

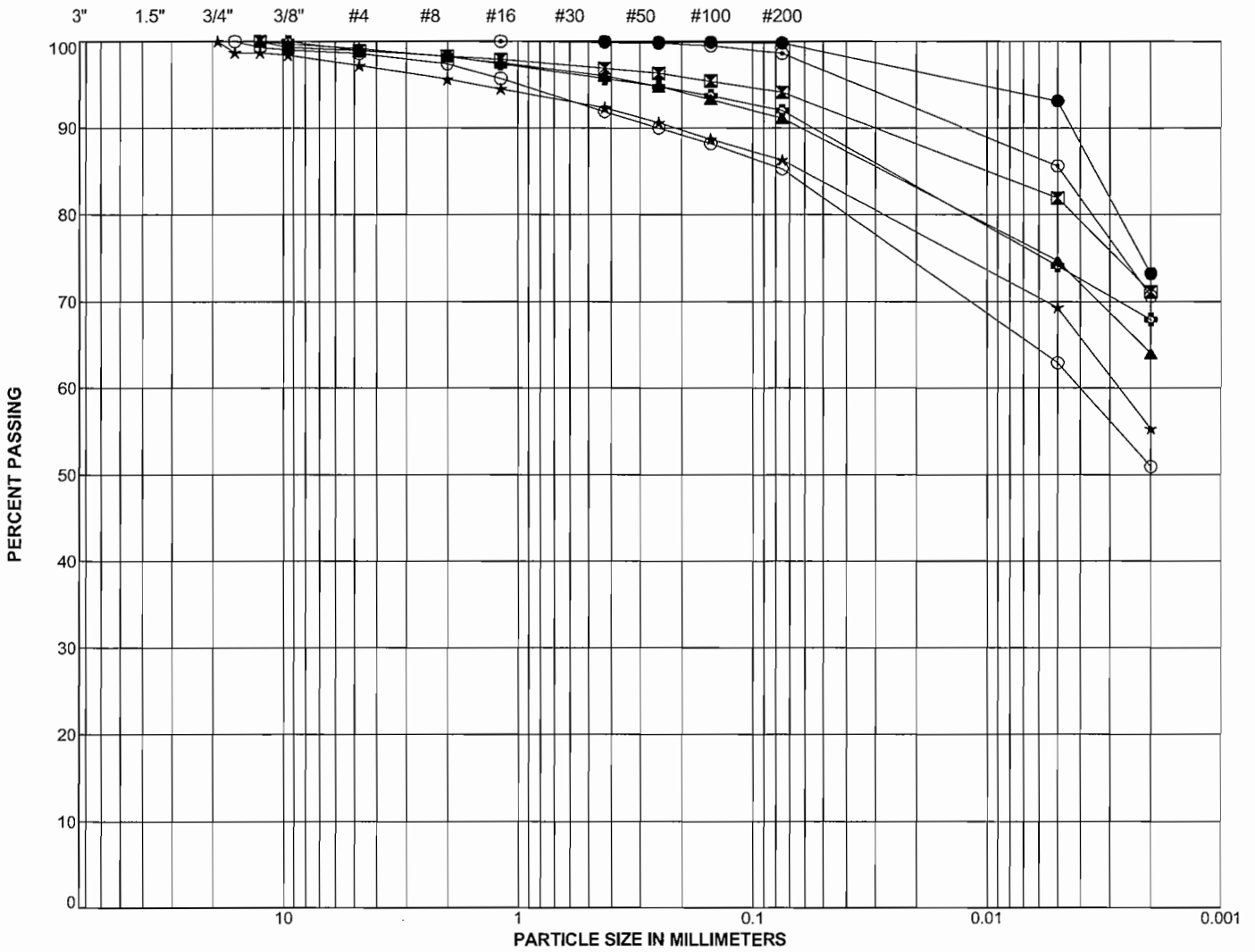
SYMBOL	HOLE	DEPTH (m)	SAMPLE #	LL	PL	PI	% SAND	% SILT	% CLAY	% MC	CLASSIFICATION
●	TH08-02	4.6	S10	96	24	72	0.2	26.6	73.2	46.3	CH
⊠	TH08-02	6.6	S14	92	24	68	4.8	23.0	71.1	44.4	CH
▲	TH08-02	8.1	S17	78	19	59	8.1	27.1	64.0	43.0	CH
★	TH08-02	10.7	S22	76	17	59	10.9	31.0	55.3	40.2	CH
⊙	TH08-03	3.6	S7	87	21	66	1.4	28.0	70.6	27.8	CH
⊕	TH08-03	5.6	S11	76	20	56	6.9	24.1	67.9	45.8	CH
○	TH08-03	7.1	S14	67	16	51	13.3	34.4	50.9	57.8	CH

Notes:  
 ML - Low Plasticity Silt  
 MH - High Plasticity Silt  
 CL-ML - Silty Clay  
 CL - Low Plasticity Clay  
 CI - Intermediate Plasticity Clay  
 CH - High Plasticity Clay  
 LL - Liquid Limit  
 PL - Plastic Limit  
 PI - Plasticity Index  
 MC - Moisture Content

<b>KGS GROUP</b>	<b>CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT</b>
DE LA CATHEDRALE OUTFALL	
<b>A-LINE PLOT</b>	
Dec 2008	Figure 1
Page 1 of 1	

