GEOCRES No.
30L14-9B

THE ST. LAWRENCE SEAWAY AUTHORITY
WELLAND CHANNEL RELOCATION
TOWNLINE ROAD/RAIL TUNNEL

GEOTECHNICAL INVESTIGATIONS AND CONSIDERATIONS

APPENDIX "B"

H. G. ACRES & COMPANY LIMITED
CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

OCTOBER 1969

THE ST. LAWRENCE SEAWAY AUTHORITY

Welland Channel Relocation
Townline Road/Rail Tunnel

GEOTECHNICAL INVESTIGATIONS AND CONSIDERATIONS

Appendix "B"

TABLE OF CONTENTS

EXPLANATION OF THE FORM

OF

DRILLING REPORTS AND FIELD BOREHOLE LOGS

LOCATION ..... All boreholes have been surveyed by SLSA and are referred to one or four control grids as noted below:

1. 6^{o} Universal Transverse Mercator grid, e.g., BH No. 153; 37,500N; 11,307E;
2. 3^{o} Universal Transverse Mercator grid, e.g., BH No. 155; 15,609,777N; 1,076,021E;
3. Contract 863 grid with Canal - Tunnel intersection defined as 150+00 and increasing Chainage to the west along tunnel centreline, e.g., BH No. 146; 129+59 254 feet south of centreline;
4. Existing Welland Canal grid with increasing Chainage to the south, e.g., BH No. 179; 975+10 8 feet west of existing canal bank.

DATUM ..... All elevations are referred to the Canadian Geodetic Datum, 1966.

DEPTH ..... All depths are given in feet.

SAMPLE SIZE ..... Dimension is in inches and refers to the nominal diameter of the sampler.

SAMPLE RET'D ..... Indicates the length in inches of sample recovered in the sampler.

PENETRATION TEST ..... The value given is the number of blows of a 140-pound weight falling freely 30 inches, required to advance the sampler. Where a 2-inch diameter split spoon sampler is used, this test is carried out in accordance with the "Standard Penetration Test Procedure."

"Pushed" indicates that the sample tube was pushed into the soil by means of the hydraulic cylinder of the drill at the hydraulic pressure shown.

"Hammer" indicates that the sample tube was advanced by the 140-pound weight without recording the number of blows.

WATER PRESSURE TEST .....

1. Units for quantity of water pumped are in imperial gallons.
2. Length of test section is 5 feet unless otherwise noted.

VANE TEST .....

1. Torque assembly used is as noted and is one of the following:
   (a) Acker precision head
   (b) Geonor Vane Borer NR219
   (c) 25 and 50-lb spring balances.
2. Vane numbers are noted, where applicable.
3. Natural shear strength is determined by rotating the vane at a rate of 1 degree per 10 seconds.
4. Soil is subsequently remolded by rapidly rotating the vane through six complete revolutions, and the test is repeated to determine remolded shear strength.

FIELD BOREHOLE LOGS

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 101 SHEET No. 1 OF 5
PROJECT Welland Rail/Road Tunnel WEATHER INSPECTOR R.F. Stewart
SITE TEMP. °F STARTED 1630 HRS. Dec.14 1967
LOCATION N-37363 (LATITUDE) 4500E (DEPARTURE) BEARING DIP 90 ° FINISHED 1620 HRS. Dec.21 1967
CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.
METHOD OF BORING: SOIL Power Auger (Penn) CASING DIAM. DRILL PLATFORM
ROCK CORE DIAM. GROUND SURFACE 582.1
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR
** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		1							
		2							
		3							
		4							
		5							
	Fill - grey green mottled silty clay.	6		BO	1	3	14	625	P.S.I. @ Hydraulic Head
	Dry with some organics.							625	
	Firm.	7						625	
		8							
								750	Lift Mach. Use hammer
	As Above.	9		BO	2		24	24	blows
								65	
		10						55	
		11							
	Tan and brown silty clay and clayey silt with organic. Dry. Fill?	12		BO	3		24	750	
								750	
		13						750	
								750	
		14							
	Olive drab clayey silt with grey	15		BO	4		24	250	
								275	
	pockets and seams. Slightly desiccated.	16						350	
								525	
	Firm.	17							
	Grey and reddish brown clay and silt	18		BO	5		24	250	
								275	
	Layered, firm not desiccated.	19						500	
								525	
		20							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 101 SHEET No. 2 OF 5

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown clay							100	P.S.I.
	and silt with red	21		BO	6	3	24	125	
	seams and grey pockets.							175	
	Soft	22						250	
		23							Pushed Easily
	Silty clay.			CO	7	3	18		
		24							
		25							
	Greyish brown clayey								Dec. 18 Pushed easily.
	silt. Mottled. Soft.	26		CO	8	3	18		
		27							
	As above with	28							
	occasional fine sub-			CO	9	3	18		Dec. 18 Pushed easily.
	angular gravel.	29							
		30							
	As Above.								Dec. 18 Pushed easily.
		31		CO	10	3	17		
		32							
	Greyish brown and	33							
	reddish brown layered			CO	11	3	18		Dec. 18 Pushed easily.
	clay and silt. Soft.	34							
	(Varved)	35							
	As Above	36		CO	12	3	17½		Dec. 18 Pushed easily.
		37							
		38							
	As Above			CO	13	3	18		Dec. 18 Pushed easily.
		39							
		40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S. L. S. A. JOB No. 1684 HOLE No. 101 SHEET No. 3 OF 5
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: M - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown clayey silt. Soft	41		CO	14	3	14		Pushed by hand
		42							with some effort
									Sample damaged by
	As above with grey	43							stone.
	silt seam at end of			CO	15		16		As Above (no damage)
	sample. Layered	44							Lost sample below
		45							silt seam
	As above. Slightly								Dec. 19
	mottled	46		CO	16		18		Pushed easily
		47							
	As Above	48							
				CO	17		18		As Above
		49							
		50							
	As Above								
		51		CO	18		18		As Above
		52							
	Reddish brown silt								
	with small greyish	53							
	brown clay pockets.			CO	19		18		Pushed easily
	Soft and very moist	54							Partly by own weight
		55							Hole caved in at 45'
	Reddish brown and								
	greyish brown mottled								
	clayey silt with grey	56		CO	20		18		As Above
	silt pockets. Soft								
		57							
		58							Rods sank 5' by own
	As above but								
	layered (Varved)			CO	21		16		weight
		59							Hole caved in @ 52'
		60							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS

NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 101 101B SHEET No. 4 OF 5

PROJECT WEATHER INSPECTOR

SITE TEMP. °F STARTED .M. 19

LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19

CONTRACTOR ELEVATIONS: DATUM

METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM

ROCK GROUND SURFACE

CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown clay								
	and silt. Layered,	61		CO	22	3	15		Pushed easily
		62							
	Greyish brown silt	63							December 20. Water at 20'
	with some clay layers.			CO	23		16		Cave-in at 40'.
	Dilatant, soft.	64							Moved Drill 3 1/2' West
		65							CO-23 first sample in
	Reddish brown silt								Hole 101-B
	with some clay-Layers	66		CO	24		12		
		67							Sample partly disturbed
									Water at 23'
	Reddish brown	68		CO	25		9		Trouble with piston
	dilatant silt	69							sampler.
									Dec. 21 Water at 21'
		70							Cave-in at 65'.
	Reddish brown silt								
	Wet. Reddish brown	71		CO	26		13		
	and greyish brown								
	clayey silt pockets.	72							
	Soft								
	Reddish brown dilatant	73							
	silt with small pockets			CO	27		13½		Pushed easily
	of fairly dry silt	74							
	or clayey silt								
		75							
	Dilatant silt	76		CO	28		0		Lost sample twice
		77							
		78							
		79							
		80							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 101 / 101B SHEET No. 5 OF 5

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	SAMPLE ##	TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown				EQ	29				
	fine sand and silt	81			CO	30		13½		
	Traces of clay									
		82								
		83								
		84								
	As Above	85			EQ	31				Hole abandoned
		86								
		87								
		88								

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 102B SHEET No. 1 OF 3

PROJECT Welland Rail/Road Tunnel WEATHER INSPECTOR Stewart

SITE TEMP. °F STARTED 730 M. Jan. 8 19 68

LOCATION N37495 E5174 (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED 1200 M. Jan. 17 19 68

CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM

METHOD OF BORING: SOIL Mod. Wash CASING DIAM. NX 106 DRILL PLATFORM

ROCK Diamond Drill BX GROUND SURFACE 577.9

CORE DIAM. BX WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	SAMPLE No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	From 0-100' see Borehole 102							6	Dec. 7 Hole caved in
	Hole 102	101		AQ	39		12	2	at 85'. Lost augers,
	Sample resumed at							3	abandoned hole
	102B	102							
	Reddish Brown fine								
	dilatent sand	103						15	
				AQ	1		6	15	
		104						16	
								23	
		105							
	Reddish brown till			AQ	2		12	48	
	like silty sand with	106						150	
	med. coarse sand and								Used core barrel to
	angular chips upto	107							penetrate this dense
	1-1/2" fairly dense								till. Reddish brown
		108		DQ	3			16	silty clay with dry
				DQ	4			35	silt seams. Traces of
	As above with clayey	109						49	med. sand stiff pliable
	silt			AQ	5		24	86	AQ5 disturbed down to
	Reddish brown silt	110							108½' by core barrel
	with clay to approx.							11	
	110½. Not very moist	111						68	
	Pliable & tough below			AQ	7		16	100	
	110½. Reddish brown to	112							
	greyish brown clayey								
	silt & fine sand with	113						60	
	angular & subangular							123	
	gravel up to 1-1/4"	114		AQ	8/9		16	100	
								135	
	Grey clayey silt and	115							
	fine sand. Till like							55	
	with angular & Subang	116		AQ	10		6	40	
	gravel up to 1/1/4"							35	
		117						37	
	As above	118						19	
								70	
		119						100	RX barrel to clear
									out hole
		120							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 102 SHEET No. 2 OF 3

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....
(LATITUDE) (DEPARTURE)

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Top of bedrock 120'	121							
	Bentonite seal from 119' to 121'10"	122							
	Sand backfill to 121'-10"	123							
		124							
		125							
		126							
	Piezometer tip	127							
	Sand backfill to 127'	128							
		129							
		130							
		131							
		132							
		133							
		134							
		135							
	End of hole	136							
		137							
		138							
		139							
		140							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: St. Lawrence Seaway Authority — JOB No. 1684

PROJECT: Welland Rail/Road Tunnel — HOLE No. 102B

SITE: Welland, Townline Road — SHEET No. 3 OF 3

Torque Assembly: Acker Precision Head

Vane No.: 246

RESULTS OF VANE TESTS

Elevation (Feet)	Shear Strength P.S.F. Natural	Remoulded	Sensitivity
558.1	984	176	5.6
556.1	734	147	4.9
554.1	945	188	5.0
552.1	554	158	3.5
550.1	1,110	394	2.9
548.1	1,020	94	10.3
545.6	364	129	2.8
544.1	846	364	2.3
542.1	1,210	645	1.9
540.1	1,280	235	5.4
538.1	1,305	259	5.0
536.1	695	352	2.0
534.1	940	330	2.9
532.1	715	342	2.1
530.1	905	318	2.8
528.1	810	400	2.0
526.1	1,035	341	3.0
524.1	716	447	1.6
522.1	904	540	1.7
520.1	1,200	588	2.0
518.1	1,360	505	2.7
516.1	1,305	620	2.1
514.1	950	705	1.4
512.1	318	118	2.7
510.1	-	-	-
508.1	930	915	1.0
506.6	1,760	975	1.8
504.6	1,580	915	1.7

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION N-37,547 E9,490 (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soil Invest.
METHOD OF BORING: SOIL Auger ROCK

JOB No. 1684 HOLE No. 106-C SHEET No. 1 OF 1
WEATHER INSPECTOR D.S.
TEMP. °F STARTED 1300 M. Sept. 29 19 67
DIP 90 ° FINISHED 1500 M. Sept. 29 19 67
ELEVATIONS: DATUM GSC
CASING DIAM. DRILL PLATFORM
GROUND SURFACE 577.6
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Samples are only taken at the depths where the Sampler failed in hole B-106A								
		16							
	Grey & Reddish Brown Mottled Clay & Silt Med. Soft	17		CO	1	3	18"		
		18							
	Reddish Brown Clayey Silt-slightly softer	19		BO	2	3	18"		Piston Equipment Removed for BO.2,3
		20							Tube Pushed Hydraulicly
	As above with occasional grey silt pockets	21		BO	3	3	18"		
		22							
	22' end of hole								

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION 37.590N (LATITUDE) 10.186E (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils
METHOD OF BORING: SOIL Mod. Wash Boring; ROCK Diamond Drill

