

# MEMORANDUM

**Ainley Graham & Associates Limited**

1-50 Grant Timmins Drive, Kingston, ON K7M 8N2

Tel: (343) 266-0002 • Fax: (343) 266-0028

Email: Kingston@ainleygroup.com

---

To: Chris Belanger, Project Manager, MTO      File: 23548-21

From: Lois-Ann Hayes, P.Eng.

Date: December 13, 2024

Ref: **Final Foundations Memo for Highway 15 and County Road 42  
Excess Material Management Areas, Geocres 31C09-002  
Agreement No. 4022-E-0020, Assignment #21**

---

## GENERAL DATA

The Ministry of Transportation Ontario (MTO), Eastern Region retained Ainley Group (AGA) to provide foundation engineering services for the intended intersection improvements planned for the intersection of Highway 15 at County Road 42 located in the Village of Crosby, within the Township of Rideau Lakes and United Counties of Leeds and Grenville at two (2) proposed Excess Material Management Areas (EMMA). The locations of the proposed EMMAs are detailed in **Enclosure No. 1** as attached to this memo.

The purpose of this memorandum is to provide engineering commentary regarding the suitability of the proposed area for the design and construction of the two (2) proposed EMMAs.

## FIELD INVESTIGATION

A geotechnical investigation was conducted in October 2024 under the constant supervision of a member of the Ainley Group geotechnical team in accordance with our Terms of Reference. Before commencing the field program, Ainley Group contacted the local utility companies and appropriate site authorities to obtain clearances for all underground services and site access in the immediate area of the proposed field program.

The geotechnical investigation consisted of the advancement of six (6) foundation boreholes, evenly distributed throughout both proposed EMMA areas (three (3) within each area). The boreholes were advanced to 1.5 m or refusal whichever was less at each location. Representative samples were collected using split spoon sampling methods (ASTM D1586-11) in BH77 and a truck-mounted drill rig. The remaining boreholes were advanced using manual techniques and grab sampling methods.

Upon completion, each borehole was backfilled using native material in accordance with Ontario Regulation 903.

## SUBSURFACE CONDITIONS AND LABORATORY ANALYSIS

Full details of the subsurface conditions encountered at the borehole locations are presented within the individual borehole logs attached to this memo as **Enclosure No. 2**. It is emphasized however, that the

soil types, their sequence, thickness and physical properties may vary between borehole locations and samples both vertically and horizontally.

Representative samples of materials encountered at each borehole location were secured during the investigation and select samples were forwarded to Atkins Realis in Kingston for laboratory analysis. The test results are included as **Enclosure No. 3**.

### **EMMA Area 1**

Three (3) boreholes were advanced throughout EMMA Area 1 (BH77-BH79). The boreholes were advanced to depths ranging from 1.35 m to 1.50 m below existing site grades and were terminated within glacial till or upon granite bedrock.

The subsoil conditions encountered within this area generally consisted of surficial topsoil (0.1 m to 0.2 m) overlying compact, brown, glacial till over bedrock. Groundwater infiltration was not encountered at the time of the investigation.

Two (2) soil samples of the glacial till were submitted for laboratory analysis from within Area 1 (BH77, SP010, 0.75 – 1.50 m) and (BH79, SP015, 0.15 – 0.60 m). The glacial till was found to be (SM) silty sand with varying amounts of clay and gravel. The results of the laboratory analysis are summarized below:

SP010 - Silty Sand some Clay and Gravel

% Passing    4.75 mm = 88.0  
                  75 µm = 47.0  
                  5 µm = 19.0 LSFH  
                  2 µm = 13.0  
Moisture Content = 10.6%

SP015 - Silty Sand some Clay trace Gravel

% Passing    4.75 mm = 96.0  
                  75 µm = 47.0  
                  5 µm = 18.0 LSFH  
                  2 µm = 13.0  
Moisture Content = 16.9%

### **EMMA Area 2**

Three (3) boreholes were advanced throughout EMMA Area 2 (BH80-BH82). The boreholes were advanced to depths ranging from 0.20 m to 1.50 m below existing site grades and were terminated within glacial till or upon granite bedrock.