SIEVE ANALYSIS

HYDROMETER ANALYSIS



GRAVEL		SAND			SILT	CLAY
coarse	fine	coarse	medium	fine		

SYMBOL	HOLE	DEPTH (m)	SAMPLE #	% GRAVEL	% SAND	% SILT	% CLAY	% SILT & CLAY	Cu	Cc	CLASSIFICATION
●	TH08-02	4.6	S10	0.0	0.2	26.6	73.2	99.8			CH
▲	TH08-02	6.6	S14	1.1	4.8	23.0	71.1	94.1			CH
▲	TH08-02	8.1	S17	0.8	8.1	27.1	64.0	91.1			CH
★	TH08-02	10.7	S22	2.8	10.9	31.0	55.3	86.3			CH
○	TH08-03	3.6	S7	0.0	1.4	28.0	70.6	98.6			CH
⊕	TH08-03	5.6	S11	1.1	6.9	24.1	67.9	92.0			CH
○	TH08-03	7.1	S14	1.4	13.3	34.4	50.9	85.3			CH



**CITY OF WINNIPEG -  
WATER AND WASTE  
DEPARTMENT**

DE LA CATHEDRALE OUTFALL

**GRAIN SIZE ANALYSES**

**CLIENT** CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT  
**PROJECT** DE LA CATHEDRALE OUTFALL  
**SITE** AVENUE DE LA CATHEDRALE  
**LOCATION** UPPER BANK AREA

**JOB NO.** 08-107-12  
**GROUND ELEV.** 229.00 m  
**TOP OF PVC ELEV.** 229.64 m  
**WATER ELEV.**  
**DATE DRILLED** 27-NOV-08  
**UTM (m)** N 5,528,064  
 E 634,715

**DRILLING METHOD** 200 mm ø Hollow Stem Auger, RM 30 Track Mounted Drill Rig

ELEVATION (m)	DEPTH		GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★		Cu TORVANE (kPa) ◆	
	(m)	(ft)										20	40	60	80
228	1			<b>SILTY CLAY FILL</b> - Dark grey, frozen to 0.3 m, stiff, high plasticity, with sand, with gravel, with roots, large silt seams and pockets, clayey silt seams (up to 50-75 mm thick). - Damp below 0.30 m.											
227.8		5		<b>CLAYEY SILT FILL</b> - Tan, moist, very soft, trace organic and silt seams (up to 1-2 mm thick)											
227.1	2			<b>SILTY CLAY FILL (CH)</b> - Mottled dark grey and light brown, damp, stiff, high plasticity, trace gypsum pockets (up to 1-2 mm diameter), silt seams running at 45° (approximately 2 mm thick). - Firm, trace silt pockets (up to 1-2 mm diameter) below 2.03 m. - Slickenside at 2.29 m.											
227		10		- Dark grey, with silt pockets (up to 10 mm thick), with silt seams (up to 3 mm thick), trace organic seams and pockets below 3.05 m.											
226	3			- Light grey, stiff below 3.73 m.											
225	4			- Mottled light brown and light grey, firm, trace silt pockets (1-2 mm diameter), no organics below 4.14 m.											
224	5			- Light grey, some silt lenses and pockets, trace organics below 4.57 m.											
223	6			- Grain Size: Gravel (0%), Sand (0.2%), Silt (26.6%), Clay (73.2%) at 4.60 m. - No organics below 5.08 m. - Stiff, trace fine grained gravel below 5.23 m.											
222	7			- Dark grey, with silt pockets (15 mm diameter), trace medium to coarse grained sand below 5.59 m.											
221	8			- Grain Size: Gravel (1.1%), Sand (4.8%), Silt (23.0%), Clay (71.1%) at 6.60 m.											
220.4	9			- Moist, trace organics and silt pockets (approximately 4 mm diameter) at 7.92 m. - Grain Size: Gravel (0.8%), Sand (8.1%), Silt (27.1%), Clay (64.0%) at 8.10 m.											
220		30		<b>SILTY CLAY (CH)</b> - Dark grey, moist, firm, high plasticity, trace to some sand, trace silt pockets (1-2 mm diameter).  - Trace fine grained gravel below 9.45 m.		8.8									

SAMPLE TYPE  Split Barrel

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**B. P. ARPIN**

APPROVED



DATE 12/12/08

SPT & TORVANE 2 P:\PROJECTS\2008\08-107-12\DESIGN\GEOLOGS\DE LA CATHEDRALE 27-NOV-08.GPJ

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★	Cu TORVANE (kPa) ◆
								20 40 60	20 40 60	20 40 60 80	20 40 60 80
217.8	11		- Trace fine to coarse grained gravel, trace silt pockets and seams at 10.06 m. - Grain Size: Gravel (2.8%), Sand (10.9%), Silt (31.0%), Clay (55.3%) at 10.7 m. <b>CLAY TILL</b> - Light grey, damp to moist, soft, high plasticity, trace fine to coarse grained sand and gravel.		10.7	S21					
216.6	12		- Tan-grey, becoming softer with depth, silt content increasing with depth below 11.89 m. - Dry, hard, silty till at 12.04 m. <b>SILT TILL</b> - Tan, dry, dense, crumbly, with silt, sand, and gravel.		11.89	S22					
213.2	15				15.2	S23					
213.2	16		<b>AUGER REFUSAL AT 15.77 m.</b>		15.8	S24					
212	17		Notes: 1. Stratigraphy based on adjacent testhole TH08-02. 2. Casagrande bottom tip 15.62 m below grade, backfilled with sand. 3. Installed pneumatic piezometers: PN30712 tip elevation at 220.16 m and PN30867 tip elevation at 218.33 m, backfilled with grout and bentonite to ground surface.								