JOB No. 1684 HOLE No. 107-B SHEET No. 1 OF 3
WEATHER INSPECTOR D.S.
TEMP. °F STARTED 13.20 M. Oct. 11 19 67
DIP ° FINISHED M. Oct. 19 19 67
ELEVATIONS: DATUM GSC
CASING DIAM. NX DRILL PLATFORM
GROUND SURFACE 569.9
CORE DIAM. NXL WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		81							This hole is 10 ft. north of hole 107
		82							Casing in 107 was Bent. & Rock Couldn't
		83							be drilled thru this
		84							casing. Also, till area still, could be sampled
		85							better.
		86							
		87							
		88							
	Reddish Brown Silty Clay	89		BO	1	3	11½		
	Dilatant Silty Sand	90							
	Reddish Brown Dilatant Silt with traces of clay some silt pockets	91		BO	2		24		Hard to push
		92							
		93							Very difficult to reach
	As above	94		BO	3		9-1/2		Piezometer tip at 93'
		95							
	Silt and clay Dilatant Silt	96		AQ	4		24	4 2	
	Greyish Red Silty Clay turning to	97		AQ	5				
	reddish brown silty clay till-like silty	98							
	sand with fine gravel below 97 As above	99		AQ	6		12-1/2	8 12 16	
	Gravel is increasing in size to 1/2"	100							

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 107-B SHEET No. 2 OF 3

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish Brown Till							32	Oct. 13
	Silty Sand & some clay	101						21	Try to over-fill the
	Gravel angular to			AQ	7		8	15	Split spoon sampler in
	rounded up to 1/2"	102						22	order to obtain
								14	more sample
	As Above	103		AQ	8		6	42	
	Gravel up to 2"							51	Damaged bit
		104						80	
	Clean clay							14	
	As Above	105		AQ	9		11	25	Possible boulder
								38	
		106						80	
	As Above							17	
		107		AQ	10		13	52	
					11			100	
		108							
	As Above			AQ	12		11½	13	
		109			13			69	Casing does not
								100	wash further down
		110							boulder
	Grey till like mat'l			AQ	14		3	80	
	silty for some with	111						100	(3")
	gravel (angular)			DQ	15		"		Sampled by drilling
	round as above	112		AQ	16		3		core barrel
	Gravel up to 1½"								
		113		DQ	17		10		
	As Above								
	Gravel and cobbles.	114							
				AQ	18		5	72	
		115						100	
	As Above	116							
				DQ	19		10		
		117							
		118							
	As Above								Drill penetration
		119		DQ	20		11		irregular as if
									drilling trough
		120							layers

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 107-B SHEET No. 3 OF 3
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR
** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Till	121	X	DQ	20				See Sheet 2
	Coarse gravel								Fine mat'l washed out.
	There may be clay	122	X	DQ	21				Washing of casing
	layers								very easy
	Bedrock at 122.5'	123							
		124							Seal
		125							
		126							
		127							
		128							
		129							
		130							
		131							
		132							
		133							Piezometer tip
		134							
		135							
		136							
		137							
		138							
		139							
		140							

COMPLETE IN DUPLICATE 155.5' End of hole FORM 176

H. G. ACRES & COMPANY LIMITED – CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 109B SHEET No. 1 OF 2
PROJECT Welland Rail/Road Tunnel WEATHER INSPECTOR R. OSBORNE
SITE TEMP. °F STARTED 0800 .M. Oct.12 19 67
LOCATION N37505 (LATITUDE) E12147 (DEPARTURE) BEARING DIP 90 ° FINISHED 1300 .M. Oct.12 19 67
CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.
METHOD OF BORING: SOIL Auger CASING DIAM. None DRILL PLATFORM
ROCK GROUND SURFACE 583.9
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE, B - THIN WALL TUBE, C - PISTON SAMPLER, D - CORE BARREL, E - AUGER, F - WASH, K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT, O - TUBE, P - WATER CONTENT TIN, Q - GLASS JAR, R - CLOTH BAG, S - PLIOFILM BAG, Y - CORE BOX, Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. / DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT, ETC.
									16 feet to 61 feet
		0							vane test
	Brownish silty								Unusual behaviour of vane
	clayey sand with	61		AQ	1		7		during testing made it
	sub-angular gravel								necessary to take test.
	up to 3/4"	62							Vane sand by own weight
	1-1/2" sub-angular								and no failure occured.
	gravel. Brownish	63		AQ	2		14		
	silty clayey sand								
	with sub-angular	64							
	gravel								Soft 1" layer at 63'.
		65							Wet

See Vane test results on next sheet

COMPLETE IN DUPLICATE FORM 176

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT St. Lawrence Seaway Authority JOB No. 1684

PROJECT Welland Rail/Road Tunnel HOLE No. 109B

SITE Welland, Townline Road SHEET No. 2 OF 2

Torque Assembly: Acker Precision Head

Vane No.: 246

RESULTS OF VANE TESTS

Elevation (Feet)	Shear Strength P.S.F. Natural	Remoulded	Sensitivity
567.3	2,090	547	3.8
564.8	1,105	283	3.9
562.3	892	294	3.0
559.8	752	211	3.5
557.3	999	300	3.3
554.8	759	317	2.4
552.3	541	353	1.5
549.8	752	371	2.0
547.3	763	327	2.3
544.8	917	346	2.6
542.3	-	400	-
539.8	892	318	2.8
537.3	928	341	2.7
534.8	1,056	356	3.0
532.3	1,062	294	3.6
529.8	-	-	-
527.3	1,104	294	3.8
524.8	741	541	1.4
522.1	-	306	-
520.3	-	-	-

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 112 SHEET No. 1 OF 6
PROJECT Welland Rail/Road Tunnel WEATHER INSPECTOR R.F. Stewart
SITE 10 565 E 37 494 N TEMP. °F STARTED 1630 .M. Oct. 20 19 67
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP 90 ° FINISHED .M. 19
CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.
METHOD OF BORING: SOIL Mod. Wash Boring CASING DIAM. NX DRILL PLATFORM
ROCK Diam. Drill. GROUND SURFACE 577.0
CORE DIAM. NX WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		1		NOTE:		MAJOR PURPOSE OF THIS			
		2				HOLE IS PROBING OF BEDROCK			
		3							
		4							
		5							
		6							
		7							
		8							
	Brown silt with grey clayey silt veins and traces of coarse sand.	9		AQ	1		24	11	
		10		AQ	2			16	
		11						20	
		12						30	
		13							
		14							
	Reddish brown clayey silt. Dense and rather dry.	15		AQ	3		18	5	
		16						6	
		17						7	Lost Wash Water
		18						8	
		19							
		20							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1654 HOLE No. 112 SHEET No. 2 OF 6
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		21							
		22							
		23							
	Well rounded 2" stone	24							Water Flows from Casing
	plugged sampler.								
	Brown silt with grey	25	X	AQ	4			10	
	silt pockets and seams		X				18	11	
	Dense and rather dry	26	X	AQ	5			15	
	Grey medium sand in								
	seams	27							
		28							
		29							
		30							
		31							
		32							
		33							
		34							
		35							
		36							
		37							
		38							
		39							
		40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1284 HOLE No. 112 SHEET No. 3 OF 6

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: - SILT - SAND - CLAY - GRAVEL

* SAMPLE CONDITION: - GOOD - DISTURBED - FAIR - LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		41							
		42							
		43							
		44							
	Reddish brown clayey silt. Firm	45	X	B	6	3	24	Pushed easy	
		46							
		47							
		48							
		49							
		50							
		51							
		52							
		53							
		54							
		55							
		56							
		57							
		58							
		59							
		60							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. [illegible] HOLE No. 112 SHEET No. 4 OF 6
PROJECT ... WEATHER ... INSPECTOR ...
SITE ... TEMP. ... °F STARTED ... .M. ... 19...
LOCATION ... (LATITUDE) (DEPARTURE) BEARING ... DIP ... ° FINISHED ... .M. ... 19...
CONTRACTOR ... ELEVATIONS: DATUM ...
METHOD OF BORING: SOIL ... CASING DIAM. ... DRILL PLATFORM ...
ROCK ... GROUND SURFACE ...
CORE DIAM. ... WATER LEVELS ...

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR
** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		61							
		62							
		63							
		64							
	Reddish brown clayey silt.	65		BO	7	3	24	Pushed easy	
		66							
		67							
		68							
		69							
		70							
		71							
		72							
		73							
		74							
	Reddish brown clayey silt with greyish and reddish seams. Varved	75		BO	8	3	20	Pushed easy	
	Reddish brown fine sand and coarse silt. Medium soft.	76							
		77							
		78							
		79							
		80							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 112 SHEET No. 5 OF 6
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR
** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT, ETC.
		81							Bentonite seal at 80'
		82							
		83							
		84							
	Reddish brown dilatent			B	9				Pushed easily
	coarse silt and fine	85		AQ	9		18		Lost Sample
	sand. 3" layer of								Re-sampled with
	laminated silt/fine	86							Split Spoon
	sand at 85'. Last 3"							13	
	sloppy till-like mat'l	87		AQ	10		6	13	
	Gravel in till is							10	
	angular and rounded.	88						10	
								13	
		89		AQ	11		10	20	Wash Material in
	As Above							30	sampler consists
		90						20	largely of rather sharp
	As Above and 1 1/2"			AQ	12		6	63	1/4 gravel. Predominantly
	Stone	91						100	Lime Stone.
		92							
	As Above	93		FQ	13				
		94							
	Most likely all							43	Lost ample.
	gravel or as above.	95		A	14		0	80	
	3" bottom piece			AQ	14		3	57	Sampler fitted with trap
	of AQ14 contains fine	96						89	
	silty sand.								
		97							
		98							
		99		A	15		0	100	Lost Sample
		100							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS

NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 112 SHEET No. 6 OF 6

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK .... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Mixture of some gravel and boulders	101							
	Very hard to penetrate. Gravel sub-angular and rounded	102		DQ	15				Piezometer tip at 101', 2 notches in plastic tubing.
		103							
		104							
	Bedrock.	105							Some caving in
		106							Bentonite seal at 105' Drilling very difficult
		107							
		108							
		109							Piezometer tip at 108' (marked with one notch in plastic tubing)
		110							
		111							
		112							
		113							
		114							
		115							
		116							Risk of loosing core barrel due to cave-in
		117							End of Hole at 115.5'
		118							
		119							
		120							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE Shaft Probe Holes
LOCATION 36,972 W (LATITUDE) 9,955 E (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils
METHOD OF BORING: SOIL Auger ROCK

JOB No. 1684 HOLE No. 113 SHEET No. 1 OF 1
WEATHER Sunny, Fair INSPECTOR J. A. S.
TEMP. °F STARTED 1600 M. Oct. 24 19 67
DIP ° FINISHED M. Oct. 25 19 67
ELEVATIONS: DATUM
CASING DIAM. DRILL PLATFORM
GROUND SURFACE 569.01
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR
** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		10							
		20							
		30							
		40							
		50							
		60							Hole caved in overnight.
		70							
	Probably dilatant sandy silt	80							
		90							
	Till Gravel and boulders	100							Difficult to penetrate
									End of Hole

Note: Purpose of this hole is to determine the depth to bedrock. Below 105' the risk of a stuck auger became high and the drilling was terminated.

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE Pump Test
LOCATION N-36,979 E-9987 (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils
METHOD OF BORING: SOIL Mod. Wash Boring; ROCK Diamond Drill

JOB No. 1684 HOLE No. 115 SHEET No. 1 OF 1
WEATHER INSPECTOR R.OSB
TEMP. °F STARTED 0730 M. Nov.7 19 67
DIP 90° FINISHED 1400 M. Nov. 10 19 67
ELEVATIONS: DATUM G.S.C.
CASING DIAM. NX DRILL PLATFORM
CORE DIAM. NXL GROUND SURFACE 568.6
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		10							Note: Instruction to Drillers Was To Obtain Samples Only If Different Horizon Was Discovered From Wash Water or Other Drill Behaviour
	Desiccated	20							
		30	X	AQ	1				
	Clayey silt	40							
		50							
		60							Bentonite Seal 67'
		70							
	Dilatant silt	80	X	AQ	2				
		90							
	Till		X	AQ	3				
		100							Interconnection with Hole 114
		110							Cave-in at 112'
	Bedrock 110' - 2"	120							Bentonite Seal 108'5" - 111' Piez. Tip at 119'4"
	126' End of Hole	130							Water comes to surface slightly salty
		140							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 115.I SHEET No. 1 OF 6
PROJECT Welland Rail/Road Tunnel WEATHER INSPECTOR R.D.Sb
SITE 50 N. of Pump Well TEMP. °F STARTED 1330 M. Nov. 15 19 67
LOCATION 36,984 N 9,972 E (LATITUDE) (DEPARTURE) BEARING DIP 90 ° FINISHED 1500 M. Nov. 21 19 67
CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.
METHOD OF BORING: SOIL CASING DIAM. NX DRILL PLATFORM
ROCK NXL Diamond Drill GROUND SURFACE 568.59
CORE DIAM. NXL WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		1							
		2							
		3							
		4							
		5							
	Brown and greyish brown silty clay; Stiff and hard	6	X	AZ	1		20	5 7 19 30	
		7							
		8							
		9							
		10							
	Same As Above	11	X	AQ	2		20	7 8	
		12		(2 jars)				10 10	
		13							
		14							
		15							
	Same As Above	16	X	AQ	3		22	3 4 6 7	
		17							
		18							
		19							
		20							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 115.I SHEET No. 2 OF 6

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... CORE DIAM. ..... GROUND SURFACE 568.6

WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Brown and dark grey silty clay rather stiff and dry	21		AQ	4		24	2	
								3	
		22						6	
								7	
		23							
		24							
		25							
	Brown grey clayey silt rather stiff and dry	26		A	5			3	
								4	
								6	
		27						9	
		28							
		29							
		30							
	Same as above, but softer	31		A	6			2	
								3	
								4	
		32						5	
		33							
		34							
		35							
	Varved clay? Very soft reddish brown clay and silt	36		A	7			0	
								2	
								2	
		37						2	
		38							
		39							
		40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 115.I SHEET No. 3 OF 6

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... CORE DIAM. ..... GROUND SURFACE .....

WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	SAMPLE ** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Varved clay. Very soft reddish brown clay and silt. Richer in silt. Varves are contorted	41	X	A	8		24	1 1 3 4	
		42							
		43							
		44							
		45							
	Reddish grey clayey silt	46	X	A	9		24	1 1 3 4	
		47							
		48							
		49							
		50							
	Same as above with some coarse	51	X	A	10		24	2 2 3	
		52							
		53							
		54							
		55							
	Same as above with some sand	56	X	A	11			2 2 4 4	
		57							
		58							
		59							
		60							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 115.I SHEET No. 4 OF 6

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ CORE DIAM. ____ GROUND SURFACE ____

WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown silty							2	
	clay. Reddish grey	61	X	A	12		24	2	
	clayey silt with grey							3	
	silt nodules.	62						3	
		63							
		64							
		65							
	Same As Above							2	
	More greyish	66	X	A	13		24	3	
		67						3	
								5	
		68							
		69							
		70							
	Wet clayey silt							2	
	Reddish with grey	71	X	A	14		24	3	
	clay layers							4	
	Varved	72						4	
		73							
		74							
		75							
	Wet reddish brown							2	
	clayey silt. Some 1/2"	76	X	AQ	15			3	
	rounded gravel							3	
		77						3	
		78							
		79							
		80							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 115.I SHEET No. 5 OF 6

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; H - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Brown reddish-brown							3	
	dilatant silt	81		AQ	16			4	
								4	
		82						5	
		83							
		84							
		85							
	Dilatant silt and							9	
	fine sand	86		AQ	17			7	
								6	
		87						5	
		88							
		89							
		90							
	Saturated silty sand							40	First Sample Lost
	and gravel (Rounded)	91						27	
	up to 3/4" "Till"			AQ	18			21	
		92						19	
		93							
		94							
		95							
	Very sharp angular			AQ	19		12	27	
	to flaky, medium to	96						36	
	coarse sand and fine							60	
	gravel	97							
				FQ	20				Wash Sample
	Fine sand and silt	98							
	sub-angular and			DQ	21				
	rounded boulders and	99							
	cobbles								
		100							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 115.I SHEET No. 6 OF 6
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE # TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		101							Hole above seal backfilled with Concrete/Bentonite mix
	Bentonite seal								
	Rounded and sub-angu-	102		DQ	22				
	lar boulders and								
	Cobbles	103							
		104							
		105							
		106							
		107							
	Same As Above			DQ	23				
		108		(2	jars)				
				DQ	24				Filter type Piezometer Tip installed in sand
		109							
	Piezometer Tip at 109'								
		110							
	Same As Above			DQ	25				
		111							
		112							
	Bentonite Seal 112'-114'	113							
		114							
		115							
	End of Hole	116							
		117							
		118							
		119							
		120							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION N-36,904 E-9,930 (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Wash Boring; ROCK Diamond Drill

JOB No. 1684 HOLE No. 116 SHEET No. 1 OF 1
WEATHER INSPECTOR R.OSB
TEMP. °F STARTED 0730 .M. Nov.9 19 67
DIP 90 ° FINISHED .M. Nov.15 19 67
ELEVATIONS: DATUM G.S.C.
CASING DIAM. NX DRILL PLATFORM
GROUND SURFACE 570.4
CORE DIAM. NXL WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR
** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		10							Note: Instruction to driller was to report and sample in areas where change of soils was suspected
		20							
		30							
	Brown silty clay		X	AQ	1				
	with small pockets	40							Note: Hole grouted with sand concrete and bentonite mix
	of grey silt?								
		50							
		60							
		70							
		80							
	Brownish silty clay		X	AQ	2			2,3,3,3	Nov. 10
	with some sandy silt	90							
	Till		X	AQ	3			23,27,25,24	
		100							
		110							Nov. 13
	Bedrock at 116'6"	120							Bentonite seal 115' - 118'
	Seal								Piez. tip at 122'1"
	Piez. tip	130							
	End of hole 130'-6"								

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION 36,897 N 9,927 E (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soil Investigation
METHOD OF BORING: SOIL
ROCK Power Auger

JOB No. 1684 HOLE No. 116-II SHEET No. 1 OF 1
WEATHER Rain INSPECTOR R.Osborne
TEMP. °F STARTED 700 M. Dec. 7 19 67
DIP 90 ° FINISHED 1500 M. Dec. 8 19 67
ELEVATIONS: DATUM G.S.C.
CASING DIAM. — DRILL PLATFORM
GROUND SURFACE 570.9
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		10							
		20							
		30							
		40							
		50							Back fill with grout
		60							
		70							
		80							
									Seal at 82'
	Sample sandy silt	90							
	with occasional clay								Piezometer at 89
		100							Depth, membrane type
									tip #60157.
									Intake white.

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION N36.900 E9.927 (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Power Auger (Penn Drill) ROCK

JOB No. 1684 HOLE No. 116-III SHEET No. 1 OF 1
WEATHER INSPECTOR R.OSB
TEMP. °F STARTED 930 .M. Dec. 8 19 67
DIP 90 ° FINISHED 1300 .M. Dec. 8 19 67
ELEVATIONS: DATUM G.S.C.
CASING DIAM. DRILL PLATFORM
CORE DIAM. GROUND SURFACE 570.4
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D. (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	For log see	10							
	Hole 116	20							
		30							Backfilled with grout
		40							
		50							
	Bentonite seal 56' -								
	57'-10" Piezometer tip	60							Membrane type tip
	at 59'. End of hole 61'								No. 0150C
		70							
		80							
		90							
		100							
		110							
		120							
		130							
		140							
		150							
		160							
		170							
		180							
		190							
		200							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 116-IV SHEET No. 1 OF 1
PROJECT Welland Rail/Road Tunnel WEATHER Cold INSPECTOR R. OSB
SITE 50' W of Pump Well TEMP. °F STARTED 0930 M. Nov. 24 19 67
LOCATION N-36,896 E-9,919 BEARING DIP 90 ° FINISHED 1430 M. Nov. 24 19 67
(LATITUDE) (DEPARTURE)
CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.
METHOD OF BORING: SOIL Auger CASING DIAM. DRILL PLATFORM
ROCK CORE DIAM. GROUND SURFACE 570.4
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
									No sampling
									This hole is to replace
									hole 116-X which was
									abandoned
	Concrete/Bentonite Backfill								
		40							
	Bentonite Seal	41							
		42							
		43							
	Membrane type Piezometer	44							
	Clean sand	45							
	Bottom of Hole	46							
		47							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 116-X SHEET No. 1 OF 6

PROJECT Welland Rail/Road Tunnel WEATHER INSPECTOR R.F.S.

SITE TEMP. °F STARTED 1500 HRS. Nov.15 1967

LOCATION 36,812N (LATITUDE) 9,766E (DEPARTURE) BEARING DIP 90 ° FINISHED 0800 HRS. Nov.24 1967

CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.

METHOD OF BORING: SOIL Auger CASING DIAM. DRILL PLATFORM

ROCK CORE DIAM. GROUND SURFACE 570.36

WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		1							
		2							
		3							
		4							
		5							
		6							
		7							
		8							
		9							
		10							
		11							
		12							
		13							
		14							
		15							
///	Reddish brown clayey silt with grey silt pockets & grey vertical thin seams. Firm & moist.	16	X	AZ	1			7 8 11	
		17							
		18							
		19							
		20							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT
PROJECT
SITE
LOCATION (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR
METHOD OF BORING: SOIL / ROCK

JOB No. 1684 HOLE No. 116-X SHEET No. 2 OF 6
WEATHER INSPECTOR
TEMP. °F STARTED .M. 19
DIP ° FINISHED .M. 19
ELEVATIONS: DATUM
CASING DIAM. DRILL PLATFORM
GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	As above but softer	21		AZ	2		18	2 3 3	
		22							
		23							
		24							
		25							
	As Above							1	
	with odd 1/2" pieces	26		AZ	3		18	2	
	of gravel							4	
		27							
		28							
		29							
		30							
	As Above							0	
		31		AZ	4		18	2	
								3	
		32							
		33							
		34							
		35							
	As Above. Slightly							0	
	more silty. One 1" piece	36		AZ	5		18	2	
	of gravel							2	
		37							
		38							
		39							
		40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT ..... JOB No. 1684 HOLE No. 116-X SHEET No. 3 OF 6

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....
(LATITUDE) (DEPARTURE)

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK .... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	As above	41	X	AZ	6		18	0 1 2	
		42							
		43							
		44							
		45							
	As above	46	X	AZ	7		18	1 2 2	
		47							
		48							
		49							
		50							
	As above. The layering hardly visible	51	X	AZ	8		18	0 2 3	
		52							
		53							
		54							
		55							
	As Above	56	X	AZ	9		18	0 2 4	
		57							
		58							
		59							
		60							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 116-X SHEET No 4 OF 6

PROJECT WEATHER INSPECTOR

SITE TEMP. °F STARTED .M. 19

LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19

CONTRACTOR ELEVATIONS: DATUM

METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM

ROCK GROUND SURFACE

CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D. (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	As Above	61	X	AZ	10		18	0 1 4	
		62							
		63							
		64							
		65							
	As Above with small grey silt	66	X	AZ	11		18	0 1 5	
		67							
		68							
		69							
		70							
	Reddish brown-grey silty clay with silt. Irregular pockets & layers	71	X	AZ	12		18	0 1 3	
	Some of the Silt Grey other Reddish (varved)	72							
		73							
		74							
		75							
	As above. Silt more predominant.	76	X	AZ	13		18	0 3 3	
		77							
		78							
		79							
		80							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT
SITE
LOCATION (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR
METHOD OF BORING: SOIL / ROCK

JOB No. 1684 HOLE No. 116-X SHEET No. 5 OF 6
WEATHER INSPECTOR
TEMP. °F STARTED .M. 19
DIP ° FINISHED .M. 19
ELEVATIONS: DATUM
CASING DIAM. DRILL PLATFORM
GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	As above with more regularity	81	X	AZ	14		18	0 2 3	Nov. 17
		82							
		83							
		84							
		85							
		86							
	Reddish brown silt & clay	87							
	Reddish Brown Clayey Silt (More Silt than above /87) becoming dilatant.	88	X	AZ	15		18	4 7 5	
		89							
		90							
	2" reddish brown silt & clay. Reddish brown clean silt & fine sand Dilatant 2" soft till-like mixture silt sand & gravel	91	X	AZ	16		18	5 1 2	
		92							
		93							
		94							Water comes to 1' ft below surface
		95							
	Clayey silty sand & gravel. Wet & soft. Above 95-1/2 larger gravel below up to 1"	96	X	AZ	17		6	7 20 29	
		97							
		98							Hole Starts Caving
	Reddish brown 98'-2" below that grayish with larger ang. stones	99	X	AZ	18			8	in at 85' ft. level for 2"
	?	100							Hole filled up to 55' Need casing

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 116-X SHEET No. 6 OF 6
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		101							
	Wash shows fine sand & silt	102							
		103							
		104							
	Wash shows fine sand & silt	105							
		106							
	Rounded & some sub-Angular coarse gravel & boulders. Not Possible to determine if this material is set in a Matrix of fine Material which can be washed out during drilling. (See Wash Sample which contains fine silty sand)	107		DQ	19				Note 1-1/2" piece of granite partly rounded
		108							
		109							
		110		FQ	19				
		111							
		112							
		113							
	Bottom of Hole Abandoned	114							
		115							
		116							
		117							
		118							
		119							
		120							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Railroad Tunnel
SITE
LOCATION N37177 E9976 (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Modified Wash Boring; ROCK Diamond Drill

