

## **Appendix A**

### **Excerpts from Geotechnical Investigation Pavement Rehabilitation, prepared by Houle Chevrier Engineering Ltd.**

Excerpts Included:

Record of Borehole Sheets

PROJECT: 15-149

# RECORD OF BOREHOLE 15-1

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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DEPTH SCALE

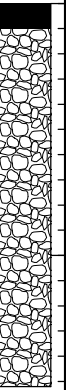
1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG, BOREHOLE LOGS, JUNE 11-12 2015, GPJ, HOULE CHEVRIER 2015, GDT, 6-29-15



PROJECT: 15-149

# RECORD OF BOREHOLE 15-2







SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 12, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	20 40 60 80				10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> 10 <sup>-2</sup>						
				DEPTH (m)				SHEAR STRENGTH				WATER CONTENT, PERCENT						
								Cu, kPa	nat. V - rem. V -	+ ⊕	Q U	● ○	Wp — W — WI					
								20	40	60	80							
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		96.11	1	C.S.										Asphaltic coldpatch		
		Asphaltic concrete		0.05														
		Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)		0.15														
		Brown sand, some gravel, trace cobbles and silt (ROADWAY SUBBASE MATERIAL)																
1		Compact, brown silty sand, some gravel (GLACIAL TILL)		95.25 0.86	2	50 D.O.		13										
	End of borehole		94.59 1.52															
2																		
3																		
4																		
5																		
6																		

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG - BOREHOLE LOGS JUNE 11-12 2015.GPJ HOULE CHEVRIER 2015.GDT 6-29-15

PROJECT: 15-149

# RECORD OF BOREHOLE 15-3

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 12, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION							
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m																
								SHEAR STRENGTH Cu, kPa		nat. V - rem. V -		+ ⊕		Q U			● ○		WATER CONTENT, PERCENT				
								20	40	60	80	20	40	60			80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>	Wp	W
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		96.21																			
		Asphaltic concrete		96.12												Asphaltic coldpatch							
		Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)		96.06	1	C.S.																	
		Brown sand, some gravel, trace silt (ROADWAY SUBBASE MATERIAL)		0.15	2	C.S.																	
		Very dense, brown silty sand, trace to some gravel (GLACIAL TILL)		95.78												Backfilled with auger cuttings							
				0.43																			
1																							
					3	50 D.O.	>50 for 75 mm																
					4	50 D.O.	>50 for 75 mm																
2																							
					5	50 D.O.	>50 for 25 mm																
		Practical auger refusal on possible boulders or bedrock		93.60												Borehole dry on completion of drilling.							
				2.61																			
3																							
4																							
5																							
6																							

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG, BOREHOLE LOGS, JUNE 11-12 2015, GPJ, HOULE CHEVRIER 2015, GDT, 6-29-15

PROJECT: 15-149

## RECORD OF BOREHOLE 15-4

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 12, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT					
				DEPTH (m)				Cu, kPa	nat. V - rem. V -	+ ⊕	Q U -	● ○	Wp	W			WI
								20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>		
								20	40	60	80	20 40 60 80					
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		95.14													
		Asphaltic concrete		95.01 0.13													
		Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)		94.69 0.45	1	C.S.							○				
		Compact, grey brown silty sand, some gravel, trace clay (GLACIAL TILL)															
1																	

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
15-06-12	0.50	94.64

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG - BOREHOLE LOGS JUNE 11-12 2015 GPJ HOULE CHEVRIER 2015 GDT 6-29-15

PROJECT: 15-149

# RECORD OF BOREHOLE 15-5


SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 12, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION						
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT											
								Cu, kPa		nat. V - rem. V -		+ ⊕		Q U				Wp		W		WI	
								20	40	60	80	20	40	60	80			10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>		
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		95.25												Asphaltic coldpatch							
Asphaltic concrete			95.14															Backfilled with auger cuttings					
Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)			0.11	1	C.S.																		
Brown sand, some silt, trace gravel (ROADWAY SUBBASE MATERIAL)			94.84																				
			0.41	2	C.S.																		
		Loose, dark grey silty sand, some gravel, trace clay (GLACIAL TILL)		94.59																			
				0.66																			
1																							

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG - BOREHOLE LOGS JUNE 11-12 2015 GPJ HOULE CHEVRIER 2015 GDT 6-29-15

