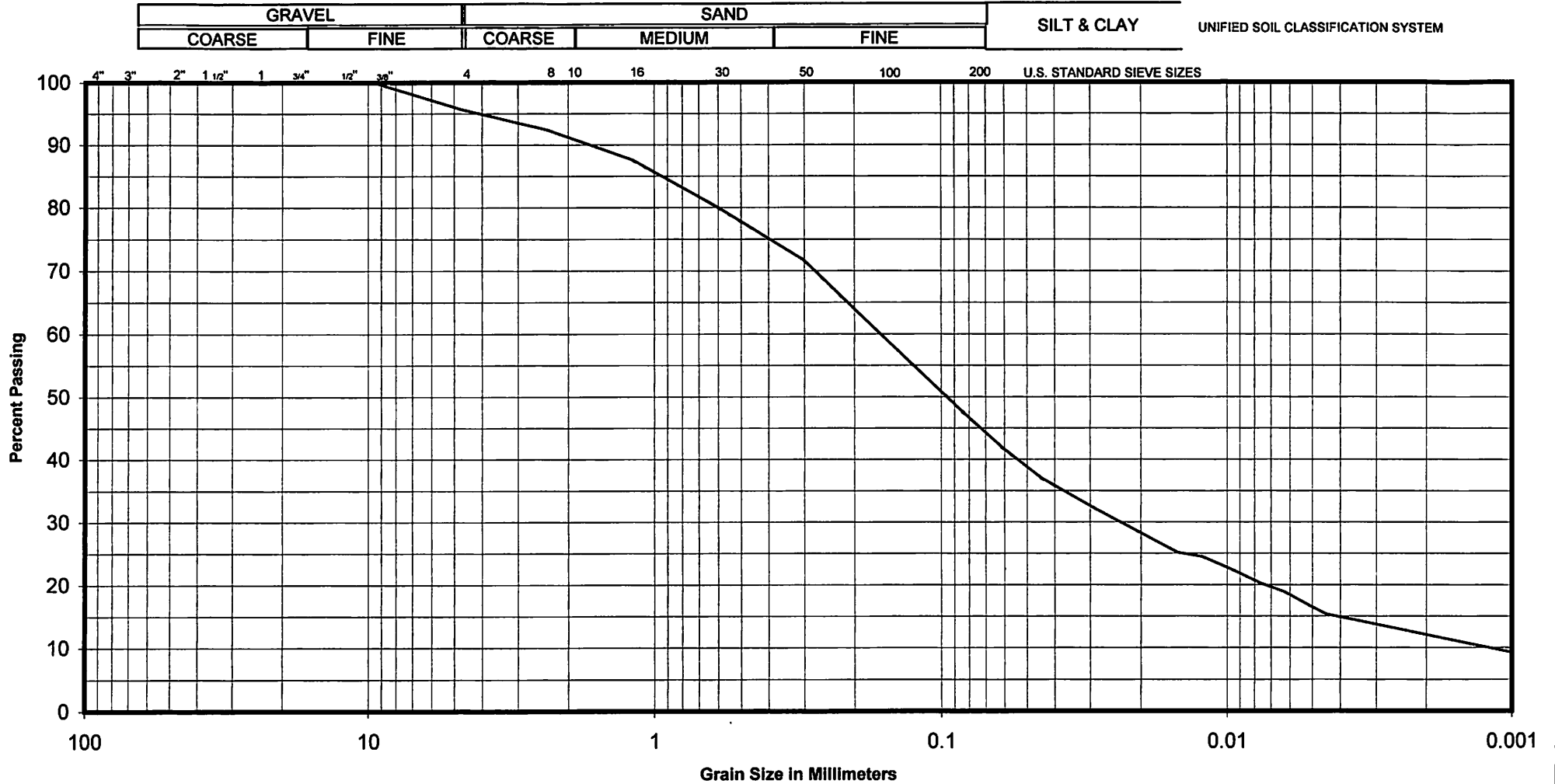
DEPTH: 0.8 to 1.2 m

SAND and SILT, some clay (SM)

ENCLOSURE No.: 18

GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 6332-13-9



PROJECT: North Oshawa Catholic Elementary School

LOCATION: Coldstream Drive/ Grandview Street North, Oshawa, ON

BOREHOLE: BH2

SAMPLE: SS2

DATE: September 2013

DEPTH: 0.8 to 1.2 m

Silty SAND, some clay (SM)

ENCLOSURE No.: 19