JOB No. 1684 HOLE No. 117 SHEET No. 1 OF 1
WEATHER INSPECTOR ROJC
TEMP. °F STARTED .M. Nov. 13 1967
DIP 90 ° FINISHED 09:00 M. Nov. 22 1967
ELEVATIONS: DATUM G.S.C.
CASING DIAM. NX DRILL PLATFORM
CORE DIAM. NXL GROUND SURFACE 571.22
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		10							
		20							
		30							Hole backfilled with
		40							rout (Cement, Sand & Bentonite)
		50							
		60							Water @ 58'
	Soft moist brown silty clay	70							
			X	AQ	1				
	Layer of Hard Material	80							
		90							
	Brown & grey clayey silt & silty clay	100	X	AQ	2				
	Soft & moist Till, Gravel & silty	110	X	AQ	3				Bentonite Seal @ 114-115
		120	X	AQ	4				
	Sand & gravel largely angular; Sub-Angular gravel up to 1-1/2"	130		AQ	5				Piezometer Tip @ 127
		140							
	Bedrock @ 118'-8"	150							
	End of Hole @ 133'	160							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE 37 174N 9.970E
LOCATION (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Mod. Wash Boring ROCK

JOB No. 1684 HOLE No. 117II SHEET No. 1 OF 1
WEATHER INSPECTOR R.S.
TEMP. °F STARTED .M. Nov. 22 1967
DIP 90 ° FINISHED .M. Nov. 23 1967
CASING DIAM. NX
CORE DIAM.
ELEVATIONS: DATUM G.S.C.
DRILL PLATFORM
GROUND SURFACE 5712
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR
** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		10							Top of protection Pipe @ 573.1
		20							
		30							For Log See 117
		40							
		50							
		60							
		70							
		80							
	Bentonite Seal @ 91.4	90							
	Piez. Tip @ 95.0	100							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION 36,786N (LATITUDE) 9,776E (DEPARTURE) BEARING
CONTRACTOR Peninsula Soil Investigation
METHOD OF BORING: SOIL Mod Wash Boring; ROCK Diamond Drill

JOB No. 1684 HOLE No. 118 SHEET No. 1 OF 1
WEATHER INSPECTOR R.O.
TEMP. °F STARTED 700 A.M. Dec.7 1967
DIP 90 ° FINISHED 1400 A.M. Dec.8 1967
ELEVATIONS: DATUM G.S.C.
CASING DIAM. NX DRILL PLATFORM
GROUND SURFACE 570.5
CORE DIAM. NXL WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		10							
	For Log See 118-II	20							
		30							
		40							
		50							
	Backfill with grout	60							
		70							
		80							
		90							
		100							
	Till. Large gravel & cobbles. Bedrock @	110	X	DQ	1				
	113'-6" Bentonite Seal 115'-116	120	X	DQ	2				Tip of Porous Type Piezometer
	Piezometer tip @ 122								
	128'-6" End of Hole	130							Water test. See next sheet
		140							
		150							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
JOB No 1684 HOLE No. 118-I SHEET No 1 OF 1
PROJECT Welland Rail/Road Tunnel
WEATHER Rain INSPECTOR E. Osborne
SITE 250' From Well
TEMP. °F STARTED 0700 M. Dec. 7 19 67
LOCATION N-36, 828 E-9,749 (LATITUDE) (DEPARTURE) BEARING
DIP 90 ° FINISHED 1100 M. Dec. 8 19 67
CONTRACTOR Peninsula Soil Investigation
ELEVATIONS: DATUM G.S.C.
METHOD OF BORING: SOIL Power Auger & Mod. Wash
CASING DIAM. NX DRILL PLATFORM
ROCK Diamond Drill
GROUND SURFACE 571.2
CORE DIAM. NXL WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - POLYFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING TERMINATION, SAMPLING PROBLEMS, WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT, ETC.
	For Log	10							
	Hole 118-I	20							
		30							
		40							
	Backfilled with Grout	50							
		60							
		70							
		80							
		90							
		100							
	Seal @ 109-3" - 110'-								Casing 108 Hole 114
	0" Piez. Tip @ 111-112	110							Falling head water test
	Bedrock @ 115'-6"								See Next Sheet
	117' End of Hole	120							
		130							
		140							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 118II SHEET No. 1 OF 5

PROJECT Welland Rail/Road Tunnel WEATHER ..... INSPECTOR Stewart

SITE ..... TEMP. ..... °F STARTED 0730 .M. Nov. 21 19 67

LOCATION N 36801 E 9764 BEARING ..... DIP 90 ° FINISHED 1200 .M. Nov. 28 19 67
(LATITUDE) (DEPARTURE)

CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.

METHOD OF BORING: SOIL Power Auger CASING DIAM. NX DRILL PLATFORM .....

ROCK ..... CORE DIAM. ..... GROUND SURFACE 571.0

WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		1							
		2							
		3							
	Greyish brown silty clay stiff and dry, desiccated.	4							
		5							
		6							
		7							
		8							
		9							
		10							
		11							
		12							
		13							
		14							
		15							
	Reddish brown silty clay. Stiff and rather dry.	16	X					4	
								5	
								6	
		17	■	AY	1				
		18							
		19							
		20							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 1181 SHEET No. 2 OF 5

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: H - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D. (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown silty clay. Stiff.	21		AY	2		15	3 6 11	
		22							
		23							
		24							
		25							
	Same As Above	26		AY	3		16	3 7 5	
	Some sand at bottom tip of sampler	27							
		28							
		29							
		30							
	Same As Above	31		AY	4		17	2 3 5	
		32							
		33							
		34							
		35							
	Reddish brown clayey silt and grey silty clay. Layered irregularly and bounderies cloudy	36		AY	5			3 4 4	
		37							
		38							
		39							
		40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT
SITE
LOCATION (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR
METHOD OF BORING: SOIL / ROCK

JOB No. 1684 HOLE No. 118II SHEET No. 3 OF 5
WEATHER INSPECTOR
TEMP. °F STARTED .M. 19
DIP ° FINISHED .M. 19
ELEVATIONS: DATUM
CASING DIAM. DRILL PLATFORM
GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown and							3	
	grey clayey silt and	41		AY	6		24	3	
	silty clay. Vaguely							4	
	layered with cloudy	42							
	contorted horizons.								
	Some fine sand at 41'	43							
		44							
		45							
	Reddish brown							2	
	clayey silt	46		AY	7		24	3	
	(Rich in Clay)							6	
		47							
		48							
		49							
		50							
	Same As Above							2	
		51		AY	8		24	3	
								4	
		52							
		53							
		54							
		55							
	Same As Above							4	
		56		AY	9		24	4	
								6	
		57							
		58							
		59							
		60							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 118II SHEET No. 4 OF 5

PROJECT WEATHER INSPECTOR

SITE TEMP. °F STARTED .M. 19

LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19

CONTRACTOR ELEVATIONS: DATUM

METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM

ROCK GROUND SURFACE

CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown clayey silt	61	X	AY	10		24	2 3 4 6	
		62							
		63							
		64							
		65							
	Same As Above	66	X	AY	11		24	3 4 7 7	
		67							
		68							
		69							
		70							
	Reddish brown clayey silt and silty clay. Varved; Varving irregular and	71	X	A	12		21	2 2 5	
	Sometime indistinct.	72							
		73							
		74							
		75							
	Reddish brown clayey silt and silty clay. Not in varves, but in irregular cloudy	76	X	AY	13		21	3 3 5	
	layers.	77							
		78							
		79							
		80							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 118II SHEET No. 5 OF 5

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D. (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
								3	Hole caved in
	Same As Before	81		AY	14		24	2	overnight up to 50.
								3	
		82						8	
		83							
									Hole keeps caving in
		84							below 70
		85							
	Reddish brown							6	Installed Piezometer
	dilatant silt.	86		AY	15		24	13	Membrane Type
								7	at 88'-89'. Seal at
	Bentonite Seal@ 86-87	87						4	86'-87'.
	Piezometer Tip at								
	88'-89'.	88							
									Hole caved in again
		89							Need Casing
	Sand Backfill								
		90							
	End of Hole								Casing to 90'
	at 90'	91							
		92							
		93							
		94							
		95							
		96							
		97							
		98							
		99							
		100							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION 36.794N 9770E (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Invest.
METHOD OF BORING: SOIL Power Auger (Penn') ROCK

JOB No. 1864 HOLE No. 118-III SHEET No. 1 OF 1
WEATHER INSPECTOR R.Q.
TEMP. °F STARTED 700 M. Nov. 27 1967
DIP 90 ° FINISHED 1300 M. Nov. 30 1967
ELEVATIONS: DATUM GSC
CASING DIAM. NX DRILL PLATFORM
GROUND SURFACE 570.7
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	For Log see Hole 118-II	10							
		20							
		30							
	Hole Back Filled With Grout	40							
		50							
	Bentonite Seal 66-67'	60							
	Piez. Tip @ 69								
	Bentonite Seal 71'-71.8'	70							Tip @ 69-70 Membrane
	Layered Clay & Silt	80							Type Set in clean sand
	77' End of Hole	90							
		100							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

118-

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION N-36,818 E-9762 (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Power Auger (Penn) ROCK

JOB No. 1684 HOLE No. IV SHEET No. 1 OF 1
WEATHER Snow INSPECTOR R. OSB.
TEMP. °F STARTED 1130 M Nov. 30 19 67
DIP 90 ° FINISHED 1730 M Nov. 30 19 67
ELEVATIONS: DATUM G.S.C.
CASING DIAM. DRILL PLATFORM
GROUND SURFACE 570.1
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		10							
		20							
	Backfill with Grout	30							
		40							
	Bentonite Seal @ 46'-8" - 47'-2" Piez. Tip @ 49'-6"	50							Membrane Type Tip in clean sand
	End of Hole 52'-2"	60							
		70							
		80							
		90							
		100							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION N36810; E9752 (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soil Invest.
METHOD OF BORING: SOIL Power Auger ROCK

JOB No. 1684 HOLE No. 118V SHEET No. 1 OF 1
WEATHER INSPECTOR R. Osb.
TEMP. °F STARTED 09:00 M. Dec. 1 19 67
DIP 90 ° FINISHED 15:00 M. Dec. 1 19 67
ELEVATIONS: DATUM G.S.C.
CASING DIAM. — DRILL PLATFORM
CORE DIAM. GROUND SURFACE 571.3
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. / DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Backfilled								For Soils Log see 118-II
	with Grout	10							
		20							
	Bentonite Seal @								Membrane Type
	26'-9"	30							Piezometer in Clean sand
	Piezometer Tip @ 29'								
	32' End of Hole	40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION N-36420 (LATITUDE) E-9878 (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Mod. Wash Boring. ROCK Diamond Drill

JOB No. 1684 HOLE No. 119 SHEET No. 1 OF 6
WEATHER INSPECTOR J. Carella
TEMP. °F STARTED M. Dec. 7 19 67
DIP 90 ° FINISHED M. Dec. 8 19 67
CASING DIAM. NX CORE DIAM. NXL
ELEVATIONS: DATUM G.S.C.
DRILL PLATFORM
GROUND SURFACE 574.3
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Humus	1							
		2							
		3							
		4							
		5							
	Desiccated stiff silty brown clay. Vertical shrinkage. Cracks with roots down to 15'.	6	X	AQ	1		18	4	
								9	
		7						12	
		8							
		9							
		10							
	As Above	11	X	AQ	2		18	3	
								6	
		12						8	
		13							
		14							
		15							
	As Above	16	X	AQ	13		18	8	
								6	
		17						7	
		18							
		19							
		20							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.I.S.A.
PROJECT
SITE
LOCATION (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR
METHOD OF BORING: SOIL / ROCK

JOB No. 1684 HOLE No. 119 SHEET No. 2 OF 6
WEATHER INSPECTOR
TEMP. °F STARTED .M. 19
DIP ° FINISHED .M. 19
ELEVATIONS: DATUM
CASING DIAM. DRILL PLATFORM
GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Brownish red silty clay. Dry and soft	21	X	AQ	4		18		
		22							
		23							
		24							
		25							
	Reddish brown silty clay with occasional small gravel.	26	X	AQ	5		16	4 6 8	
		27							
		28							
		29							
		30							
	As above with hardly any gravel at all. Very soft and damp.	31	X	AQ	6		18	3 4 5	
		32							
		33							
		34							
		35							
	Brown and grey silty clay and clayey silt. Varved. Soft and wet.	36	X	AQ	7		18	3 4 5	
		37							
		38							
		39							
		40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS

NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 119 SHEET No. 3 OF 6

PROJECT WEATHER INSPECTOR

SITE TEMP. °F STARTED .M. 19

LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19

CONTRACTOR ELEVATIONS: DATUM

METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM

ROCK CORE DIAM. GROUND SURFACE

WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	As Above	41	X	AQ	8		18	3	
	(Varved)							4	
								5	
		42							
		43							
		44							
		45							
	As above but silt		X					3	
	becomes more	46	X	AQ	9		18	3	
	predominant.		X					5	
		47							
		48							
		49							
		50							
								3	
	As Above	51	X	AQ	10		18	3	
			X					4	
		52							
		53							
		54							
		55							
	Gradual change		X					3	
	to clayey silt	56	X	AQ	11		18	5	
			X					6	
		57							
		58							
		59							
		60							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 119 SHEET No. 4 OF 6