SAMPLE TYPE Split Barrel

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**B. P. ARPIN**

APPROVED

DATE 12/12/08

SPT & TORVANE 2 P:\PROJECTS\2008\08-0107-12\DESIGN\GEOLOGS\IDE LA CATHEDRALE 27-NOV-08.GPJ

**CLIENT** CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT  
**PROJECT** DE LA CATHEDRALE OUTFALL  
**SITE** AVENUE DE LA CATHEDRALE  
**LOCATION** UPPER BANK AREA - 1.52 m North of TH08-01  
**DRILLING METHOD** 200 mm ø Hollow Stem Auger, RM 30 Track Mounted Drill Rig

**JOB NO.** 08-107-12  
**GROUND ELEV.** 229.09 m  
**TOP OF PVC ELEV.** 229.68 m  
**WATER ELEV.**  
**DATE DRILLED** 27-NOV-08  
**UTM (m)** N 5,528,066  
 E 634,715

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★			Cu TORVANE (kPa) ◆
									20 40 60	20 40 60	PL	MC	LL	20 40 60 80
229			<b>SILTY CLAY FILL</b> - Dark grey, frozen to 0.3 m, stiff, high plasticity, with sand, with gravel, with roots, large silt seams and pockets, clayey silt seams (up to 50-75 mm thick). - Damp below 0.30 m.											
227.9	1		<b>CLAYEY SILT FILL</b> - Tan, moist, very soft, trace organic and silt seams (up to 1-2 mm thick)											
227.2	5		<b>SILTY CLAY FILL (CH)</b> - Mottled dark grey and light brown, damp, stiff, high plasticity, trace gypsum pockets (up to 1-2 mm diameter), silt seams running at 45° (approximately 2 mm thick). - Firm, trace silt pockets (up to 1-2 mm diameter) below 2.03 m. - Slickenside at 2.29 m.											
227	2													
226	3		- Dark grey, with silt pockets (up to 10 mm thick), with silt seams (up to 3 mm thick), trace organic seams and pockets below 3.05 m.  - Light grey, stiff below 3.73 m.		3.0									
225	4		- Mottled light brown and light grey, firm, trace silt pockets (1-2 mm diameter), no organics below 4.14 m. - Light grey, some silt lenses and pockets, trace organics below 4.57 m.											
224	5		- Grain Size: Gravel (0%), Sand (0.2%), Silt (26.6%), Clay (73.2%) at 4.60 m. - No organics below 5.08 m. - Stiff, trace fine grained gravel below 5.23 m.											
223	6		- Dark grey, with silt pockets (15 mm diameter), trace medium to coarse grained sand below 5.59 m.  - Grain Size: Gravel (1.1%), Sand (4.8%), Silt (23.0%), Clay (71.1%) at 6.60 m.											
222	7													
221	8		- Moist, trace organics and silt pockets (approximately 4 mm diameter) at 7.92 m. - Grain Size: Gravel (0.8%), Sand (8.1%), Silt (27.1%), Clay (64.0%) at 8.10 m.											
220.5	9		<b>SILTY CLAY (CH)</b> - Dark grey, moist, firm, high plasticity, trace to some sand, trace silt pockets (1-2 mm diameter).  - Trace fine grained gravel below 9.45 m.											
220	9													

SPT & TORVANE 2 P:PROJECTS\2008\08-0107-12\DESIGN\GEOLOGS\DE LA CATHEDRALE 27-NOV-08.GPJ

SAMPLE TYPE  Split Barrel

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**B. P. ARPIN**

APPROVED  DATE 12/12/08

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ Cu TORVANE (kPa) ◆	
									PL	MC
219			- Trace fine to coarse grained gravel, trace silt pockets and seams at 10.06 m.							
218.0	11		- Grain Size: Gravel (2.8%), Sand (10.9%), Silt (31.0%), Clay (55.3%) at 10.7 m.							
218			<b>CLAY TILL</b> - Light grey, damp to moist, soft, high plasticity, trace fine to coarse grained sand and gravel.							
217.0	12		- Tan-grey, becoming softer with depth, silt content increasing with depth below 11.89 m.							
216.7	40		- Dry, hard, silty till at 12.04 m.							
			<b>SILT TILL</b> - Tan, damp, with silt, sand, and gravel.							
			<b>AUGER REFUSAL AT 12.09 m.</b>							
216	13		Notes: 1. Stratigraphy based on TH08-01 located 1.52 m north of TH08-02. 2. No water observed at the end of drilling. 3. Installed a slope inclinometer to a depth of 12.09 m with a stick-up of 0.71 m above ground surface. Backfilled with grout and bentonite to ground surface.							
215	14									
214	15									
213	16									
212	17									
211	18									
210	19									
209	20									
208	21									

