KGS GROUP

SUMMARY LOG

HOLE NO. **TH10-01**

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT 2010 Outfall Repair Program
SITE Burrows Avenue Outfall
LOCATION Toe of Upper Slope
DRILLING METHOD 200 mm ø Hollow Stem Auger, RM 30 Track Mount

JOB NO. **10-0107-18**
GROUND ELEV. **226.18 m**
TOP OF PVC ELEV. **227.20 m**
WATER ELEV.
DATE DRILLED **10/12/2010**
UTM (m) N **5,530,717** E **634,372**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
226				**CLAYEY SILT** - Brown, damp, firm, low plasticity, trace rootlets, trace organic material.				S1	8		
								S2	35		
225.1	1			**SILTY CLAY** - Brown, damp, firm to stiff, intermediate plasticity, trace oxidation, trace rootlets, trace fine grained gravel, trace fine to coarse grained sand.				S3	65		
225		5		- Piece of wood at 1.57 m. - Firm, decreased fine grained gravel, decreased coarse grained sand below 1.57 m.				S4	40		
	2			- Moist to wet, trace to some wood fibres below 2.03 m. - Grain Size Distribution: Gravel (0.0%), Sand (5.8%), Silt (46.0%), Clay (48.2%) at 2.03 m.				S5	70		
224				- Grey to black below 2.69 m.				S6	100		
	3	10		- Damp, trace silt seams (1 mm thick) below 3.05 m.				S7	40		
223				- Firm, trace silt nodules (2-4 mm diameter) below 3.56 m.				S8	100		
	4							S9	100		
222		15		- Moist, increased silt content below 4.42 m. - No recovery from 4.57 m to 5.08 m.							
	5			- Trace gypsum nodules (3-10 mm diameter) at 5.08 m.				S10	100		
221				- Increased gypsum nodules from 5.77 m to 5.89 m.				S11	100		
220.1	6	20		**SILTY CLAY** - Grey, moist, soft to firm, high plasticity, some silt, trace sand, trace gypsum nodules.		6.3		S12	100		
220				- Grain Size Distribution: Gravel (0.0%), Sand (0.1%), Silt (10.7%), Clay (89.2%) at 6.10 m. - Gypsum seam (1 mm thick) at 6.25 m. - Decreased gypsum content below 6.26 m. - Possible slickenside at 6.42 m.		6.5		S13	100		

SAMPLE TYPE ▮ Split Barrel

CONTRACTOR Paddock Drilling Ltd.
INSPECTOR C. FRIESEN
APPROVED DEA
DATE 11/30/10

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HOLE NO. **TH10-01**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
219				- Trace gypsum nodules (2-10 mm diameter), trace silt nodules (2-5 mm diameter) at 6.60 m.
				- Decreased gypsum content below 7.11 m.
	8	25		
218				- Soft below 8.13 m.
				- Increased silt nodules (1-3 mm diameter), trace medium grained sand between 8.63 m and 9.14 m.
	9	30		
217				- Decreased medium grained sand below 9.14 m.
216.2	10			**SILT TILL** - Light brown, moist, firm, no plasticity to low plasticity, trace fine grained gravel, trace fine to coarse grained sand.
216		35		- Moist to wet below 10.36 m.
	11			
215				- Increased moisture content, some fine to coarse grained sand below 11.18 m.
				- 50 mm gravel at 11.63 m.
214.3				- 50 mm of medium grained sand at 11.68 m, dense silt till below 11.73 m.
	12	40		**AUGER REFUSAL AT 11.89 m.**
214				Notes: 1. Water level at 4.57 m below grade at end of drilling. 2. Water level at 2.29 m below grade 20 minutes after end of drilling. 3. Installed PN 033747 to a depth of 9.60 m below grade. 4. Installed PN 033749 to a depth of 6.40 m below grade. 5. Installed slope inclinometer to a depth of 11.89 m with a stickup of 1.02 m. 6. Pushed plug from 4.57 m to 5.08 m due to small sample diameters from 2.03 m to 4.57 m. 7. Backfilled test hole with bentonite slurry mixture from 11.89 m to 1.52 m and bentonite chips from 1.52 m to grade.
	13			
213		45		
	14			
212				
	15	50		
211				

PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %
			S14	100
			S15	100
			S16	100
			S17	100
	9.5		S18	100
	9.7		S19	100
			S20	40
			S21	70
			S22	65
			S23	50
	11.9		S24	75

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

SAMPLE TYPE ◧ Split Barrel

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	C. FRIESEN	DEA	11/30/10

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SUMMARY LOG

HOLE NO. **TH10-02**

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT 2010 Outfall Repair Program
SITE Burrows Avenue Outfall
LOCATION Toe of Upper Slope
DRILLING METHOD 125 mm ø Solid Stem Auger, RM 30 Track Mount

JOB NO. 10-0107-18
GROUND ELEV. 226.23 m
TOP OF PVC ELEV. 227.25 m
WATER ELEV.
DATE DRILLED 10/12/2010
UTM (m) N 5,530,716
E 634,373

ELEVATION (m)	DEPTH (m)	DEPTH (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 LL %
226				**CLAYEY SILT** - Brown, damp, firm, low plasticity, trace rootlets, trace organic material.							
225.2	1			**SILTY CLAY** - Brown, damp, firm to stiff, intermediate plasticity, trace oxidation, trace rootlets, trace fine grained gravel, trace fine to coarse grained sand.							
225		5		- Piece of wood at 1.57 m. - Firm, decreased fine grained gravel, decreased coarse grained sand below 1.57 m.							
	2			- Moist to wet, trace to some wood fibres below 2.03 m.							
224				- Grey to black below 2.69 m.							
	3	10		- Damp, trace silt seams (1 mm thick) below 3.05 m.		3.0					
223				- Firm, trace silt nodules (2-4 mm diameter) below 3.56 m.							
	4										
222		15		- Moist, increased silt content below 4.42 m. - No recovery from 4.57 m to 5.08 m.							
	5			- Trace gypsum nodules (3-10 mm diameter) at 5.08 m.							
221				- Increased gypsum nodules from 5.77 m to 5.89 m.							
220.1	6	20		**SILTY CLAY** - Grey, moist, soft to firm, high plasticity, some silt, trace sand, trace gypsum nodules.							
220				- Gypsum seam (1 mm thick) at 6.25 m. - Decreased gypsum content below 6.26 m. - Possible slickenside at 6.42 m. - Trace gypsum nodules (2-10 mm diameter), trace silt nodules (2-5 mm diameter) at 6.60 m.							

SAMPLE TYPE

CONTRACTOR Paddock Drilling Ltd.
INSPECTOR C. FRIESEN
APPROVED DEA
DATE 11/30/10

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SUMMARY LOG

HOLE NO. **TH10-02**

ELEVATION (m)	DEPTH (m)	DEPTH (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 LL %
219				- Decreased gypsum content below 7.11 m.						20 40 60	20 40 60 80
	8	25		- Soft below 8.13 m.							
218				- Increased silt nodules (1-3 mm diameter), trace medium grained sand between 8.63 m and 9.14 m.							
	9	30		- Decreased medium grained sand below 9.14 m.							
217						9.8					
216.3	10			**SILT TILL** - Light brown, moist, firm, no plasticity to low plasticity, trace fine grained gravel, trace fine to coarse grained sand.							
216		35		- Moist to wet below 10.36 m.							
	11										
215				- Increased moisture content, some fine to coarse grained sand below 11.18 m.		11.3					
				- 50 mm gravel at 11.63 m.							
	12			- 50 mm of medium grained sand at 11.68 m, dense silt till below 11.73 m.		11.9					
214.0 214		40		**AUGER REFUSAL AT 12.19 m.**		12.2					
	13			Notes: 1. Stratigraphy has been projected approximately 1.57 m south from TH10-01. 2. Installed Casagrande standpipe piezometer to a depth of 12.19 m with a stickup of 1.02 m. 3. Backfilled test hole with silica sand from 12.19 m to 11.28 m, bentonite chips from 11.28 m to 9.75 m, cuttings from 9.75 m to 3.05 m and bentonite chips from 3.05 m to grade.							
213											
		45									
	14										
212											
	15										
211		50									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	C. FRIESEN	DEA	11/30/10