PROJECT: 15-149

# RECORD OF BOREHOLE 15-6








SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 12, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m	20 40 60 80				10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> 10 <sup>-2</sup>						
				DEPTH (m)				SHEAR STRENGTH Cu, kPa		nat. V - + Q ● rem. V - ⊕ U - ○		WATER CONTENT, PERCENT						
								20 40 60 80			Wp  -----  W  -----  WI 20 40 60 80							
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		95.66											Sieve (See Fig. A1) Sieve (See Fig. A3)	Asphaltic coldpatch  Backfilled with auger cuttings		
		Asphaltic concrete		0.04	1	C.S.												
		Grey crushed sand and gravel, some silt (ROADWAY BASE MATERIAL)		0.14	2	C.S.												
		Brown gravelly sand, trace silt (ROADWAY SUBBASE MATERIAL)																
1		Very loose, brown silty sand, trace gravel (GLACIAL TILL)		94.75 0.91	3	50 D.O.	4									Borehole dry on completion of drilling.		
	End of borehole		94.14 1.52															
2																		
3																		
4																		
5																		
6																		

DEPTH SCALE

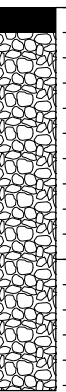
1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG, BOREHOLE LOGS, JUNE 11-12 2015 GPJ, HOULE CHEVRIER 2015 GDT, 6-29-15



PROJECT: 15-149

## RECORD OF BOREHOLE 15-7

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m										
								SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa	nat. V - rem. V -	+ ⊕	Q U -	Wp	W	WI			
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		95.77													
		Asphaltic concrete		0.04													
		Grey crushed sand and gravel, trace to some silt (ROADWAY BASE MATERIAL)		95.60 0.17	1	C.S.											
		Brown sand and gravel, some silt (ROADWAY SUBBASE MATERIAL)															
		Brown clayey silt, some sand and trace organic material (Former TOPSOIL)		95.16 0.61	2	C.S.											
1		Compact, grey gravel, some sand, trace silt (GLACIAL TILL)		94.86 0.91	3	50 D.O.	29										
		End of borehole		94.25 1.52													
2																	
3																	
4																	
5																	
6																	

Asphaltic coldpatch

Backfilled with auger cuttings

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
15-06-11	0.90	94.87

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV. (m)
15-06-11	0.90	94.87

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG, BOREHOLE LOGS, JUNE 11-12 2015, GPJ, HOULE CHEVRIER 2015, GDT, 6-29-15



PROJECT: 15-149

# RECORD OF BOREHOLE 15-8

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 12, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION								
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT													
								20		40		60		80				10 <sup>-5</sup>		10 <sup>-4</sup>		10 <sup>-3</sup>		10 <sup>-2</sup>	
								SHEAR STRENGTH Cu, kPa		nat. V - rem. V -		+ ⊕		Q U				● ○		Wp		W		WI	
								20	40	60	80														
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		95.68																					
		Asphaltic concrete		95.60																					
		Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)		95.53	1	C.S.																			
		Brown sand, trace gravel (ROADWAY SUBBASE MATERIAL)		95.38	2	C.S.																			
		Compact, grey brown silty sand, some gravel, trace clay (GLACIAL TILL)		95.30																					
1																									

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG, BOREHOLE LOGS, JUNE 11-12 2015, GPJ, HOULE CHEVRIER 2015, GDT, 6-29-15

PROJECT: 15-149

## RECORD OF BOREHOLE 15-9

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION					
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m														
								SHEAR STRENGTH Cu, kPa		nat. V - rem. V -		+ ⊕		Q U -			WATER CONTENT, PERCENT				
								20	40	60	80	20	40	60			80	Wp — W — WI			
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		97.37											Flushmount protector						
		Asphaltic concrete		97.29												Bentonite seal					
		Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)		0.08	1	C.S.															
				97.12																	
		Brown sand, some gravel and silt (FILL MATERIAL)		0.25	2	C.S.															
1																					
2																					
3																					

Flushmount protector

Bentonite seal

Filter sand

51 mm Diameter, 1.52 metres long well screen

## GROUNDWATER OBSERVATIONS

DATE	DEPTH (m)	ELEV. (m)
15-06-29	4.45	92.92

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG, BOREHOLE LOGS, JUNE 11-12 2015, GPJ, HOULE CHEVRIER 2015, GDT, 6-29-15

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

Borehole  
dry on  
completion  
of drilling.