SPT & TORVANE 2 P:\PROJECTS\2008\08-0107-12\DESIGN\GEOLOGSIDE LA CATHEDRALE 27-NOV-08.GPJ

SAMPLE TYPE  Split Barrel

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**B. P. ARPIN**

APPROVED  DATE **12/12/08**

**CLIENT** CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT  
**PROJECT** DE LA CATHEDRALE OUTFALL  
**SITE** AVENUE DE LA CATHEDRALE  
**LOCATION** LOWER BANK AREA  
**DRILLING METHOD** 200 mm ø Hollow Stem Auger, RM 30 Track Mounted Drill Rig

**JOB NO.** 08-107-12  
**GROUND ELEV.** 225.10 m  
**TOP OF PVC ELEV.** 225.73 m  
**WATER ELEV.**  
**DATE DRILLED** 27-NOV-08  
**UTM (m)** N 5,528,059  
 E 634,700

ELEVATION (m)	DEPTH		GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ Cu TORVANE (kPa) ◆		
	(m)	(ft)								20	40	60
225				<b>SILTY CLAY</b> - Mottled grey and brown, frozen to 0.66 m, high plasticity, trace organics, and silt, and sand.  - Firm below 0.66 m.		0.3						
224	1						S1	25				
223.5		5					S2	30				
223.3				<b>CLAYEY SILT</b> - Tan, moist, soft, high plasticity, fine to medium grained sand, silt seams (1 mm thick), silt pockets (1-2 mm diameter), trace organics.			S3	60				
223		2		<b>SILTY CLAY (CH)</b> - Dark grey, damp, firm, high plasticity, trace organics, trace sand, trace silt pockets (1-2 mm diameter).			S4	100				
222		10		- Moist, very soft, trace organics between 3.25 m and 3.40 m. - Mottled light brown and dark grey clayey silt seams, increased laminated silt seams between 3.40 m and 3.86 m. - Grain Size: Gravel (0%), Sand (1.4%), Silt (28.0%), Clay (70.6%) at 3.6 m. - Grey, stiff below 3.66 m.			S5	60				
221		4		- Some black organics, moist, intermediate to high plasticity below 4.42 m.			S6	90				
220.3		15					S7	100				
220.0				<b>CLAYEY SILT</b> - Tan, damp to moist, firm, intermediate to high plasticity, silt pockets (1 mm diameter), silt seams (1 mm thick), trace organics.			S8	100				
220		5		<b>SILTY CLAY (CH)</b> - Mottled light brown and dark grey, damp, firm, high plasticity, trace to some sand, trace gravel, trace organics, trace silt seams.			S9	100				
219		20		- Grey, firm, trace silt pockets (1-5 mm diameter) below 5.49 m. - Grain Size: Gravel (1.1%), Sand (6.9%), Silt (24.1%), Clay (67.9%) at 5.60 m.			S10	100				
218		7		- Moist, soft between 6.76 m and 7.01 m.			S11	100				
218				- Grain Size: Gravel (1.4%), Sand (13.3%), Silt (34.4%), Clay (50.9%) at 7.1 m.			S12	100				
217		8		<b>CLAY TILL</b> - Grey-tan, damp to moist, soft to very soft, some fine to coarse grained sand and gravel.			S13	100				
216.1							S14	100				
216		9		<b>SILT TILL</b> - Tan, damp, with silt, sand, gravel, clay.			S15	100				
215.6		30					S16	65				
							S17	90				
							S18	40				
				AUGER REFUSAL AT 9.55 m.		9.7						

SAMPLE TYPE  Split Barrel

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**B. P. ARPIN**

APPROVED  DATE 12/12/08

SPT & TORVANE 2 P:\PROJECTS\2008\08-01\07-12\DESIGN\GEOLOG\SIDE LA CATHEDRALE 27-NOV-08.GPJ

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER RECOVERY %	SPT (N) blows/0.15 m ▲  DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★		Cu TORVANE (kPa) ◆	
								20 40 60 80	20 40 60 80	PL MC LL	%
215			Notes: 1. Some water observed at the end of drilling at the bottom of the testhole. 2. Installed a slope inclinometer to a depth of 9.72 m with a stick-up of 0.64 m above ground surface, backfilled with grout and bentonite to ground surface.								
	35										
214	11										
	12										
213	40										
	13										
212											
	45										
211	14										
	15										
210	50										
	16										
209											
	55										
208	17										
	18										
207	60										
	19										
206											
	65										
205	20										
	21										
204	70										