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SUMMARY LOG

HOLE NO. **TH10-03**

CLIENT CITY OF WINNIPEG - WATER AND WASTE DEPARTMENT
PROJECT 2010 Outfall Repair Program
SITE Burrows Avenue Outfall
LOCATION Lower Bank
DRILLING METHOD 200 mm ø Hollow Stem Auger, RM 30 Track Mount

JOB NO. 10-0107-18
GROUND ELEV. 225.71 m
TOP OF PVC ELEV. 226.73 m
WATER ELEV.
DATE DRILLED 10/13/2010
UTM (m) N 5,530,719
E 634,388

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
225.2				**CLAYEY SILT** - Brown, damp to moist, firm, low plasticity, trace rootlets, trace organic material.		S1	60		
225	1	5		**SILTY CLAY** - Brown, moist, stiff, intermediate plasticity, trace fine grained gravel, trace medium to coarse grained sand, trace silt nodules (2 to 5 mm diameter) below 0.51 m.		S2	75		
				- Firm, trace fine grained sand below 1.01 m.		S3	50		
224	2	10		- Stiff, high plasticity, trace silt nodules (1-4 mm diameter), trace fine grained gravel, trace fine to coarse grained sand, trace rootlets at 1.57 m.		S4	85		
				- Firm, decreased sand and gravel below 2.03 m.		S5	72.5		
223	3	10		- 60 mm piece of wood at 2.46 m. - No recovery from 2.54 m to 3.05 m. - 25 mm organic layer at 3.05 m.		S6	100		
222.1				**SILTY CLAY** - Grey, moist, firm to soft, high plasticity, with silt, trace sand, trace silt nodules.		S7	75		
222	4	15		- Trace fine grained sand at 3.56 m. - Grain Size Distribution: Gravel (0.0%), Sand (7.6%), Silt (26.0%), Clay (66.4%) at 3.56 m.		S8	100		
221	5	15		- Soft, trace silt nodules (1-10 mm diameter) below 4.57 m.		S9	100		
						S10	100		
220	6	20		- Increasing moisture content with depth, trace fine grained gravel, trace coarse grained sand below 5.64 m.		S11	100		
				- Decreased gravel and sand below 6.10 m.		S12	100		
219						S13	100		

SAMPLE TYPE ▮▮ Split Barrel

CONTRACTOR Paddock Drilling Ltd.
INSPECTOR C. FRIESEN
APPROVED DEA
DATE 11/30/10

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KGS GROUP

SUMMARY LOG

HOLE NO. **TH10-03**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
218	8	25		- Reduced silt nodules below 7.87 m.		S14	100		
						S15	100		
217	9	30		- Grain Size Distribution: Gravel (0.0%), Sand (0.5%), Silt (19.7%), Clay (79.8%) at 8.64 m. - No silt nodules below 8.74 m.		S16	100		
						S17	100		
				- Trace silt nodules (2-5 mm diameter) below 9.40 m.		S18	100		
216.1									
216				**SAND** - Brown, wet, loose, fine to medium grained, trace silt, trace coarse grained sand.		S19	60		
215.7	10			**SILT TILL** - Light grey, wet, soft, non-plastic, trace fine to coarse grained sand, trace fine grained gravel.		S20	71		
215.2				**AUGER REFUSAL AT 10.52 m.**					
215	11	35		Notes: 1. Installed slope inclinometer to a depth of 10.52 m with a stickup of 1.03 m. 2. Backfilled test hole with bentonite slurry mixture from 10.52 m to 1.52 m and bentonite chips from 1.52 m to grade.					
214	12	40							
213	13								
212	14	45							
211	15	50							

SAMPLE TYPE ▮▮ Split Barrel

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	C. FRIESEN	DEA	11/30/10

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