CHECKED:

PROJECT: 15-149

## RECORD OF BOREHOLE 15-11

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m										
								SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa	nat. V - rem. V -	+ ⊕	Q U -	Wp	W	WI			
								20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>		
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		96.98													
		Asphaltic concrete		0.05													
		Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)		96.75 0.23													
		Brown sand, trace to some silt, trace gravel and cobbles (ROADWAY SUBBASE MATERIAL)			1	C.S.											
1		Compact, brown sand, trace to some gravel (GLACIAL TILL)		96.07 0.91		2	50 D.O.	11									
		End of borehole		95.46 1.52													
2																	
3																	
4																	
5																	
6																	

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG - BOREHOLE LOGS JUNE 11-12 2015 GPJ HOULE CHEVRIER 2015 GDT 6-29-15

PROJECT: 15-149

## RECORD OF BOREHOLE 15-12

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m										
								SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa	nat. V - rem. V -	+ ⊕	Q U -	Wp	W	WI			
								20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>		
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		100.85													
		Asphaltic concrete		100.76													Asphaltic coldpatch
		Grey crushed sandy gravel, trace silt (ROADWAY BASE MATERIAL)		0.09	1	C.S.											
		Brown sand and silt, trace gravel and cobbles (FILL MATERIAL)		100.52													
				0.33	2	C.S.											Backfilled with auger cuttings
1		Dense, brown silty sand, trace clay and gravel (GLACIAL TILL)		99.78	3	50 D.O.	31										
				1.07													
		End of borehole		99.33													Borehole dry on completion of drilling.
				1.52													
2																	
3																	
4																	
5																	
6																	

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG, BOREHOLE LOGS, JUNE 11-12 2015, GPJ, HOULE CHEVRIER 2015, GDT, 6-29-15

PROJECT: 15-149

## RECORD OF BOREHOLE 15-13

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m										
								20 40 60 80				10 <sup>-5</sup> 10 <sup>-4</sup> 10 <sup>-3</sup> 10 <sup>-2</sup>					
								SHEAR STRENGTH Cu, kPa		nat. V - + rem. V - ⊕		Q ● U - ○		WATER CONTENT, PERCENT			
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		97.25													
		Asphaltic concrete		97.17													
		Grey crushed sandy gravel, trace silt (ROADWAY BASE MATERIAL)		0.08	1	C.S.									Sieve (See Fig. A1)	Asphaltic coldpatch	
		Grey brown silty sand, trace gravel (ROADWAY SUBBASE MATERIAL)		96.79 0.46	2	C.S.									Sieve (See Fig. A3)	Backfilled with auger cuttings	
					3	C.S.											
1																	
		Very dense, grey silty sand, trace to some gravel, trace clay (GLACIAL TILL)		96.18 1.07	4	50 D.O.	>50 for 50 mm										
		End of borehole		95.73 1.52												Borehole dry on completion of drilling.	
2																	
3																	
4																	
5																	
6																	

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG, BOREHOLE LOGS, JUNE 11-12 2015 G.P.J. HOULE CHEVRIER 2015 G.D.T. 6-29-15

PROJECT: 15-149

## RECORD OF BOREHOLE 15-14

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m										
				DEPTH (m)				SHEAR STRENGTH				WATER CONTENT, PERCENT					
								20	40	60	80	nat. V - Cu, kPa	+ rem. V - ⊕	Q U -	● ○		
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		95.80													
		Asphaltic concrete		0.05												Asphaltic coldpatch	
		Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)		0.15													
		Very dense, brown sand, some gravel, trace cobbles (ROADWAY SUBBASE MATERIAL)			1	C.S.										Backfilled with auger cuttings	
1																	
					2	50 D.O.	64										
		End of borehole		94.28 1.52												Borehole dry on completion of drilling.	
2																	
3																	
4																	
5																	
6																	

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG - BOREHOLE LOGS JUNE 11-12 2015 GPJ HOULE CHEVRIER 2015 GDT 6-29-15

BORING DATE: June 11, 2015

## Houle Chevrier Engineering

SPT HAMMER: 63.5 kg; drop 0.76 metres

CHECKED:

BOREHOLE LOG BOREHOLE LOGS JUNE 11-12 2015.GPJ HOULE CHEVRIER 2015.GDT 6-29-15



PROJECT: 15-149

## RECORD OF BOREHOLE 15-16

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m										
								SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa	nat. V - rem. V -	+ ⊕	Q U - ● ○	Wp	W	WI			
								20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>		
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		96.11													Asphaltic coldpatch
		Asphaltic concrete		0.04	1	C.S.											
		Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)		95.83 0.28													
		Brown sand, some gravel, trace silt and cobbles (ROADWAY SUBBASE MATERIAL)		95.50 0.61	2	C.S.											Backfilled with auger cuttings
		Very dense, brown silty sand, some gravel (GLACIAL TILL)															
1					3	50 D.O.	61										
		Practical auger refusal on possible boulders or bedrock		94.64 1.47													Borehole dry on completion of drilling.
2																	
3																	
4																	
5																	
6																	

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

BOREHOLE LOG, BOREHOLE LOGS, JUNE 11-12 2015, GPJ, HOULE CHEVRIER 2015, GDT, 6-29-15

PROJECT: 15-149

## RECORD OF BOREHOLE 15-17






SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.3m										
				DEPTH (m)				SHEAR STRENGTH				WATER CONTENT, PERCENT					
								Cu, kPa	nat. V - rem. V -	+ ⊕	Q U - ● ○	Wp	W	WI			
								20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>		
0	Power Auger  200 mm Diameter Hollow Stem	Ground Surface		98.18	1	C.S.										Asphaltic coldpatch	
		Asphaltic concrete		98.10													
	Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)		98.03 0.15														
	Brown sand, some gravel, trace silt and cobbles (ROADWAY SUBBASE MATERAIL)		97.67 0.51														
		Practical auger refusal on possible boulders or bedrock		0.51												Backfilled with soil cuttings Borehole dry on completion of drilling.	
1																	
2																	
3																	
4																	
5																	
6																	

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

PROJECT: 15-149

## RECORD OF BOREHOLE 15-18

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT, PERCENT							
								Cu, kPa		nat. V - + rem. V - ⊕		Q - ● U - ○							
								20	40	60	80	10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>				
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		100.24															
		Asphaltic concrete		0.04															
		Grey crushed sandy gravel, trace silt (ROADWAY BASE MATERIAL)		100.04	1	C.S.													
		Brown sand, some silt and gravel (ROADWAY SUBBASE MATERIAL)		0.20															
		Very loose, brown silty sand, some clay, trace gravel (GLACIAL TILL)		99.63	2	C.S.													
				0.61															
1																			
					3	50 D.O.	3												
		End of borehole		98.72															
		Note: Refusal to split barrel sampler at about 1.4 metres below surface grade.		1.52															
2																			
3																			
4																			
5																			
6																			

DEPTH SCALE

1 to 30

Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

PROJECT: 15-149

## RECORD OF BOREHOLE 15-19

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: Geodetic

BORING DATE: June 11, 2015

SPT HAMMER: 63.5 kg; drop 0.76 metres

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m					HYDRAULIC CONDUCTIVITY, k, cm/s					ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m												
								SHEAR STRENGTH					WATER CONTENT, PERCENT						
								Cu, kPa					nat. V - + Q ● rem. V - ⊕ U - ○						Wp  -----  W  -----  WI
							20	40	60	80		10 <sup>-5</sup>	10 <sup>-4</sup>	10 <sup>-3</sup>	10 <sup>-2</sup>				
0	Power Auger 200 mm Diameter Hollow Stem	Ground Surface		98.04														Asphaltic coldpatch	
		Asphaltic concrete		0.06														Backfilled with soil cuttings	
		Grey crushed sand and gravel, trace silt (ROADWAY BASE MATERIAL)		97.84															
				0.20															
		Brown silty sand, some gravel (ROADWAY SUBBASE MATERIAL)		97.43	1	C.S.													
				0.61															
1		Compact, brown silty sand, some gravel, trace clay (GLACIAL TILL)																	
					2	50 D.O.	14												
				96.52															
				1.52															
2		Practical auger refusal on possible boulders or bedrock																Borehole dry on completion of drilling.	
3																			
4																			
5																			
6																			