SPT & TORVANE 2 P:\PROJECTS\2008\08-01\07-12\DESIGN\GEOLOGSIDE LA CATHEDRALE 27-NOV-08.GPJ

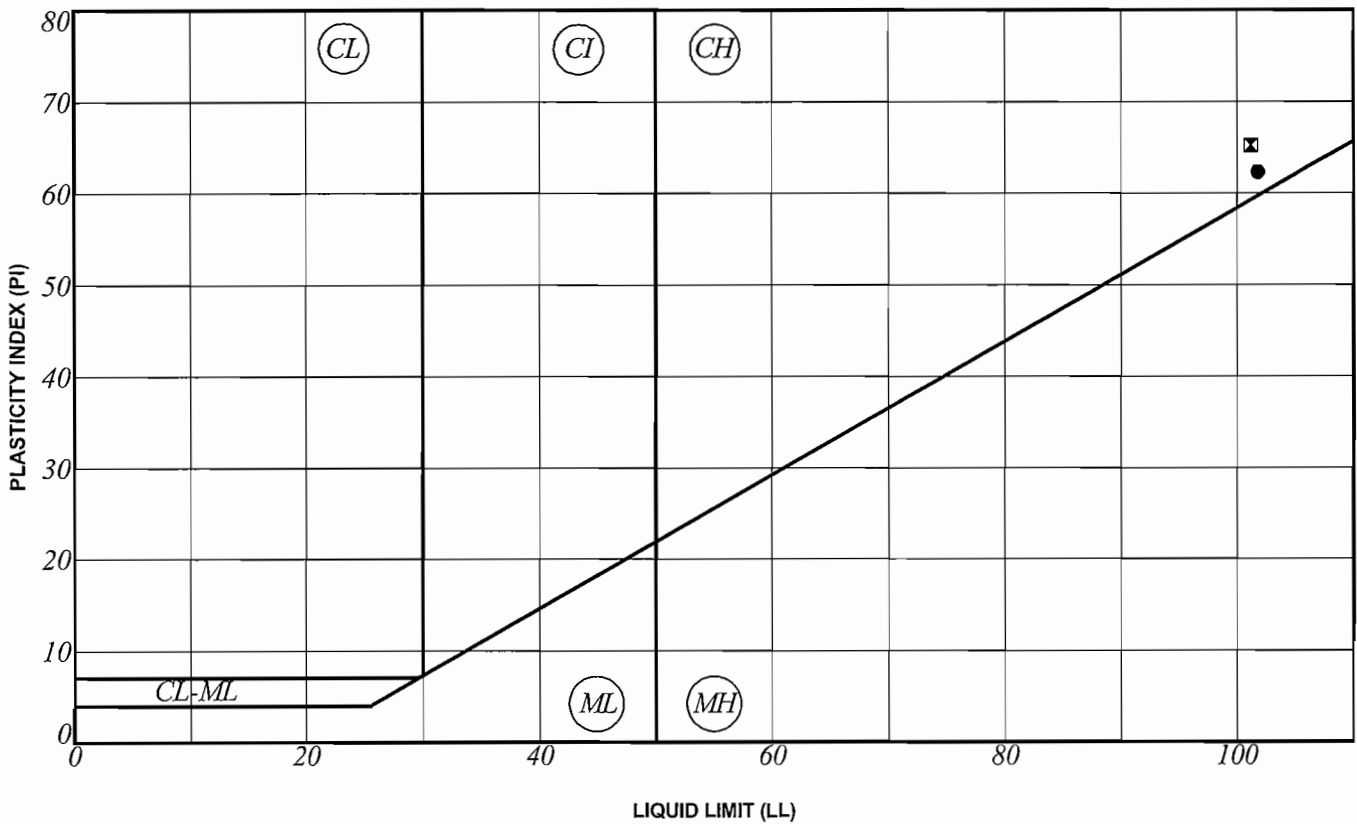
SAMPLE TYPE  Split Barrel

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**B. P. ARPIN**

APPROVED *[Signature]* DATE **12/12/08**





SYMBOL	HOLE	DEPTH (m)	SAMPLE #	LL	PL	PI	% SAND	% SILT	% CLAY	% MC	CLASSIFICATION
●	SI-03 (Despins)	4.1	9	102	40	62	4.8	11.7	83.5	49.4	CH
⊠	SI-04 (Despins)	9.7	20	101	36	65	0.2	23.3	75.7	44.3	CH

**Notes:**

- ML - Low Plasticity Silt
- MH - High Plasticity Silt
- CL-ML - Silty Clay
- CL - Low Plasticity Clay
- CI - Intermediate Plasticity Clay
- CH - High Plasticity Clay
- LL - Liquid Limit
- PL - Plastic Limit
- PI - Plasticity Index
- MC - Moisture Content