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE H.M. TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	As Above	61		AQ	12		18	3	
								3	
								5	
		62							
		63							
		64							
		65							
	Reddish brown clayey silt or silty clay. Richer in clay than #12. Very small grey nodules (1mm)	66		AQ	13		16	3	
								3	
								4	
		67							
		68							
		69							
		70							
	Grey clay and brownish red silt in layers Varved. Soft and Wet	71		AQ	14		16	3	
								3	
								4	
		72							
		73							
		74							
		75							
	As Above	76		AQ	15		16	3	
								3	
								4	
		77							
		78							
		79							
		80							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.S.S.A. JOB No. 1684 HOLE No. 119 SHEET No. 5 OF 6
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK CORE DIAM. GROUND SURFACE
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish clayey silt							3	
	changing into fine	81		AQ	15		16	7	
	sand silt. Wet							9	
	Horizon at 81	82							
		83							
		84							
		85							
	Dilatant sandy							16	
	silt. Reddish	86		AQ	17		14	10	
								16	
		87							
		88							
		89							
	Till silty sand and							13	
	gravel. Very wet	90		AQ	18		10	7	
	Sand rather sharp.							14	
	Gravel mostly rounded	91							
		92							
		93							
		94							
		95							
								100	for 5"
		96		AQ	19		2½		
		97							
		98							
		99							
		100							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT U.S.A. JOB No. 1144 HOLE No. 113 SHEET No. 6 OF 6
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK CORE DIAM. GROUND SURFACE
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Till reddish brown							14	Nov. 27, 1967
	clayey silt sand	101		AJ	20		10	35	
								70	
		102							
		103							
		104							
	Well rounded								This gravel may have
	washed limestone	105							been set in matrix
	Gravel 1/4" to 1-1/2"								of fines washed out
		106			22	21			during drilling
		107							
		108							
	Bedrock								
	Concrete backfill	109							
		110							
	Bentonite Seal	111							
		112							
	Gravel backfill								
		113							
		114							
		115							
	Piezometer Tip								
		116							
		117							
	Gravel backfill								
		118							
		119							
		120							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION N-36,893 (LATITUDE) E-10,013 (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Mod. Wash Boring; ROCK Diamond Drill

JOB No. 1684 HOLE No. 120 SHEET No. 1 OF 2
WEATHER INSPECTOR R.O. & J.C.
TEMP. °F STARTED 0700 M Nov. 27 19 67
DIP 90 ° FINISHED 1100 M Dec. 5 19 67
ELEVATIONS: DATUM G.S.C.
CASING DIAM. NX DRILL PLATFORM
GROUND SURFACE 568.5
CORE DIAM. NXL WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Not Logged above 85 Ft. Depth	81							
		82							Artesian Water
		83							
		84							
		85							
		86							
		87							
		88							
	Till, Silty sandy gravel	89		AQ	1		7"		
		90							
		91							
		92							
		93							
		94							
		95							
	Very hard till	96							
	as above	97		DQ	2				
		98							
		99							
		100							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 120. SHEET No. 2 OF 2

PROJECT WEATHER INSPECTOR R.O. & J.C.

SITE TEMP. °F STARTED .M. 19

LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19

CONTRACTOR ELEVATIONS: DATUM

METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM

ROCK GROUND SURFACE

CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Small boulder	101		D	3				Hole Cave-In
	Gravel of various sizes Up to 3" Rounded to sub-angular.	102		DQ	4				Note: Sampling has to be done by core barrel. However this results in washing away of any fine material.
		103		DQ	5				
	Well rounded gravel & cobbles. Some of them granite	104		DQ	6				
		105							
	Rounded to sub-angular gravel & cobbles	106		DQ	7				More water coming to surface. For Water Test see Section 3.
		107		DQ	8				
	Bedrock 107'-7"	108							
		109							
		110							
	Bentonite Seal	111							
		112							
		113							
	Crushed stone back-fill	114							
		115							
	Porous Tip	116							
		117							
		118							
		119							
		120							

End of Hole 120.5'

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION N36073 (LATITUDE) E9778 (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL
ROCK Diamond Drill

JOB No. 1684 HOLE No. 121 SHEET No. 1 OF 1
WEATHER INSPECTOR J.Carella
TEMP. °F STARTED 700 A.M. May 30 19 67
DIP ° FINISHED 1500 A.M. Dec. 6 19 67
ELEVATIONS: DATUM G.S.C.
CASING DIAM. NX
CORE DIAM. NXL
DRILL PLATFORM
GROUND SURFACE 570.4
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR
** SHIPPING CONTAINER: N - INSERT; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		10							
		20							
		30							
		40							
	No sampling	50							Piezometer installation only
		60							Hole backfilled with cement grout
		70							
		80							
		90							
	Top of coarse till	100							
		110							
	Bedrock 109'-2"								
	Bentonite seal 111-110								
	Piezometer tip at 118	120							
	End of hole 124'-2"								
		130							
		140							For water test see separate report

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 122 SHEET No. 1 OF 2

PROJECT Welland Rail/Road Tunnel WEATHER ..... INSPECTOR R. OSB

SITE ..... TEMP. ..... °F STARTED 0700 M. Dec. 11 19 67

LOCATION N37001 (LATITUDE) E9905 (DEPARTURE) BEARING ..... DIP 90 ° FINISHED 1700 M. Dec. 13 19 67

CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.

METHOD OF BORING: SOIL Mod. Wash Boring CASING DIAM. NX DRILL PLATFORM .....

ROCK Diamond Drill CORE DIAM. NXL GROUND SURFACE 570.4

WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	No logging above 97 feet.	81							
	Note: Desiccated clay till 25 feet.	82							
		83							
		84							
		85							
		86							
		87							
		88							
		89							
		90							
		91							
		92							
		93							
		94							
		95							
		96							
		97							
	Till	98							
		99							
		100							

COMPLETE IN DUPLICATE

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 122 SHEET No. 2 OF 2

PROJECT WEATHER INSPECTOR

SITE TEMP. °F STARTED .M. 19

LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19

CONTRACTOR ELEVATIONS: DATUM

METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM

ROCK GROUND SURFACE

CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		101							
		102							
		103							
		104							
		105							
		106							
	Till	107							
		108							
		109							
		110							
		111							
		112							
		113							
	Rounded gravel up to 2"	114							
	Bedrock at 114'6"	115							
	Bentonite seal	116							
		117							
	Piezometer tip at 122	118							
	End of Hole at 128'2"	119							
		120							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION 4702.6 E 38,125N (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Mod. Wash Boring; ROCK Diamond Drill

JOB No. 1684 HOLE No. BH-129 SHEET No. 1 OF 6
WEATHER INSPECTOR R.F.Stewart
TEMP. °F STARTED 1500 A.M. Feb. 2 19 68
DIP 90 ° FINISHED 1730 A.M. Feb. 9 19 68
ELEVATIONS: DATUM
CASING DIAM. NX-126' BX-134' DRILL PLATFORM 570.0
CORE DIAM. BX GROUND SURFACE
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	All measurements from Raft Floor: 14" above water level. Canal Bottom at 31'10"	31							R-B = Reddish Brown G-B = Greyish Brown W/ = With
		32							
	Reddish brown silt w/some clay, quite soft	33		BO	1	3	15		Easy: 1 Man Drying on 5' Rod
		34							
		35							
	R-B and G-B Silt and Clay Layered (Varved) Soft	36		BO	2		18		Fair Push: 1 Man x 5' 17:30/2 Feb. - Quit 7:00/5 Feb. - Started
		37							
	R-B W/Trace of Grey (Layered) Clayey Silt, Very Soft	38		BO	3		18		Easy: 1 Man x 5'
		39							
		40							
	R-B Clay and Silt Slightly More Firm	41		BO	4		18		Easy: 1 Man x 5'
		42							
	R-B and G-B Mottled Silty Clay W/Occasional Dry Grey Silt Pockets Soft	43		BO	5		18		Easy: 1 Man x 5'
		44							
		45							
	As Above	46		BO	6		18		Easy: 1 Man x 5'
		47							
	R-B Silty Clay W/Grey Silt Seam at 49', Soft	48		BO	7		17		Easy: 1 Man x 5' Lost Sample Below Seam
		49							
		50							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. BH-129 SHEET No. 2 OF 6

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	R-B Silt W/Traces of	50							
	Dry Grey Silt Pockets,								
	R-B Clay Pockets, Soft	51		BO	8	3	18		Easy: 1 Man x 5'
		52							
	R-B Dilatent Silt	53							
				BO	9		16		Fairly Easy: 1 Man x 5'
		54							
		55							
	As Above								Good Push: 1 Man x 10'
		56		BC	10		7		for 13"
								7/5"	
		57							
									Good Push: 1 Man x 10'
	R-B Dilatent Silt	58		BC					
	W/Traces of Sand and			AQ	11		12	6/3"	for 9". Lost Sample
	Occas. Pockets of Grey	59						10	From Tube Recovered with
	(+ one 3/8" stone								Spoon
	Rounded)	60							
	R-B Dilatent Silt							Sank	6"
	W/Two Greyish Clay	61		AQ	12		12	3	
	Pockets							3	
		62							
	R-B Dilatent Silt	63						4	
	W/Traces of R-B Clay			AQ	13		9	6	
		64						6	
		65							
	R-B Dilatent Silt							Sank	18"
	W/Two Pockets of	66		AQ	14		12		
	R-B Clay								
		67							
	Dark R-B Dilat. Coarse								
	Silt to Approx. 68½	68						7	
	Then Lighter R-B Fine			AQ	15		16	9	
	Silt, Less Dilat. Dense	69						9	

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. BH-129 SHEET No. 3 OF 6

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE NO. TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		70							
	R-B Dilatent Fine							Sank	11"
	Silt	71		AQ	16		16	1/1"	
								7	
		72							
	R-B Dilatent Silts	73						Sank	2"
	W/Traces of G-B Clay			AQ	17		11	6/4"	
	and Coarse Sand at	74						10	
	Approx. 73½'							9	
		75							
	R-B Dilatent Silts							5	
	W/Traces of R-B and	76		AQ	18		16	9	
	G-B Clay at 76'							9	
		77							
	R-B Silts W/Some Fine	78						7	
	Sand and Traces of			AQ	19		12	16	
	Clay Pockets Dilatent	79						19	
		80							
	R-B Coarse Silt and							Sank	6" Lost Sample 1st
	Fine Sand. Dilatent	81		AQ	20		18	6	Try. NX Backfilled 3'
								9	When Spoon Returned
		82							For 2nd Try.
	R-B Coarse Silt and	83						7	
	Fine Sand Slightly			AQ	21		12	11	
	Dilatent	84						13	
	As Above to Approx 85½	85							
	then W/Clay Pockets &							10	
	Some Coarse Sand & Fine	86		AQ	22		18	18	
	Rounded Gravel to 86'							19	
	Then Fine Dilat. Silt	87							
	R-B Silt W/Some R-B	88						10	
	Clay Pockets at approx			AQ	23		18	22	
	88½' Fairly Dilatent	89						23	19:00/5 Feb. - Quit

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. BH-129 SHEET No. 4 OF 6

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: - SILT - SAND - CLAY - GRAVEL

* SAMPLE CONDITION: - GOOD - FAIR - DISTURBED - LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		90							7:00/6 Feb. - Started
	R-B Silt and Fine Sand Fairly Dilatent	91		AQ	24		9	6 5 18*	*Suspect Spoon Over-Filled. Materials Back-Filling NX Approx. 6" after Each Washing
		92							
	R-B Fine Sand W/Some Silt Slightly Dilatent (in Spoon)	93 94		AQ	25		18	3 3 3	NX Backfilled Again Jiggled Spoon to Take Sample
		95							Have had Considerable
	R-B Silts and Fine Sand Fairly Dilatent	96		AQ	26		18	11 20 25	Back-Wash After Each Washing at 95' Tried Leaving Water Swivel
		97							Connected and Controlled
	R-B Fine Sand W/Coarse Silt. Dilatent	98		AQ	27		4	3 3 3	Rate of Back-wash With Pump Valves. Neglibible Backfill
		99							
	Grey Fine Sand With Coarse Silt and Traces of R-B Fine Silt. Dilat	100 101		FQ	28				NX Got Stuck at 90' While Washing to 97½' Drove to 97½ Sand Backfilled NX 3' Once
		102							Wash Rods Removed Jiggled Sample Again
	Grey Fine Sand With Coarse Silt. Dilatent	103		FQ	29				Washed NX to 100' Sand Backfilled to 90'
		104							
	As Above	105		FQ	30				Tried Washing W/Spoon W/Conical Spring Trap and Ball Wired Open In
	With 5' NX Stick-up	106							Attempt to Beat Backwash
	Water Drops at 2"/min	107							Problem Lost Sample at 102½. Reverted to Wash
	As Above	108		FQ	31				Samples: Quicker and No More Vague Than Spoon
		109							Sample of Backwash.