The subsoil conditions encountered within this area generally consisted of surficial topsoil (0.2 m) overlying compact, brown, glacial till over bedrock. Groundwater infiltration was not encountered at the time of the investigation.

One (1) soil sample of the glacial till was submitted for laboratory analysis from within Area 2 (BH82, SP039, 0.75 – 1.50 m). The glacial till was found to be (SM) silty sand some gravel trace clay. The results of the laboratory analysis are summarized below:

SP036 - Silty Sand some Gravel trace Clay

% Passing      4.75 mm = 96.0  
                    75 µm = 53.0.0  
                    5 µm = 24.0 LSFH  
                    2 µm = 17.0

Moisture Content = 12.6%

## **RECOMMENDATIONS**

It is understood that the excess material generated during construction will be used to construct earth berms within the project limits (EMMA Areas 1 and 2) to a maximum height of 3 m and 3H:1V side slopes. It is our understanding that no elements will be constructed on top of the berms.

Based on the findings of the investigation, the underlying subsoil is considered suitable to support the construction of the proposed berms. Removal of topsoil before berm construction should be completed. The entire berm should be capped with topsoil (50 mm minimum) and seeded upon completion.

**ENCLOSURE No. 1**  
**BOREHOLE LOCATION PLAN**





KEY MAP  
N.T.S.

BOREHOLE DATA			
ID	TOP OF GRADE ELEVATION (masl)	BEDROCK ELEVATION (masl)	GROUNDWATER ELEVATION (masl)
BH77	N/A	N/A	N/A
BH78	N/A	N/A	N/A
BH79	N/A	N/A	N/A
BH80	N/A	N/A	N/A
BH81	N/A	N/A	N/A
BH82	N/A	N/A	N/A

LEGEND

⊕ = BOREHOLE LOCATION  
N/A = INFO NOT AVAILABLE





**ENCLOSURE No. 2**



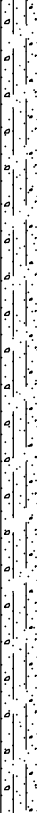
**BOREHOLE LOGS**

RECORD OF BOREHOLE No. BH77

1 OF 1

METRIC

W.P. 4022-E-0020 #21 LOCATION NBL Ditch, 36.9 m Rt CL, 18T 400285.390E 4945125.655 N ORIGINATED BY SCP  
DIST Eastern HWY 15 BOREHOLE TYPE G.E.T. Drilling Ltd., Truck-Mounted CME-55 / Manual Sampling COMPILED BY JRC  
DATUM NAD 1983 DATE 2024.10.21 LATITUDE 44.65257 LONGITUDE -76.25759 CHECKED BY LAH

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT   NATURAL MOISTURE CONTENT   LIQUID LIMIT			REMARKS & GRAIN SIZE DISTRIBUTION (%)						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					w <sub>p</sub>	w	w <sub>L</sub>	WATER CONTENT (%)						
								20	40	60	80	100							GR	SA	SI	CL
0.0	Topsoil; Silty sand with rootlets Loose Brown		SP009	SS1	9																	
0.1	(SM) Silty sand with rootlets trace clay Loose Brown/black																					
0.6	(SM) Till; Silty sand some clay and gravel Compact Light brown		SP010	SS2	16																	
1.5	End of borehole 1.50 m below existing grades within compact till.  Groundwater was not encountered during the field investigation.																					

MTD - NO ENVIRO 23548-21 - HWY 15 ROUNDABOUT EXCESS SOILS.GPJ DATA TEMPLATE - 2024\_09\_06.GDT 13-12-24

RECORD OF BOREHOLE No. BH78

1 OF 1

METRIC

W.P. 4022-E-0020 #21 LOCATION NBL Ditch, 45.3 m Rt CL, 18T 400309.173E 4945176.397N ORIGINATED BY SCP  
DIST Eastern HWY 15 BOREHOLE TYPE G.E.T. Drilling Ltd., Truck-Mounted CME-55 / Manual Sampling COMPILED BY JRC  
DATUM NAD 1983 DATE 2024.10.21 LATITUDE 44.65303 LONGITUDE -76.2573 CHECKED BY LAH

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					W <sub>p</sub>	W	W <sub>L</sub>	
							20	40	60	80	100					
0.0	Topsoil; Silty sand with rootlets Loose Brown															
0.2	(SM) Till; Silty sand some clay trace gravel Compact Light brown		SP011	SS1	-											
			SP012	SS2	-											
1.5	End of borehole 1.50 m below existing grades within compact till.  Groundwater was not encountered during the field investigation.															