**KGS  
GROUP**

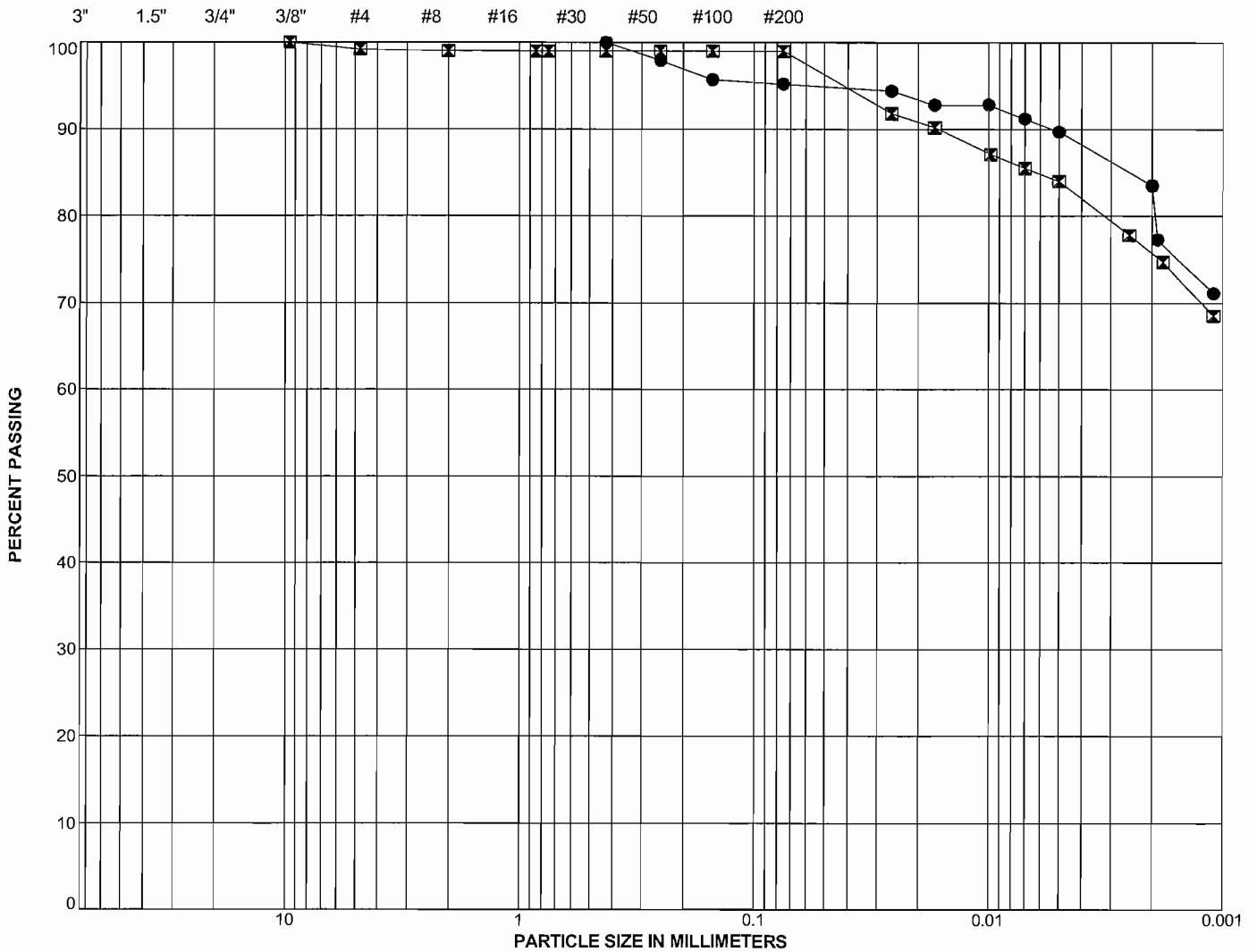
**CITY OF WINNIPEG -  
WATER AND WASTE  
DEPARTMENT**

DESPINS

**A-LINE PLOT**

SIEVE ANALYSIS

HYDROMETER ANALYSIS



GRAVEL		SAND			SILT	CLAY
coarse	fine	coarse	medium	fine		

SYMBOL	HOLE	DEPTH (m)	SAMPLE #	% GRAVEL	% SAND	% SILT	% CLAY	% SILT & CLAY	Cu	Cc	CLASSIFICATION
●	SI-03 (Despins)	4.1	9	0.0	4.8	11.7	83.5	95.2			CH
⊠	SI-04 (Despins)	9.7	20	0.8	0.2	23.3	75.7	99.0			CH

SIEVE ANALYSIS (2004) P:\PROJECTS\2004\04-0107-12\GEOLOGS\04-107-12.400 LOGS.GPJ



**CITY OF WINNIPEG -  
WATER AND WASTE  
DEPARTMENT**

DESPINS

**GRAIN SIZE ANALYSES**

**CLIENT** CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT  
**PROJECT** FLOOD PUMPING STATIONS - CONDITION ASSESSMENT  
**SITE** Despins Flood Pumping Station  
**LOCATION** Lower Bank, 7 m East of Shoreline  
**DRILLING METHOD** 200 mm ø Hollow Stem Auger, ACKER SS Drill Rig

**JOB NO.** 04-107-12.400  
**GROUND ELEV.** 226.95 m  
**TOP OF PVC ELEV.** 227.86 m  
**WATER ELEV.**  
**DATE DRILLED** 13-Oct-04  
**UTM (m)** N  
 E

ELEVATION (m)	DEPTH		GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★		Cu TORVANE (kPa) ◆	
	(m)	(ft)										PL	MC	LL	%
226.8				<b>TOPSOIL</b>											
	1	5		<b>CLAY FILL</b> - Black, moist, stiff, intermediate plasticity, traces of gravel, sand, silt, wood, rootlets and oxidation. - Traces of brick pieces at 0.51 m.  - Dark grey to brown, trace organics, trace gypsum precipitate at 1.02 m.  - Dark brown, gravel and wood at 2.03 m.  - Trace gravel, trace wood at 3.05 m.  - Trace cinders at 3.56 m.		1.5									
222.4	15			<b>LACUSTRINE SILTY CLAY (CH)</b> - Brown, mottled grey-brown, moist, stiff, high plasticity, trace silt, trace organics.  - Trace silt nodules below 5.08 m.  - Firm, trace gypsum precipitate at 5.59 m.  - Stiff at 6.10 m.  - Mottled grey-brown, trace rootlets at 6.60 m.  - Trace oxidation at 7.11 m.  - Grey, firm, trace coarse grained sand at 8.64 m.  - Trace gravel, trace silt nodules at 9.14 m.  Grain Size Distribution: Gravel (0.8%), Sand (0.2), Silt (23.4%) and Clay (75.6%) at 9.65 m.											