DEPTH SCALE

1 to 30

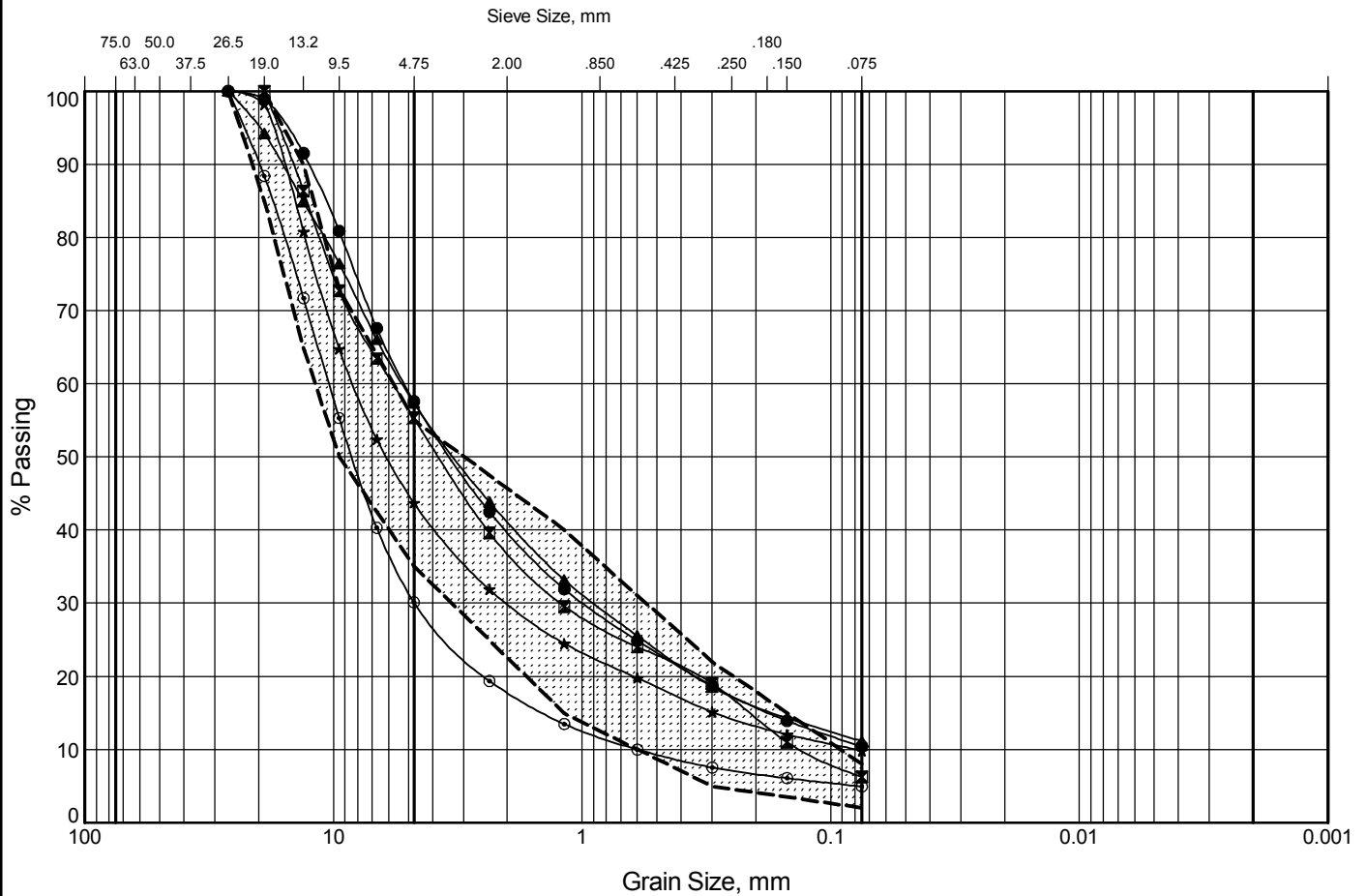
Houle Chevrier Engineering

LOGGED: M.L.

CHECKED:

# GRAIN SIZE DISTRIBUTION

FIGURE A1



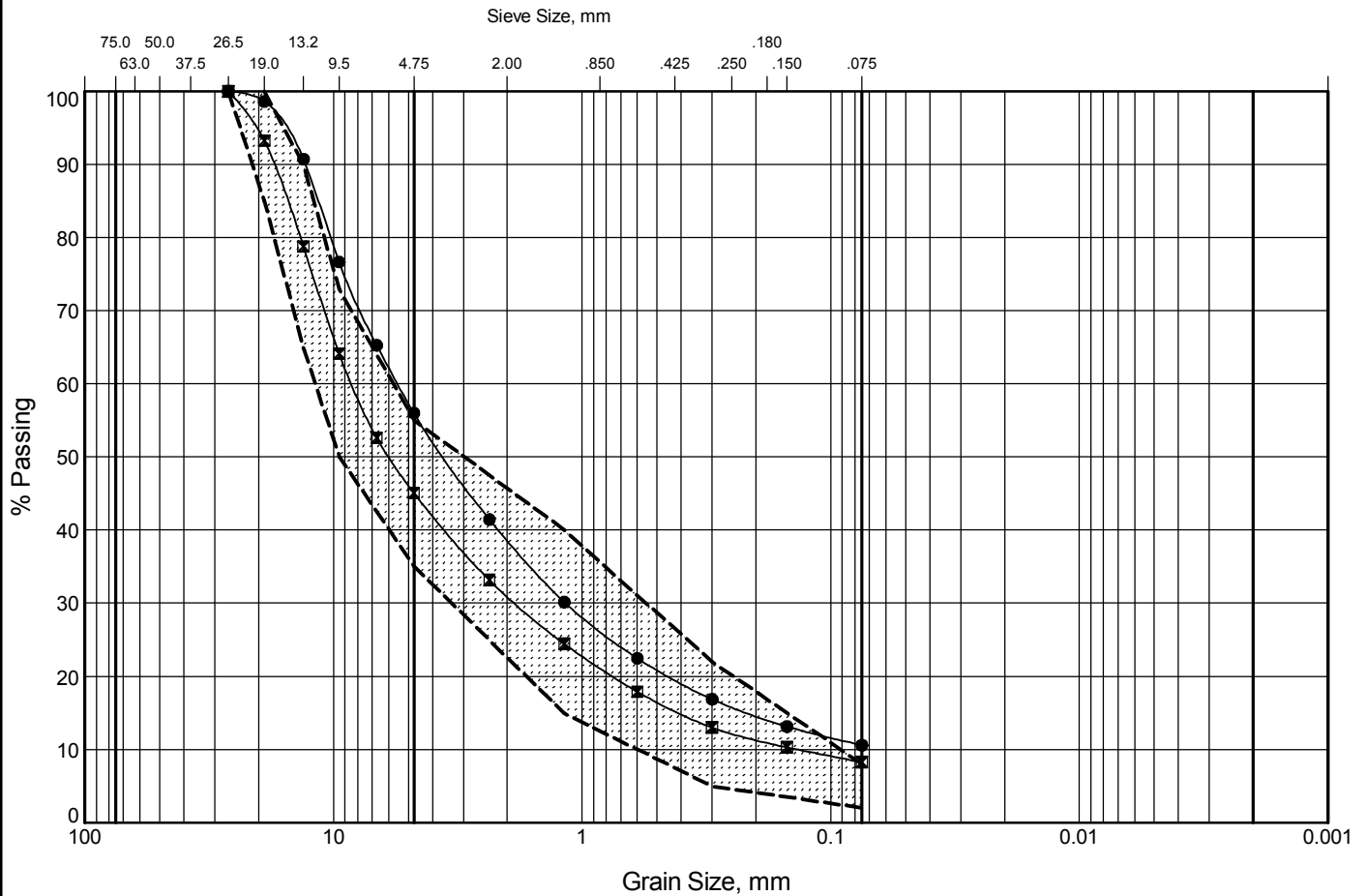
COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
	GRAVEL		SAND			

Legend	Borehole	Sample	Depth (m)	% Gravel	% Sand	% Silt & Clay
●	15-1	1	0.1 - 0.3	42	47	10
⊠	15-4	1	0.2 - 0.3	45	49	6
▲	15-6	1	0.1 - 0.1	43	46	11
★	15-12	1	0.1 - 0.3	56	34	10
⊙	15-13	1	0.1 - 0.3	70	25	5