MTO - NO ENVIRO 23548-21 - HWY 15 ROUNDABOUT EXCESS SOILS.GPJ DATA TEMPLATE - 2024\_09\_06.GDT 13-12-24







RECORD OF BOREHOLE No. BH81

1 OF 1

METRIC

W.P. 4022-E-0020 #21 LOCATION WBL Ditch, 56.4 m Rt CL, 18T 400424.058E 4945323.510N ORIGINATED BY SCP  
DIST Eastern HWY CR42 BOREHOLE TYPE G.E.T. Drilling Ltd., Truck-Mounted CME-55 / Manual Sampling COMPILED BY JRC  
DATUM NAD 1983 DATE 2024.10.21 LATITUDE 44.65437 LONGITUDE -76.25588 CHECKED BY LAH

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					W <sub>p</sub>	W	W <sub>L</sub>	
							20	40	60	80	100					
0.0	Topsoil; Silty sand with rootlets Loose Brown															
0.2	(SM) Till; Silty sand with clay trace gravel Compact Brown/grey															
			1	SS1	-											
			SP040	SS2	-											
1.5	End of borehole 1.50 m below existing grades within firm till.  Groundwater was not encountered during the field investigation.															

MTD - NO ENVIRO 23548-21 - HWY 15 ROUNDABOUT EXCESS SOILS.GPJ DATA TEMPLATE - 2024\_09\_06.GDT 13-12-24

RECORD OF BOREHOLE No. BH82

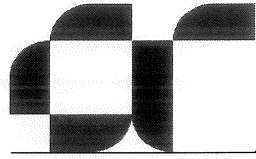
1 OF 1

METRIC

W.P. 4022-E-0020 #21 LOCATION WBL Ditch, 56.4 m Rt CL, 18T 400471.094E 4945339.452N ORIGINATED BY SCP  
DIST Eastern HWY CR42 BOREHOLE TYPE G.E.T. Drilling Ltd., Truck-Mounted CME-55 / Manual Sampling COMPILED BY JRC  
DATUM NAD 1983 DATE 2024.10.21 LATITUDE 44.65452 LONGITUDE -76.25529 CHECKED BY LAH

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					W <sub>p</sub>	W	W <sub>L</sub>	
							20	40	60	80	100					
0.0	Topsoil; Silty sand with rootlets Loose Brown															
0.2	(SM) Silty sand trace clay, gravel, and rootlets Loose Brown		SP038	SS1	-											
0.8	(SM) Silty sand some clay trace gravel Compact Light brown		SP039	SS2	-											
1.5	End of borehole 1.50 m below existing grades within firm till.  Groundwater was not encountered during the field investigation.															