SPT & TORVANE 2 P:\PROJECTS\2008\08-0107-12\DESIGN\GEOLOGS\04-107-12.400 LOGS - REVISED FOR 2008 PROJECT.GPJ

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ Cu TORVANE (kPa) ◆			
										20	40	60	80
216	11		- Firm at 10.16 m.		11.0								
215	12		<b>CLAY TILL</b> - Light grey, moist, soft, trace cobbles, trace gravel, trace coarse grained sand, trace silt.		12.5								
214	13		- Pink, some silt below 12.7 m.		13.4								
213.5			<b>SILT TILL</b> - Pink, moist, dense, trace limestone cobbles, trace gravel, trace coarse grained sand.										
213	14		<b>AUGER REFUSAL AT 13.41 m</b>										
212	15		Notes: 1. Stratigraphy based on SI-04 located approximately 1.0 m east. 2. Installed Casagrande Standpipe SP-02 at 13.41 m. Stick up height is 0.91 m. Water level 10.72 m on October 13, 2004.										
211	16												
210	17												
209	18												
208	19												
207	20												
206	21												

SPT & TORVANE 2 P:\PROJECTS\2008\08-0107-12\DESIGN\GEOLOGS\04-107-12.400 LOGS - REVISED FOR 2008 PROJECT GPJ

**CLIENT** CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT  
**PROJECT** FLOOD PUMPING STATIONS - CONDITION ASSESSMENT  
**SITE** Despins Flood Pumping Station  
**LOCATION** Lower Bank, 7 m East of Shoreline  
**DRILLING METHOD** 200 mm ø Hollow Stem Auger, ACKER SS Drill Rig

JOB NO. **04-107-12.400**  
 GROUND ELEV. **226.80 m**  
 TOP OF PVC ELEV.  
 WATER ELEV.  
 DATE DRILLED **13-Oct-04**  
 UTM (m) **N**  
**E**

ELEVATION (m)	DEPTH		GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★			Cu TORVANE (kPa) ◆		
	(m)	(ft)										20	40	60	80	PL	MC
226.7				<b>TOPSOIL</b>													
		1		- Black, moist, stiff, intermediate plasticity, traces of gravel, sand, silt, wood, rootlets and oxidation. - Traces of brick pieces at 0.51 m.													
		5		- Dark grey to brown, trace organics, trace gypsum precipitate at 1.02 m.													
		2		- Dark brown, gravel and wood at 2.03 m.													
		3		- Trace gravel, trace wood at 3.05 m.													
		4		- Trace cinders at 3.56 m.													
		4				4.0											
		5		<b>LACUSTRINE SILTY CLAY (CH)</b> - Brown, mottled grey-brown, moist, stiff, high plasticity, trace silt, trace organics.													
		5		- Trace silt nodules below 5.08 m.													
		6		- Firm, trace gypsum precipitate at 5.59 m.													
		6		- Stiff at 6.10 m.													
		7		- Mottled grey-brown, trace rootlets at 6.60 m.													
		7		- Trace oxidation at 7.11 m.													
		8															
		8				8.5											
		9		- Grey, firm, trace coarse grained sand at 8.64 m.													
		9				9.1											
				<b>END OF HOLE AT 9.14 m</b>													
				Notes: 1. Stratigraphy based on SI-04 located approximately 1.0 m North.													

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**SAMPLE TYPE**

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**D. ANDERSON**

APPROVED FINAL DATE 12/16/08

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER RECOVERY %	SPT (N) blows/0.15 m ▲  DYNAMIC CONE (N) blows/ft △  20 40 60	Cu POCKET PEN (kPa) ★		Cu TORVANE (kPa) ◆	
								20 40 60 80	PL MC LL	20 40 60 80	%
216	11		2. installed Standpipe Pneumatics PN-03 at 9.14 m, (Serial No. 29636) and PN-04 at 4.57 m (Serial No. 29643) with above ground casings.								
215	12										
214	13										
213	14										
212	15										
211	16										
210	17										
209	18										
208	19										
207	20										
206	21										
205											

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SAMPLE TYPE

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**D. ANDERSON**

APPROVED FINAL DATE 12/16/08

**CLIENT** CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT  
**PROJECT** FLOOD PUMPING STATIONS - CONDITION ASSESSMENT  
**SITE** Despins Flood Pumping Station  
**LOCATION** Upper Bank, 1.5 m West of Path at Crest of Slope  
**DRILLING METHOD** 200 mm ø Hollow Stem Auger, ACKER SS Drill Rig

**JOB NO.** 04-107-12.400  
**GROUND ELEV.** 229.56 m  
**TOP OF PVC ELEV.**  
**WATER ELEV.**  
**DATE DRILLED** 14-Oct-04  
**UTM (m)** N  
 E

ELEVATION (m)	DEPTH		GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★			Cu TORVANE (kPa) ◆		
	(m)	(ft)										20	40	60	80	20	40
229.5				<b>TOPSOIL</b>													
229	1	3		<b>CLAY FILL</b> - Black, mottled black-brown, moist, stiff, intermediate plasticity, trace gravel, sand, silt, organics, trace rootlets. - Brown, mottled black-brown, trace cinders, trace oxidation below 0.51 m.													
228	5	16		- Firm, trace concrete rubble below 1.52 m.													
227.5	2	11		<b>GRANULAR FILL</b> - Brown, loose, mixture of gravel, coarse grained sand, brick, concrete rubble, clay, silt.													
227.0				<b>CLAY FILL</b> - Brown, moist, stiff, intermediate plasticity, trace gravel, sand, brick, concrete rubble, silt, trace oxidation.													
227	3	10		- Mottled black-brown, stiff, trace roots below 3.05 m.													
226.0				<b>LACUSTRINE SILTY CLAY (CH)</b> - Brown, stiff, high plasticity, trace silt, silt nodules, organics, trace oxidation.													
226	4	13		- Mottled grey-brown below 4.06 m. Grain Size Distribution: Gravel (0.0%), Sand (7.8%), Silt (13.3%) and Clay (78.9%) at 4.06 m.													
225	5	15		- Brown, mottled grey-brown, moist, stiff, trace gypsum precipitate below 4.57 m.													
224	6	20		- Grey, stiff, trace silt nodules below 5.08 m.													
223	7	23		- Trace gravel pieces within clay below 6.60 m.													
222	8	26															
221	9	30															
220				- Firm below 9.14 m.													