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. BH-129 SHEET No. 5 OF 6

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
									Continued Washing
	Grey Fine Sand and	110		FQ	32				With Wired-up Spoon
	Coarse Silt		X				18		
	R-B Coarse Silt With	111	X	AQ	33				Jiggled Sample
	Fine Sand & Occas		X						
	Trace of Grey Clay.	112							
	Dilatent			FQ	34				Tried Spoon Sampler 112½
	Grey Silts & FineSand	113							But Lost It
	W/Traces of Reddish								
	Fine Silt. Dilatent	114							
	Grey Silt and Fine	115							
	Sand W/Occas Coarse			FQ	35				
	Sand Sized Pocket of	116							
	Grey Silt								
		117							
	R-B Silt W/Some	118	X						
	Fine Sand and Large		X	AQ	36		18		Jiggled Sample
	R-B Clay Pockets	119	X						19:00/6 Feb. - Quit
									7:00/7 Feb. - Started
		120							
	R-B Silts W/Fine Sand		X						
	Traces of R-B Clay	121	X	AQ	37		18		Jiggled Sample
	at 120½' and 121½'		X						
		122							
	R-B Silts W/Some	123	X						
	Fine Sand		X	AQ	38		18		Jiggled Sample
		124	X	AQ	39		1		
	R-B Clayey Silt W/One								NX Backfilled 9" When
	Piece Med Gravel Sub-	125							NXL Barrel Down, Flushed
	Angular								NX Drove 2" and Flushed
		126		D	39A				Again. Ran to 126'
	3 Pieces 3-3/4" and								
	Smaller								Drove Again but Boulder
									Didn't Crack
									13:30/7 Feb. - Fetching
									BX: 15:50 - BX Aboard
									Raft: 17:00 - BX Tel.126

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.I.S.A. JOB No. 1684 HOLE No. BH-129 SHEET No. 6 OF 6

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
									17:30/7 Feb-PX Driven to
	Grey Silty Sands with	127							126½' Noted Water
	Traces of Fine Gravel			FQ	40				Loss When Washing
	Ang. and Sub.-Ang.	128							Drove BX to 127½'Washed
	Grey Silty Sands		X	AQ	41		5	102	Again.Washing Hard From
	W/Ang. and Sub.-Ang.	129							126½' Down
	Gravels and Some								
	Gypsom. Dense	130							Attempted Spoon Sample
	Grey Silty Sands With			FQ	42				at 127½ BX Backfilled 18
	Angular Fine Gravel.	131							Jiggled Sample of Mat'l.
									Identical to FQ-40
		132							
									19:00/7 Feb. - Quit
		133							7:00/8 Feb. - Started
	Grey Till-like Sands		X					100/5"	
	W/Ang. Fine Gravel	134	X	AQ	43		5		Wash Rods Ringing at 130
									Put PX Barrel Down and
		135							Ran for 1' Recovered
									Core and Pebbles
									Drove BX to 131'4" & Ran
	Top of Bedrock 134'2"								Another 2' Recovered
									More Boulder Core and
									Pebbles
									Drove BX to 133'4".Began
									Washing.Water R-B &Silty
									atFirst.Turned Grey After
									a Dozen Chops W/Rods
		144							Sampled & Drove PX Again
									Refusal at 134'2".Water
	End of Hole 144'7"	145							R-B Again & Remained so
									for First 2 Min.Washing
									Then it Turned Grey Again
									Wash Rods Ringing at 134'
									2"Put Down BX Barrel and
									Ran to 137'7" Recovered
	9 Feb.- Cont. Compl.								36" of Core.Had Hydrauli
	coring at 144'7"								Lock Between Two Core
	Jarred up BX and NX								Sections
	17:30 Quit								19:00/8 Feb. - Quit
									7:00/9 Feb. - Started

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. | JOB No. 1684 | HOLE No. BH131 | SHEET No. 1 OF 4

PROJECT Welland Rail/Road Tunnel | WEATHER | INSPECTOR R. F. Stewart

SITE | TEMP. °F | STARTED 13:00 M. Feb. 13 19 68

LOCATION 4890.7E; 442.7SE (LATITUDE) (DEPARTURE) | BEARING | DIP 90 ° | FINISHED 11:00 M. Feb. 16 19 68

CONTRACTOR Peninsula Soils | ELEVATIONS: DATUM

METHOD OF BORING: SOIL Mod. Wash. Boring | CASING DIAM. NX-94'10" | DRILL PLATFORM 570

ROCK | GROUND SURFACE 539.6

CORE DIAM. NX | WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
									R-B = Reddish brown
	Canal bottom 30'5"	30							G-B = Greyish brown
									W/ - With
		31		Bo					Good Push - 2 Men Leaning
									on Wrenches. Ice Chips
		32							in top end prevented
									ball in top end from
	R-B silt and clay	33							sealing
	w/traces of dry grey			Bo	1		18		Rods icey: Slipped free
	silt pockets. Soft.	34							and imbedded 6".12" Push-
									ed easy. 2Men on wrenches
		35							
	As Above								Washing down by casing
	Slightly stiffer	36		Bo	2		18		Easy: 1 man prying on
									5' rod
		37							
	R-B as above w/traces	38							
	of dry grey silt. As			Bo	3		18		Good Push: 1 Man x 5'
	stiff as BO-2	39							
		40							
	As Above								
		41		Bo	4		18		Good Push: 1 Man x 5'
		42							
	As above at top.	43							
	Bottom is R-B and G-B			Bo	5		17		Slightly Easier: 1Man x 5
	silt and clay. Soft.	44							
		45							
	R-B silt and clay								
		46		Bo	6		18		as Above: 1 Man x 5'
									17:30/13 Feb. - Quit
		47							7:00/14 Feb. - Started
	R-B silt W/R-B and								
	G-B mottled clayey	48							
	pockets at 47½			Bo	7		16		Easy: 2 men on wrenches
	Slightly dilatent	49							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1654 HOLE No. 67-13 SHEET No. 2 OF 4

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	R-B silt. Slightly dilatent w/small pocket of R-B clayey silt.	50							
		51		BO	8		5		Easy: 2 Men on Wrenches for 12"
	Soft. 1 piece of sub-ang. med. gravel at top. Dilat. R-B 51½ Silt	52						12	
	R-B silt. Dilat. at 52½ R-B till-like silt w/f ine and occas med. sands and fine sub-ang. gravel. Trace of possibly med. gravel. Not moist.	53							Progressively Stiffer
		54		BO	9		18	14/4"	for 8": 1 man x 5'
		55						51	
	R-B till-like silts w/sands and trace of sub-ang. fine gravel. Dense. Firm. Not moist	56		AQ	10		13	35	
		57			11			56	
	As Above Less Sands	58		AQ	12		14	49	
		59			13			35	
		60						68	
								103	
	As Above (AQ 12-13) Slightly Softer Seam at 61'	61		AQ	14		14	29	
		62			15			42	
								69	
	As above but slightly more moist. Silty fine sand.	63		AQ	16		18	13	
		64			17			26	
		65						39	
	As above for 2" then R-B till-like silts w/ fine & occas. med. and coarse & occas. med. sand seams. Dense but slightly Softer. More Moist Than Before	66		AQ	18		15	14	
		67			19			29	
								42	

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. W-131 SHEET No. 3 OF 4

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK .... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	R-B sandy silt W/occas.	67							
	fine sand seams. 1 Pce								
	sub-ang. med. gravel at	68	X					23	
	67½. Softer & slightly		X	AQ	20		18	37	
	dilat. to 68½ then more	69	X		21			42	
	firm. Less dilatent								
	Greyish silty fine Sand	70							
	to 70½' W/ang. chips at		X					19	
	70½ then R-B silt w/	71	X	AQ	22 23		18	22	
	occas. med. sand pocket		X					22	
	Dense. Slightly dilat.	72							
	R-B sand silt. Firm. Not								
	too moist to 73' then	73	X					Sank	4"
	slightly dilat. w/ fine		X	AQ	24 25		16	3/2"	
	sand layer at 73½	74						9	
								11	
	R-B sandy silt. Slight	75							
	dilat. Small pocket of		X	AQ	26		12	7	NX Backfilled 6"
	less moist more firm	76	X					17	
	silt w/trace of core								
	sand at 75'	77							
	R-B silty fine sand.	78	X					15	NX Backfilled 9"
	Slightly dilatent			AQ	27		10	27	
		79							
	As above but more	80							
	dilat. To 81' then R-B		X					6/3"	
	& G-B dry clayey pock.	81	X	AQ	28		13	21	NX Backfilled 3"
	Followed by R-B silt							44	
	w/some fine sand. Dil.	82							
	R-B silts. Fairly	83	X					20	
	dilat. Firmer & more		X	AQ	29		17	31	
	dilatent at 84'	84						33	

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. BH-131 SHEET No. 4 OF 4

PROJECT ... WEATHER ... INSPECTOR ...

SITE ... TEMP. ... °F STARTED ... .M. ... 19...

LOCATION ... (LATITUDE) (DEPARTURE) BEARING ... DIP ... ° FINISHED ... .M. ... 19...

CONTRACTOR ... ELEVATIONS: DATUM ...

METHOD OF BORING: SOIL ... CASING DIAM. ... DRILL PLATFORM ...

ROCK ... GROUND SURFACE ...

CORE DIAM. ... WATER LEVELS ...

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	R-B Fine Sandy Silts	85							
	W/Dry R-B&G-B Clay		X					30	
	Pock.to 85'9"Then R-B	86	X	AQ	30 31		18	66	
	Silts W/Occas.Fine &		X					100/5½"	(Spoon Overfilled)
	Med.Sand Pock.More	87							
	Dilat. at 86½'.R-B								21:00/14 Feb. - Quit
	Silts W/Clay Pockets	88	X					6	7:00/15 Feb. - Started
	Soft & Firm.W/Trace		X	AQ	32 33		12	22	NX Backfilled 6" W/Silt
	of Med.Sub-ang.Gravel	89							
	(Soupy W/Lumps) to 87'								
	10"Then Firm Dry Till								
	like R-B Fine Sandy								
	Silt w/Occas. Med./								
	Coarse Sands & Trace								
	of Med.Sub-Ang.Gravel								
	Changing at 88½-Grey								Have washed NX Down
	Till-like Silt W/Sand								all the way so Far.
	& Ang.Chips. Dense								Progress Difficult
		90							Approaching 90'.
	Grey Till:Clayey Silt		X					38	
	& Sands W/Ang. Grey	91	X	AQ	34		10	100/5"	
	Stone Chips up to								
	Spoon Ø & Trace of								
	Gypsum.Disturb & No								Drove NX to 92½ & Washed
	Longer Dense.Brittle	92							
									Traces of Grey ClayeySilt
	As Above?	93	■					100/2"	in Nose of Spoon
		94							Ran 2' with NXL. No
									Recovery.Wash at 94'6"
	Top of Bedrock 94'10"	95							Contained Med.&CoarseSand
									Sized Hard Grey Silt
									Drove NX to 94'10":Refus-
									al.Wash Rods Ringing at
									94'10".Ran NXL Again
		105							21:00/15 Feb. - Quit
	End of Hole 105'4"								7:00/16 Feb. - Started
		106							11:00/16 Feb.-Drill.Fin.

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. | JOB No. 1684 | HOLE No. 135 | SHEET No. 1 OF 5

PROJECT Welland Rail/Road Tunnel | WEATHER | INSPECTOR J.Carella

SITE | TEMP. °F | STARTED 1300 M. Feb. 27 19 68

LOCATION 15608749N (LATITUDE) 1080419E (DEPARTURE) | BEARING | DIP 90 ° | FINISHED | M. Mar. 4 19 68

CONTRACTOR Peninsula Soil Investigation | ELEVATIONS: DATUM G.S.C.

METHOD OF BORING: SOIL Mod. Wash. | CASING DIAM. NX | DRILL PLATFORM

ROCK Diamond Drill | GROUND SURFACE 585.4

CORE DIAM. NXL | WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		1							
		2							
		3							
		4							
		5							
	Greyish brown silty clay with reddish	6		BO	1	3	6"		Pushed by hand
	layers. Very stiff and dry.	7							
		8							
	As above			BO	2		14		As above
		9							
		10							
	Brownish silty clay with layers of red and	11							Hard to push
	grey clay. Gypsum deposits in cracks.	12		BO	3		24		
	Very stiff	13							
	Reddish brown silty clay with grey layers.	14		BO	4		20		Pushed easily
	Soft, spongy and rather moist.	15							
									Pushed easily. 8" fell
	As above	16		BO	5		24		out of tube when waxing
		17							
		18							
	As above								Identification from
		19		BO	6				material still sticking
		20							to tube.