**ENCLOSURE No. 3**  
**LABORATORY RESULTS**



Lab #5687 Client: Ainley

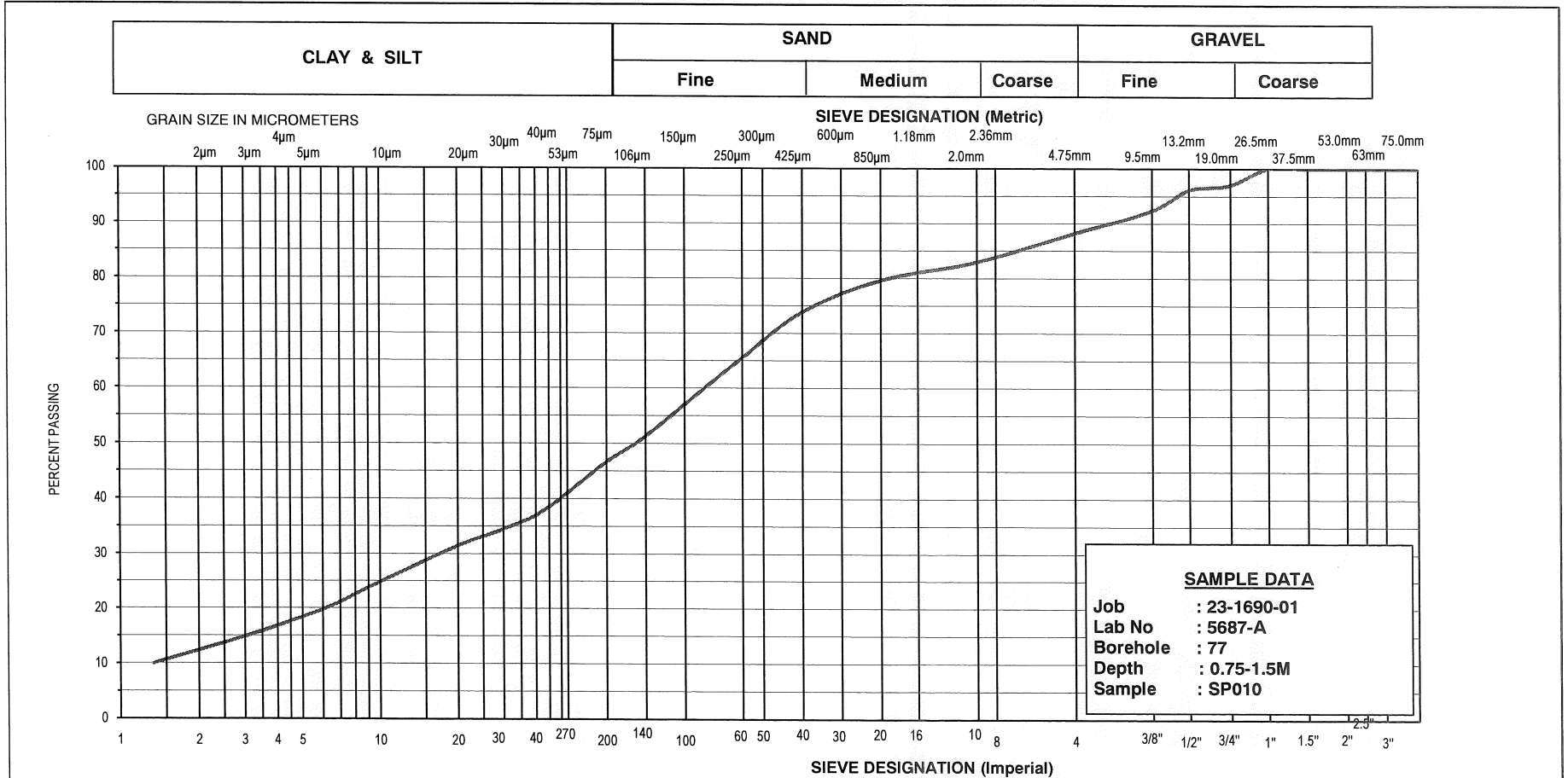
Project Name: 23548-21 Highway #15 Roundabout Date: October 21,2024

SAMPLE INFORMATION	SAMPLE	MASS OF SAMPLE WET & TARE (g)	MASS OF SAMPLE DRY & TARE (g)	MASS OF WATER (g)	MASS OF DRY SOIL (g)	MASS OF TARE (g)	MOISTURE CONTENT (%)
SP010	A	661.7	610.6	51.1	482.3	128.3	10.6
SP015	B	535.3	469.5	65.8	388.6	80.9	16.9
SP039	C	543.4	497.1	46.3	366.1	131	12.6