----- Gradation Envelope: OPSS 1010 - GRANULAR A

# GRAIN SIZE DISTRIBUTION

FIGURE A2



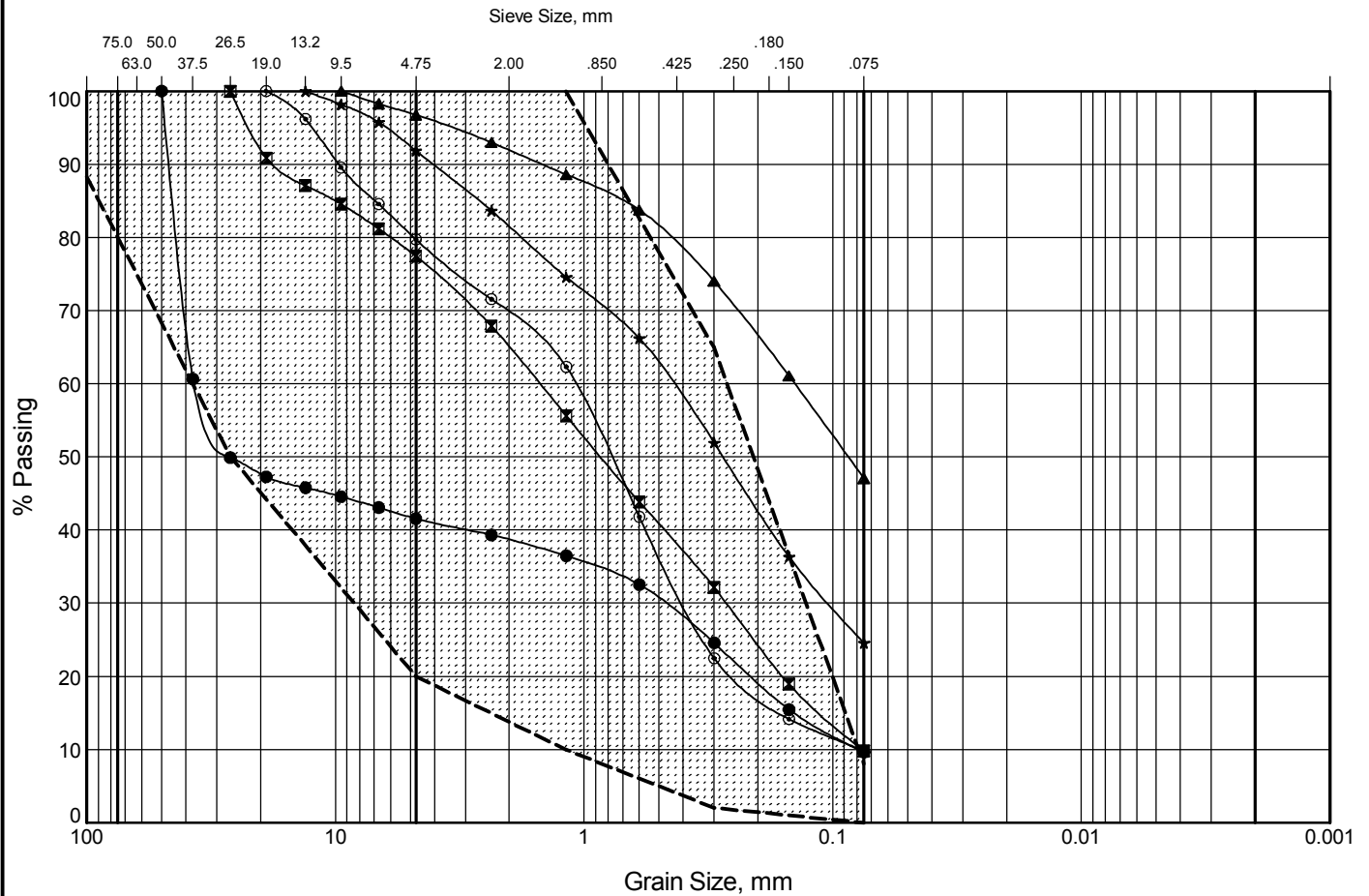
COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
	GRAVEL		SAND			

Legend	Borehole	Sample	Depth (m)	% Gravel	% Sand	% Silt & Clay
●	15-15	1	0.1 - 0.2	44	45	11
■	15-18	1	0.1 - 0.2	55	37	8