COMPLETE IN DUPLICATE

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 135 SHEET No. 2 OF 5

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....
(LATITUDE) (DEPARTURE)

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK .... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	SAMPLE TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown silty clay with small (1/16" - 1/8") grey pockets. Soft and spongy.	21		CO	7	3	17		February 28 Pushed easily
		22							
		23							
	As above	24		CO	8	3	20		As above
		25							
	As above.	26							
	More Moist.	27		CO	9		20		As above
		28							
	As above	29		CO	10		20		As above
		30							
	As above	31		CO	11		20		As above
		32							
		33							
	As above	34		CO	12		20		As above
		35							
	Reddish brown silty clay with thick grey layers of silty clay. Soft and moist.	36		CO	13		20		As above
		37							
		38							
	As above	39		CO	14		20		As above
		40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 135 SHEET No. 3 OF 5

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish clayey silt								February 28
	to silty clay with	41		CO	15	3	20		Pushed easily
	grey layers. Soft								
	and moist.	42							
	Reddish silty fine	43		CO	16		14		Pushed with effort.
	sand. Dense and								
	moist.	44							
		45							February 29
	Reddish brown silty			AQ	17		24	11	
	fine sand with 3" of	46						9	
	rock and grey silty							8	
	clay. Soft and moist.	47						11	
	Reddish brown silty	48		CO	18		20		Pushed easily
	clay with grey layers								
	and pockets. Soft	49							
	and moist.								
		50							
	Reddish brown silty								
	clay with layers of	51		CO	19		20		As above
	reddish silty fine								
	sand. Soft and moist.	52							
		53							
	As above			CO	20		20		As above
		54							
		55							
	Reddish brown silty								
	clay with small grey	56		CO	21		20		As above
	pockets. Soft & moist								
		57							
	Reddish brown silty	58							
	clay with some silty			CO	22		20		As above
	sand layers. Soft	59							
	and moist.								
		60							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 135 SHEET No. 4 OF 5

PROJECT ... WEATHER ... INSPECTOR ...

SITE ... TEMP. ... °F STARTED ... .M. ... 19...

LOCATION ... (LATITUDE) (DEPARTURE) BEARING ... DIP ... ° FINISHED ... .M. ... 19...

CONTRACTOR ... ELEVATIONS: DATUM ...

METHOD OF BORING: SOIL ... CASING DIAM. ... DRILL PLATFORM ...

ROCK ... GROUND SURFACE ...

CORE DIAM. ... WATER LEVELS ...

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown silty								February 27
	clay. Soft and moist	61		CO	23		20		Pushed by hand
		62							
		63							
	As above			CO	24		5		As above
		64							
		65							
	As above	66		CO	25		20		As above
		67							
	Red-reddish silty clay	68							
	with grey layers.			CO	26		20		As above
		69							
		70							March 1
	As above	71		CO	27		20		As above
		72							
		73							
	As above			CO	28		20		As above
		74							
		75							Could not drive casing past 75'. Drilled thru
	Boulder gravel, silt and sand. Till	76							boulder. Hit bedrock at 79'-6"
		77							
		78							
		79							
	Bedrock at 79'-6"	80							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 135 SHEET No. 5 OF 5

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19 .....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19 .....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... CORE DIAM. ..... GROUND SURFACE .....

WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Bedrock	81							Hole grouted above bentonite seal
	Bentonite seal @ 81.5	82							
		83							
	Gravel (3/8") backfill	84							
		85							
		86							
	Piezometer tip @ 86.5	87							
		88							
	3/8" crushed stone backfill	89							
		90							
	End of hole	91							
		92							
		93							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 136 SHEET No. 1 OF 6
PROJECT Welland Rail/Road Tunnel WEATHER INSPECTOR J. Carella
SITE TEMP. °F STARTED 1400 M. Mar. 6 1968
LOCATION 37500N (LATITUDE) 2501.4E (D) BEARING DIP 90 ° FINISHED 1700 M. Mar. 14 1968
CONTRACTOR P.S.I. ELEVATIONS: DATUM G.S.C.
METHOD OF BORING: SOIL Mod. Wash. CASING DIAM. N.X. DRILL PLATFORM
ROCK Dia. Drill GROUND SURFACE 590.7
CORE DIAM. N.X.L. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Humus & topsoil roots								
	Grey brown silty clay to clavey silt. Most likely fill placed hydraulically.	1 2 3							
		4							
	Multicoloured layers of clay and silty clay. Stiff & moist Fill.	5 6 7		Co	1	3	13		Push by Hand
	ped & grey layers of clay and silty clay. Stiff & moist Fill?	8 9		Bo	2	3	17		Do
	Brown, silty clay with thick layers of grey clay. Stiff and moist.	10 11 12		Bo	3	3	20		Do
	As above but softer	13 14		Bo	4	3	22		Do
	As above	15 16 17		Bo	5	3	22		Do
	Brown layered clay with red pockets & traces of clear crystals. Very stiff and dry.	18 19 20		Bo	6	3	16		Had to be hammered 38 Blows 350 lb Hammer

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 136 SHEET No. 2 OF 6

PROJECT ... WEATHER ... INSPECTOR ...

SITE ... TEMP. ... °F STARTED ... .M. ... 19...

LOCATION ... (LATITUDE) (DEPARTURE) BEARING ... DIP ... ° FINISHED ... .M. ... 19...

CONTRACTOR ... ELEVATIONS: DATUM ...

METHOD OF BORING: SOIL ... CASING DIAM. ... DRILL PLATFORM ...

ROCK ... GROUND SURFACE ...

CORE DIAM. ... WATER LEVELS ...

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
									Mud to Hammer
	As above	21		Bo	7	3	13		45 Blows 350 Lbs.
	Very stiff	22							
	Brown clay to silty	23							
	clay with red pockets			Bo	8	3	16		As Above 40 Blows
	& grey layers. Very	24							
	stiff and dry.	25							
	As above								As Above 9 Blows
	Medium stiff and dry	26		Bo	9	3	24		
		27							
	As above								
	Soft and dry	28							
				Bo	10	3	22		Pushed by Hand
		29							
	Grey silty clay								
	Soft and moist	30							
		31		Co	11	3	20		Do
		32							
		33							
	Grey silty clay								Do
	with red pockets	34		Co	12	3	20		
		35							
									Do
	As above	36		Co	13	3	20		
		37							
	Reddish brown								
	silty clay with small	38							
	grey pockets (1/16") &			Co	14	3	20		Do
	(1/4") angular stones	39							
	Soft. Sticky. Moist.	40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 136 SHEET No. 3 OF 6

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: M - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	As above	41		To	15	3	20		Pushed by hand
		42							
	As above	43		To	16		16		Pushed by hand Sample pulled free
	Soft and wet	44							from Tube Walls at Lower 6-8" (Ductile)
		45							
	As above	46		Co	17		20		Pushed by hand
		47							
		48							
	As above	49		To	18		20		Do
		50							
	Grey clay with small red pockets soft and moist.	51		Bo	19		17		Do
		52							
	Silty Sand & clayey silt. Soft and wet.	53		Bo	20		14		Do Sample fell out of Tube when waxing placed in jars
		54							
		55							
	Brown silty clay with red & grey layers. Soft and moist	56		Bo	21		24		Pushed easily.
		57							
		58							
	Brown silty clay with red and grey layers. Soft and moist.	59		Bo	22		24		Do
		60							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 136 SHEET No. 4 OF 6
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Brown silty clay with red and grey layers & some 1/8" angular gravel, soft and moist.	61		Bo	23	3	24		Pushed easily by hand
		62							
		63							
	As above			Bo	24		24		Do
		64							
		65							
	As above with some red pockets	66		Bo	25		24		Do
		67							
	Reddish brown silty clay with few grey layers & pockets. Wet. Very soft.	68		AQ	26		24		First attempt with Shelby lost sample.
		69							
		70							
	Brown medium to coarse silt. Wet.	71		AQ	27		8		First attempt with Shelby lost sample.
		72							
		73						18	
	As above			AQ	28		14	25	
		74						17	
	As above	75						19	
	Layered (1/8" Red, 1/8" Grey, 3/4" Brown) Clay or silty clay.	76		AQ	29		12	/	Sank by weight of rods.
		77						/	
		78						9	
	As #28			AQ	30		16	16	
		79						10	
		80						13	
								17	

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. HOLE No. 136 SHEET No. 5 OF 6
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Brownish grey silty fine sand, with 1/4"	81	X	AQ	31		14	10 16	
	layering difficult to recognize. Wet.	82	■					24 25	
	As above but dryer.	83	X	AQ	32		18	8 16	
		84	■					28	
		85							
	As above. Grey 1/4" silty clay and gravel (Sub Angular)	86	X	AQ	33		19	0 8	
		87	■					9 11	
	Red silty sand with 1/8"-1/16" grey	88	X					13	
	pockets & 1/4" grey clay layer. Wet.	89	■	AQ	34		14	15 19	
		90						20	
	Brownish grey silty sand with some gravel up to 1/4". Till.	91	X	AQ	35		24	13 13	
		92						9 11	
	Silty sand fine to coarse with some	93	X					3	
	small gravel. Gravel angular & subangular.	94		AQ	36		24	4 4	
		95						7	
	Silty sand with small gravel. Till. Silty	96	X	AQ	37		13	9 17	
	sand with gravel up to 1-1/4" (Angular &	97	■					17 17	
	Sub Angular) Uniform. Very Sharp.							11	
	Medium to coarse and with some gravel up to 3/4" Gravel subangular		X	AQ	38		13	13 13 10	

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 136 SHEET No. 6 OF 6

PROJECT ... WEATHER ... INSPECTOR ...

SITE ... TEMP. ... °F STARTED ... .M. ... 19...

LOCATION ... (LATITUDE) (DEPARTURE) BEARING ... DIP ... ° FINISHED ... .M. ... 19...

CONTRACTOR ... ELEVATIONS: DATUM ...

METHOD OF BORING: SOIL ... CASING DIAM. ... DRILL PLATFORM ...

ROCK ... CORE DIAM. ... GROUND SURFACE ...

WATER LEVELS ...

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	As above. Fine to medium in size	101		AQ	39		21	2 7	
		102						11 26	
									Sand came up 11 feet into casing
	Till-like grey mixture from clay to gravel Sand Sharp. Gravel sub angular.	103		AQ	40		12	80 100	
		104							
		65							
	As Above	61		AQ	41		14	85 46	
		107						30 56	
	Till. Brown very stiff & dry clayey silt with few silty sand seams 7" boulder & some 1" gravel	68		AQ	42		8	86 100	(2")
		69							
		110							
	Grey limestone gravel and cobbles. Some rounded, some angular, remainder sub angular	111		DQ	43				Grey clay or Matrix most likely washed away. Remnants observable on some of the gravel
		112							
	Bentonite Seal @ 112.5	113							
	Bedrock at 112' Seam	114							
	Piezometer Tip @ 115'	115							
		116							Hole frequently caving in. No water test possible
		117							
		118							Bedrock part of hole back filled with crushed stone Remainder of hole grouted
		119							
	121'-6" End of hole	120							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. | JOB No. 1684 | HOLE No. 137 | SHEET No. 1 OF ...

PROJECT Welland Rail/Road Tunnel | WEATHER ... | INSPECTOR T.Svercher

SITE ... | TEMP. ... °F | STARTED 1300 .M. Mar.15 1968

LOCATION 36,915N 9954E (LATITUDE) (DEPARTURE) | BEARING ... | DIP 90 ° | FINISHED ... .M. Mar.19 1968

CONTRACTOR Peninsula Soils Investigation | ELEVATIONS: DATUM G.S.C.

METHOD OF BORING: SOIL Power Auger 6" diam. | CASING DIAM. ... | DRILL PLATFORM ...

ROCK ... | CORE DIAM. ... | GROUND SURFACE 571.5 | WATER LEVELS ...

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish silty clay								
	with grey pockets	41							Pushed With Drill's
	Soft and moist			CO	1	5	48		Hydraulic Head
		42							
		43							
		44							
		45							
	As Above	46		BO	2	5	48		DO
									Pressure Hydraulic
		47							System 1250 P.S.I.
		48							
		49							
	As Above			BO	3	5	48		DO
		50							1100 P.S.I.
		51							
		52							
		53							
									DO
		54		BO		5	0		1000 P.S.I.
									Sample Lost
		55							
		56							
		57							
		58							DO
				CO	4	5			550 P.S.I.
		59							
		60							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 137 SHEET No. 2 OF 2

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. / DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		61							
									Pushed Hydraulicly
		62		CO	5	5	48		Pressure in Hydraulic
									System Up to 750 P.S.I.
		63							
		64							
		65							Sample Lost
				CO	6	5	0		Pressure up to 800 P.S.I
		66							
		67							
		68							Abandoned Hole
									Moved 10 ft. West
		69							To 138
		70							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 138 SHEET No. 1 OF

PROJECT Welland Rail/Road Tunnel WEATHER INSPECTOR T.Svercher

SITE TEMP. °F STARTED 1300 M. Mar.20 19 68

LOCATION 36,918N (LATITUDE) 9,964E (DEPARTURE) BEARING DIP 90 ° FINISHED 1700 M. Mar.23 19 68

CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.