SAMPLE TYPE  Split Barrel

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**D. ANDERSON**

APPROVED FINAL DATE 12/16/08

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ELEVATION (m)	DEPTH		GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ Cu TORVANE (kPa) ◆		
	(m)	(ft)								PL	MC	LL
219		35		<b>CLAY TILL</b> - Light grey, moist, trace gravel, coarse grained sand and silt.  <b>AUGER REFUSAL AT 14.33 m</b>		14.3			21	100	45	55
	11								22	100	45	55
218									23	100	45	55
	12	40							24	100	45	55
217									25	100	45	55
	13								26	100	45	55
216		45							27	100	45	55
	14								28	30	45	55
215.3									29	20	45	55
215.2												
215												
	15	50										
214												
	16											
213		55										
	17											
212												
	18	60										
211												
	19											
210		65										
	20											
209												
	21	70										
208												

Notes:  
1. Slope Inclinator SI-03 grouted to ground level and installed with an above ground casing.  
2. Water level at 13.11 m below ground elevation after drilling.

SAMPLE TYPE  Split Barrel

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**D. ANDERSON**

APPROVED FINAL DATE 12/16/08

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**CLIENT** CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT  
**PROJECT** FLOOD PUMPING STATIONS - CONDITION ASSESSMENT  
**SITE** Despins Flood Pumping Station  
**LOCATION** Lower Bank, 7 m East of Shoreline  
**DRILLING METHOD** 200 mm ø Hollow Stem Auger, ACKER SS Drill Rig

**JOB NO.** 04-107-12.400  
**GROUND ELEV.** 226.73 m  
**TOP OF PVC ELEV.**  
**WATER ELEV.**  
**DATE DRILLED** 13-Oct-04  
**UTM (m)** N  
 E

ELEVATION (m)	DEPTH		GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★			Cu TORVANE (kPa) ◆
	(m)	(ft)										PL	MC	LL	%
226.6				<b>TOPSOIL</b>											
				<b>CLAY FILL</b> - Black, moist, stiff, intermediate plasticity, traces of gravel, sand, silt, wood, rootlets and oxidation. - Traces of brick pieces at 0.51 m.											
	1	5		- Dark grey to brown, trace organics, trace gypsum precipitate at 1.02 m.											
	2	10		- Dark brown, gravel and wood at 2.03 m.											
	3	15		- Trace gravel, trace wood at 3.05 m.											
	4	20		- Trace cinders at 3.56 m.											
222.2				<b>LACUSTRINE SILTY CLAY (CH)</b> - Brown, mottled grey-brown, moist, stiff, high plasticity, trace silt, trace organics.											
	5	25		- Trace silt nodules below 5.08 m.											
	6	30		- Firm, trace gypsum precipitate at 5.59 m.											
	7	35		- Stiff at 6.10 m.											
	8	40		- Mottled grey-brown, trace rootlets at 6.60 m.											
	9	45		- Trace oxidation at 7.11 m.											
	10	50		- Grey, firm, trace coarse grained sand at 8.64 m.											
	11	55		- Trace gravel, trace silt nodules at 9.14 m.											
	12	60		Grain Size Distribution: Gravel (0.8%), Sand (0.2%), Silt (23.4%) and Clay (75.6%) at 9.65 m.											

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SAMPLE TYPE  Split Barrel

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**D. ANDERSON**

APPROVED FINAL DATE 12/16/08

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ Cu TORVANE (kPa) ◆	
									PL	MC
216	35		- Firm at 10.16 m.							
	11		- Till inclusion from 10.67 to 10.87 m.							
			- With till inclusions at 11.68 m.							
215	12									
214.5	40		<b>CLAY TILL</b> - Light grey, moist, soft, trace cobbles, trace gravel, trace coarse grained sand, trace silt.							
214			- Pink, some silt below 12.7 m.							
213.5	13		<b>SILT TILL</b> - Pink, moist, dense, trace limestone cobbles, trace gravel, trace coarse grained sand.							
213.3			<b>AUGER REFUSAL AT 13.41 m</b>		13.4					
213	45									
212	14		Notes: 1. Slope Inclinerometer SI-04 grouted to ground level and installed with an above ground casing. 2. Water infiltration at 10.67 m below ground elevation after drilling.							
211	15									
210	50									
209	16									
208	55									
207	17									
206	60									
205	65									
	70									

SAMPLE TYPE  Split Barrel

CONTRACTOR  
**Paddock Drilling Ltd.**

INSPECTOR  
**D. ANDERSON**

APPROVED FINAL DATE 12/16/08

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