# Atkins Realis

## UNIFIED SOIL CLASSIFICATION SYSTEM

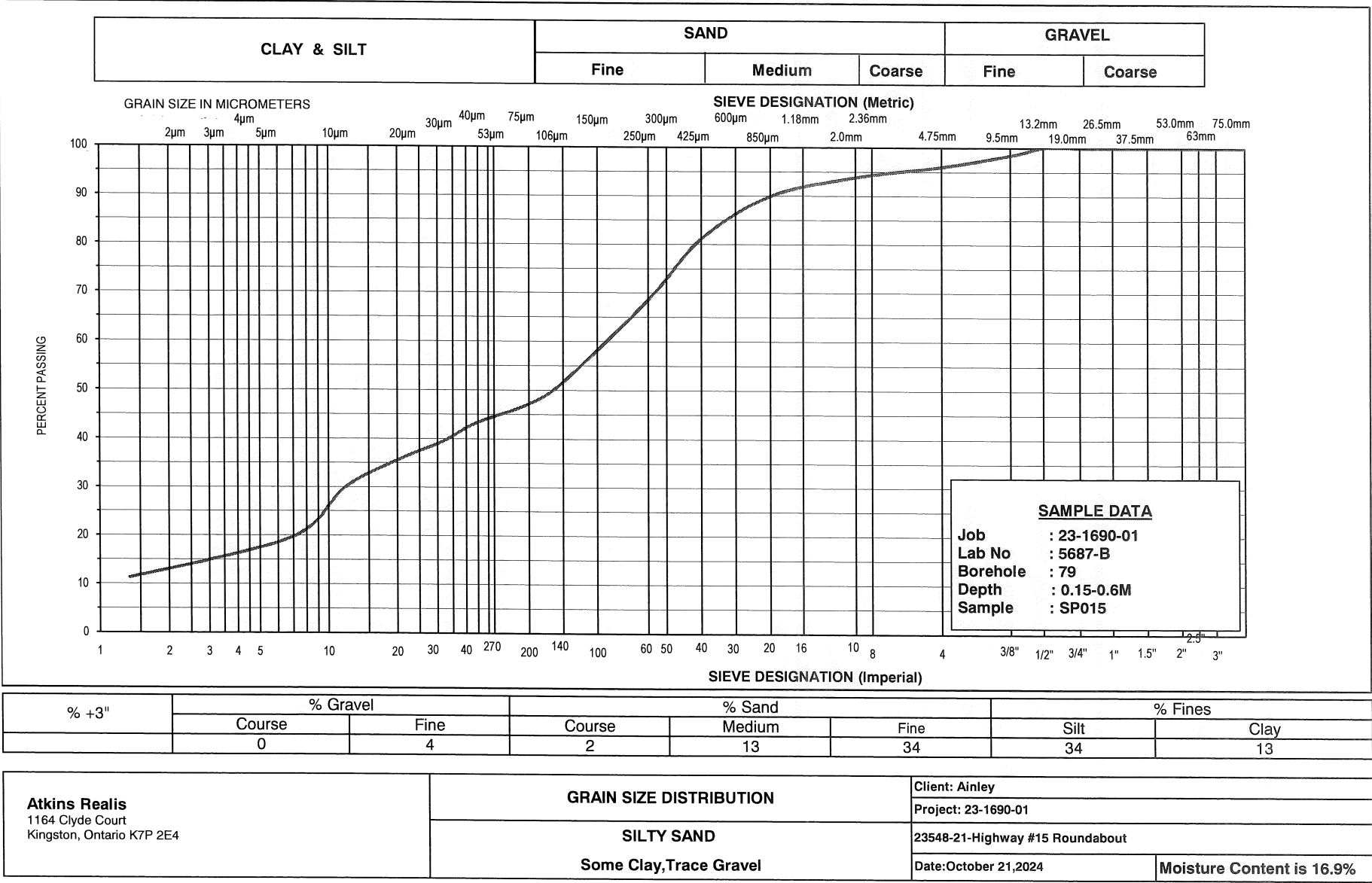


% +3"	% Gravel		% Sand			% Fines	
	Course	Fine	Course	Medium	Fine	Silt	Clay
	3	9	5	9	27	34	13

<b>Atkins Realis</b> 1164 Clyde Court Kingston, Ontario K7P 2E4	<b>GRAIN SIZE DISTRIBUTION</b>		Client: Ainley	
	<b>SILTY SAND</b>		Project: 23-1690-01	
	<b>Some Clay,Some Gravel</b>		23548-21-Highway #15 Roundabout	
	Date: October 21, 2024			Moisture Content is 10.6%