----- Gradation Envelope: OPSS 1010 - GRANULAR A

# GRAIN SIZE DISTRIBUTION

FIGURE A3



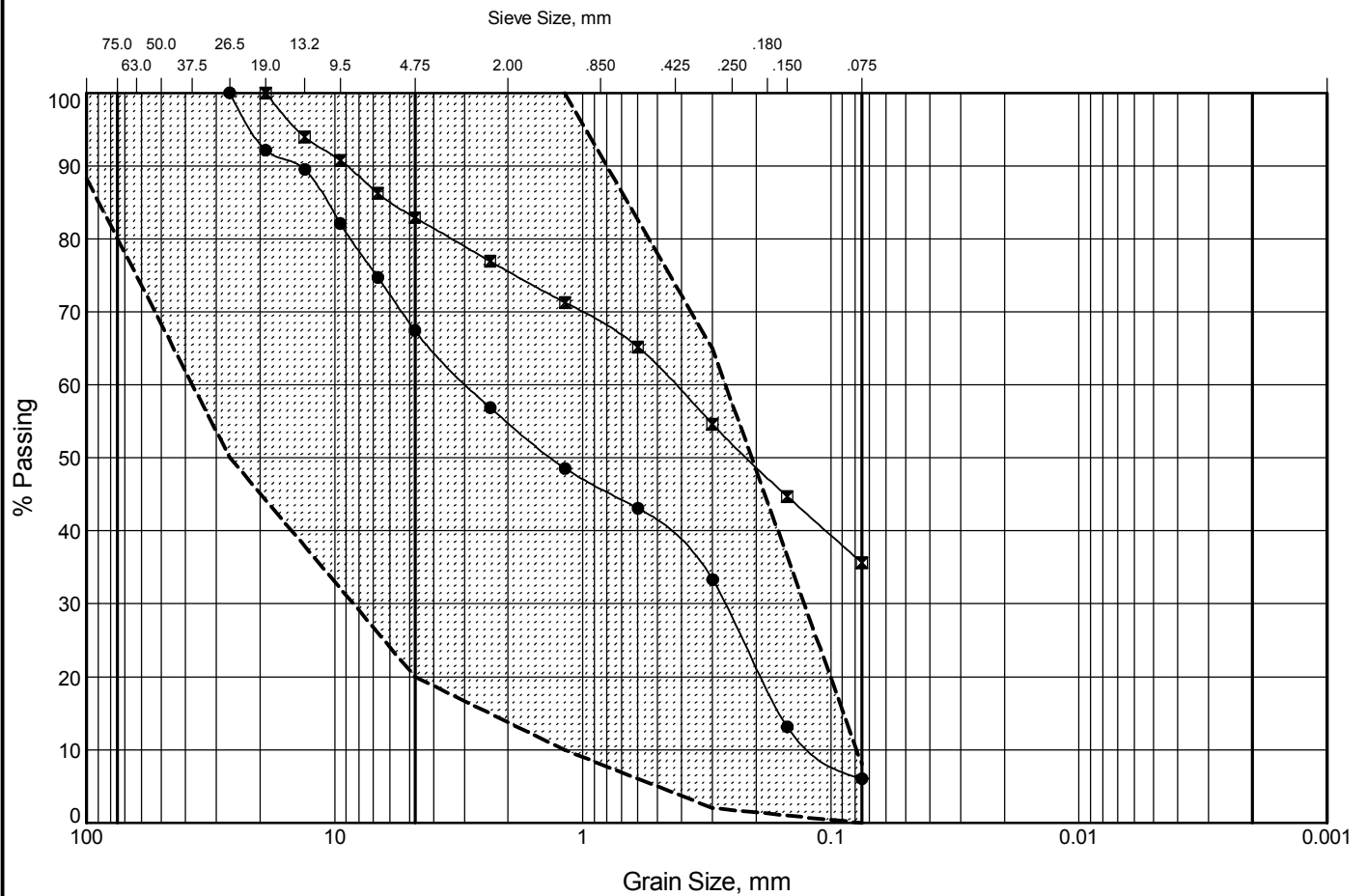
COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
	GRAVEL		SAND			

Legend	Borehole	Sample	Depth (m)	% Gravel	% Sand	% Silt & Clay
●	15-1	2	0.5 - 0.8	58	32	10
☒	15-6	2	0.3 - 0.4	23	68	10
▲	15-12	2	0.4 - 0.5	3	50	47
★	15-13	2	0.5 - 0.7	8	67	25
⊙	15-14	1	0.3 - 0.6	20	70	10

----- Gradation Envelope: OPSS 1010 - GRANULAR B TYPE I

# GRAIN SIZE DISTRIBUTION

FIGURE A4



COBBLES	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
	GRAVEL		SAND			

Legend	Borehole	Sample	Depth (m)	% Gravel	% Sand	% Silt & Clay
●	15-15	2	0.5 - 0.8	33	61	6
⊠	15-19	1	0.3 - 0.5	17	47	36

----- Gradation Envelope: OPSS 1010 - GRANULAR B TYPE I