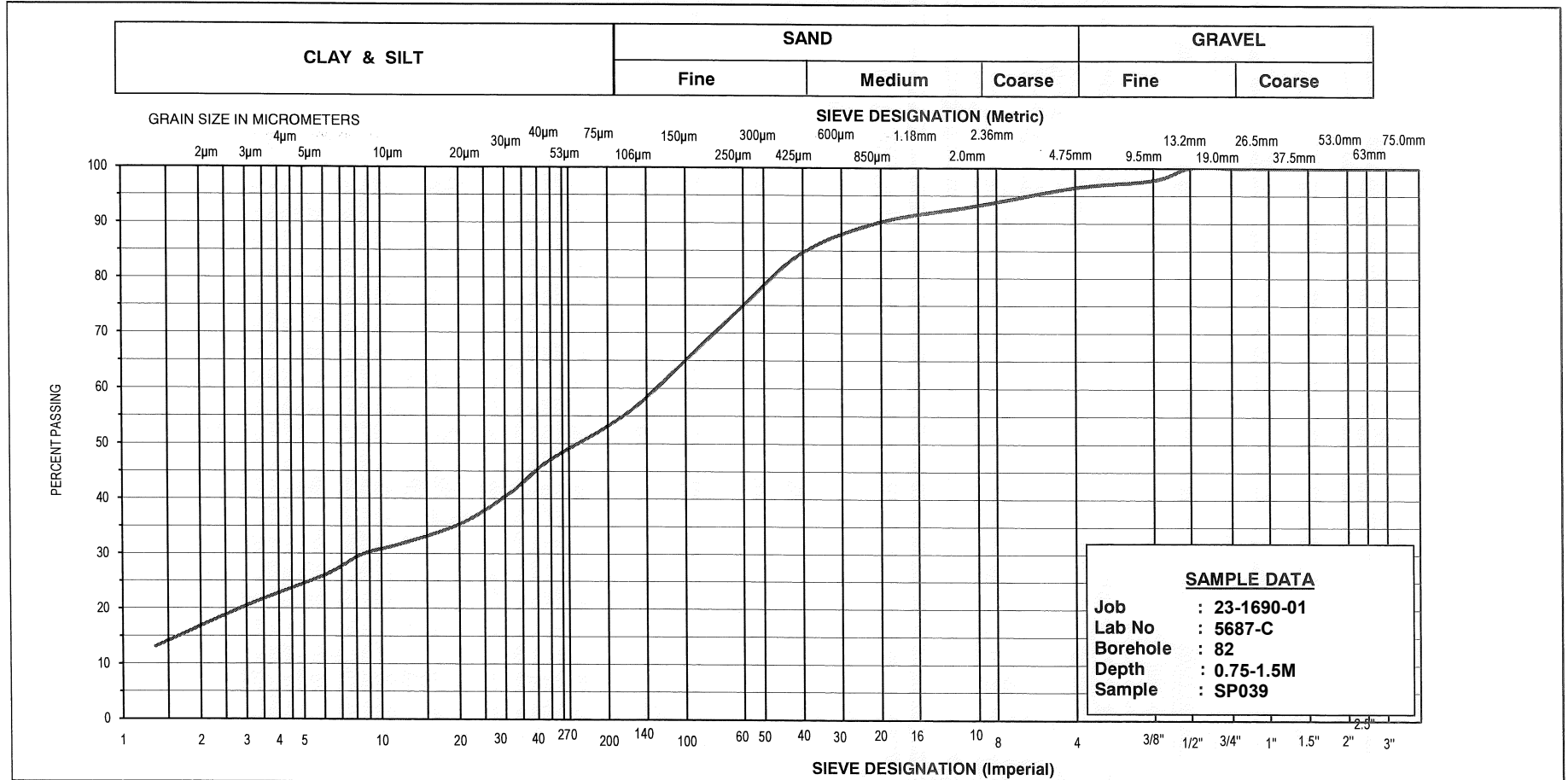
# Atkins Realis

## UNIFIED SOIL CLASSIFICATION SYSTEM



# Atkins Realis

## UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Course	Fine	Course	Medium	Fine	Silt	Clay
	0	4	3	9	31	36	17

Atkins Realis 1164 Clyde Court Kingston, Ontario K7P 2E4	GRAIN SIZE DISTRIBUTION				Client: Ainley	
	SILTY SAND				Project: 23-1690-01	
	Some Clay, Trace Gravel				Date: October 21, 2024	Moisture Content is 12.6%