METHOD OF BORING: SOIL Power Auger 6" and 8" CASING DIAM. DRILL PLATFORM

ROCK GROUND SURFACE 571.4

CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT, ETC.
		51							
		52							
	Reddish grey silty clay.Soft.Wet.	53		CO	1	5	48		Pushed with drill's Hydraulic Head System Press. 1250 P.S.I.
		54							
		55							
		56							
		57							
		58							
		59							
		60							For samples in this area see Hole 137
		61							
		62							
		63							
		64							
		65							
	As Above	66		CO	2	5	48		As CO 1 Pressure 1100 P.S.I.
		67							
		68							
		69							As Above
	As Above	70		CO	3	5	48		Pressure 900 P.S.I.

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS

NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 138 SHEET No. 2 OF 2

PROJECT ... WEATHER ... INSPECTOR ...

SITE ... TEMP. ... °F STARTED ... M. ... 19...

LOCATION ... (LATITUDE) (DEPARTURE) BEARING ... DIP ... ° FINISHED ... M. ... 19...

CONTRACTOR ... ELEVATIONS: DATUM ...

METHOD OF BORING: SOIL ... CASING DIAM. ... DRILL PLATFORM ...

ROCK ... GROUND SURFACE ...

CORE DIAM. ... WATER LEVELS ...

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT, ETC.
		71		CO	3				See Page 1
		72							
		73							
		74							
		75		CO	4	5	48		Pressure 750 P.S.I.
		76							
		77							
		78		CO	5	5	48		Sample damaged by frost due to neglect of proper storage during weekend
		79							
		80							
		81		END OF HOLE					
		82							
		83							
		84							
		85							
		86							
		87							
		88							
		89							
		90							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION 165+43 69' N of ℄ (LATITUDE) (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Auger & Wash Boring; ROCK

JOB No. 1684 HOLE No. 139 SHEET No. 1 OF 3
WEATHER INSPECTOR T.S. & C.N.
TEMP. °F STARTED 0800 M. Mar. 24 19 68
DIP 90 ° FINISHED 1800 M. Apr. 2 19 68
ELEVATIONS: DATUM G.S.C.
CASING DIAM. 6" DRILL PLATFORM
GROUND SURFACE 573.9
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: M - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		41							No Sample Taken Above 40 feet
		42							
		43							
		44							
		45							
	Reddish brown silty clay	46							
		47		CO	1	5	44		Pushed Hydraulicly Max. Press. 900 P.S.I.
		48							
		49							
		50							
		51		CO	2	5	46		As Above Pressure 750 P.S.I.
		52							
		53							
		54							
		55		CO	3	5	48		As Above Pressure 520 P.S.I.
		56							
		57							
		58							
		59							
		60		CO	4	5	40		As Above Pressure 500 P.S.I.

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 139 SHEET No. 2 OF 3

PROJECT ... WEATHER ... INSPECTOR ...

SITE ... TEMP. ... °F STARTED ... .M. ... 19...

LOCATION ... (LATITUDE) (DEPARTURE) BEARING ... DIP ... ° FINISHED ... .M. ... 19...

CONTRACTOR ... ELEVATIONS: DATUM ...

METHOD OF BORING: SOIL ... CASING DIAM. ... DRILL PLATFORM ...

ROCK ... GROUND SURFACE ...

CORE DIAM. ... WATER LEVELS ...

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

NOTE: LOGGING CAN ONLY BE DONE FROM END OF EACH 4 FT. SAMPLE ANL IS CONSEQUENTLY VERY SKETCHY.

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	See Page 1			CO	4	Cont'd			March 29
									Switched to Diamond
	Reddish brown clayey silt to silty clay W/ dry grey silt pockets & occasional gravel up to 1/2" (Rounded)	61							Drill and Casing
		63		CO	5	5	40		Pushed with drill head
		64							
		65							
	Reddish brown silty clay mottled with red and grey pockets and layers. Firmer than CO 5.	66							Pushed with drill
		67		CO	6	5	47		Head
		68							
		69							
	Greyish brown silt and clay. Soft.	70							As above
		71		CO	7	5	36		
		72							
		73							
		74							
	Reddish brown clay. Soft.	75		CO	8	5	46		As above
		76							
		77							April 1
									Sample starts
	As above	78							sliding out of tube
									Place in stove pipe
		79		CO	9	5	48		container
									Pushed easily
		80							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 139 SHEET No. 3 OF 3

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
									See Page 2 of 3
		81							
	Reddish brown silty clay vaguely layered	82							
	in grey & red clayey material. Occasional	83		CO	10	5	34		Pushed easily
	1/8" black gravel.	84							
		85							
	As above	86		CO	11	5	14		Pushed with effort
		87							
	Reddish brown clay							3	
	and silty sand with	88		CO	12		18	7	April 2
	small gravel up to 1/8".	89						16	
	Silty sand	90						6	
	Reddish brown silty			AQ	13		18	6	
	clay below 90'. Red	91						7	
	silty same with			CO	14	3	6½		Could not push with
	same clay.	92							full weight of drill
								3	& 3 Men
	Clay layer at 93'.	93		AQ	15			4	
								9	
	Red silty sand with	94						3	
	reddish brown silty			AQ	16			6	
	clay and grey pockets	95						10	
									Couldn't push more
	Reddish brown silty	96							than 8"
	sand with silty								Remainder of sample
	clay layers	97		CO	17	3	48		Hammered 300
									blows with 140 lb Hammer
		98							
		99							
	Red silty sand			AQ	18		7	5	
	Dilatent	100						5	End of hole

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 145 SHEET No. 1 OF 3

PROJECT Welland Rail/Road Tunnel WEATHER INSPECTOR J.Carella

SITE TEMP. °F STARTED 07:00 .M. Apr.18 1968

LOCATION N15,609,160;E1067,735 (LATITUDE) (DEPARTURE) BEARING DIP 90 ° FINISHED 17:00 .M. Apr.19 1968

CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.

METHOD OF BORING: SOIL Penn Drill 6 Ø Auger CASING DIAM. DRILL PLATFORM

ROCK GROUND SURFACE 581.8

CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE, B - THIN WALL TUBE, C - PISTON SAMPLER, D - CORE BARREL, E - AUGER, F - WASH, K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT, O - TUBE, P - WATER CONTENT TIN, Q - GLASS JAR, R - CLOTH BAG, S - PLIOFILM BAG, Y - CORE BOX, Z - DISCARDED

DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT, ETC.
								No samples above 20'0"
Reddish brown silty	21							
clay with grey layers								Pushed Hydraulicly
and 1/16" grey pockets.	22		BO	1	5	48		at 750 P.S.I.
Soft and moist	23							
	24							
	25							
As Above			BO	2	5	42		Pushed at 900 P.S.I.
	26							
	27							
	28							
Reddish brown silty	29							
clay with ¼" grey pockets								Pushed at 800 P.S.I.
¼" Black sub-angular	30		BO	3	5	48		
stones. Soft and moist								
	31							
	32							
Reddish br. silty clay	33							
with 1/16 black pockets			BO	4	5	45		Pushed at 750 P.S.I.
Soft and moist	34							
	35							
	36							
Reddish br. silty clay	37							
with thick grey layers			BO	5	5	40		Pushed at 1250 P.S.I.
Moist and stiff	38							
	39							
	40							

IDENTIFICATION AT END OF 4 FT. LONG TUBES ONLY

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. | JOB No. 1684 | HOLE No. 145 | SHEET No. 2 OF 3

PROJECT | WEATHER | INSPECTOR

SITE | TEMP. °F | STARTED .M. 19

LOCATION (LATITUDE) (DEPARTURE) BEARING | DIP ° | FINISHED .M. 19

CONTRACTOR | ELEVATIONS: DATUM

METHOD OF BORING: SOIL | CASING DIAM. | DRILL PLATFORM

ROCK | GROUND SURFACE

CORE DIAM. | WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
									April 19, 1968
	Reddish br. silty clay	41							
	with thin layers of			BO	6	5	48		
	grey & red clay, fine	42							Pushed at 1000 P.S.I.
	seams of silty sand								
	Moist and stiff	43							
		44							
	Reddish br. silty clay	45							
	with grey clay layers			BO	7	5	48		Pushed at 750 P.S.I.
	& silty sand pockets	46							
	1/16" grey pockets								
	Soft and moist	47							
		48							
	Reddish br. silty clay	49							
	with grey pockets			BO	8	5	48		Pushed at 750 P.S.I.
	Soft and moist	50							
		51							
		52							
		53							
	As Above 1/4" sub-								
	angular stones	54		BO	9	5	48		Pushed at 600 P.S.I.
	Soft and moist								
		55							
		56							
		57							
	As Above			BO	10	5	48		Pushed at 600 P.S.I.
		58							
		59							
		60							

IDENTIFICATION AT END OF 4 FT. O IN. TUBES ONLY

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 145 SHEET No. 3 OF 3

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK .... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
IDENTIFICATION AT END OF 4 FT. O IN. TUBES ONLY	Reddish br. silty clay with grey layers Soft and moist	61 62 63 64 65		BO	11	5	48		Pushed at 600 P.S.I.
	As above plus sand layers	66 67 68		BO	12	5	48		Pushed at 750 P.S.I.
	Reddish br. silty clay with some silty sand.	69 70 71 72		BO	13	5	48		Pushed at 600 P.S.I.
	Red silty sand	73 74 75		AQ	14		24		Fell 3'-0" From Weight of Rods End of Hole

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. | JOB No. 1684 | HOLE No. 157 | SHEET No. 1 OF 3

PROJECT Welland Rail/Road Tunnel | WEATHER | INSPECTOR J. Carella

SITE | TEMP. °F | STARTED 0700 .M. May 16 1968

LOCATION 37 398N (LATITUDE) 4 213E (DEPARTURE) | BEARING | DIP 90 ° | FINISHED 1700 .M. May 17 1968

CONTRACTOR Peninsula Soils Investigation | ELEVATIONS: DATUM G.S.C.

METHOD OF BORING: SOIL Mod. Wash Boring | CASING DIAM. NX | DRILL PLATFORM

ROCK | CORE DIAM. | GROUND SURFACE 596.2 | WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown silty clay with grey clay pockets. Stiff & moist	1		CO	1	3	18		This hole was bored in a hydraulic fill
		2							
	Reddish brown silty clay with grey layers Very soft and moist	3		CO	2	3	18		
		4							
		5							
	As Above	6		CO	3	3	20		
		7							
	Reddish Brown Silty clay with red and grey layers. Fine gravel very very soft&moist (soft as warm butter)	8		CO	4	3	20		
		9							
		10							
	As Above	11		CO	5	3	18		
		12							
	Reddish brown silty clay. Grey silt layers Stiff and moist	13		CO	6	3	20		
		14							
	Could not push sample with hyd. head. Brown silty clay. Stiff and moist. Brown silty clay with red&grey layers. Stiff and moist.	15		CO	7	3	6	4	Used small hammer
		16		BO	8	3	20	12	to bang Shelby
		17						21	
								33	
	Brown silty clay with grey layers and red layers. Very stiff and dry.	18		BO	9	3	12	15	May 17, 1968
		19						21	
		20						28	
								60	

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 157 SHEET No. 2 OF 3
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Tube broke away from head. Used split spoon to recover.	21		BO	10	3		7 15	
	Grey brown silty clay with traces of organic mat'l.	22						27 47	
		23							
	Brown silty clay with red and grey layers Stiff and moist	24		AQ	11		18	11 11 12	
		25							
	Brownish grey silty clay with red layers Stiff and dry	26		AQ	12		8	7 14 20 24	
		27							
	Greyish brown silty clay with red layers Soft and moist	28		AQ	13		24	3 4 4 4	
		29							
		30							
	Brownish grey silty clay with red layers Soft and moist	31		BO	14	3	24		Pushed by hand
		32							
		33							Pushed by hand
	As above	34		BO	15	3	24		
		35							
	Grey silty clay	36		BO	16	3	22		Pushed by hand
		37							
		38							
	As Above	39		BO	17	3	23		Pushed by hand
		40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 157 SHEET No. 3 OF 3

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....
(LATITUDE) (DEPARTURE)

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish grey silty clay. Soft and moist	41		BO	18	3	24		Pushed by hand
		42							Hole abanded at 42'0"
		43							Moved to hole 157A
		44							Took vane test to 16'0". Took split spoon from 15'0"
		45							
		46							
		47							
		48							

COMPLETE IN DUPLICATE FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE
LOCATION 15,609,000N (LATITUDE) 1078,000E (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Mod. Wash; ROCK Dia. Drill

JOB No. 1684 HOLE No. 168 SHEET No. 1 OF 5
WEATHER INSPECTOR Montgomery
TEMP. °F STARTED M. July 16 1968
DIP 90 ° FINISHED M. July 22 1968
CASING DIAM. NX CORE DIAM. BX
ELEVATIONS: DATUM G.S.C.
DRILL PLATFORM
GROUND SURFACE 586.0
WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		1							
		2							
		3							
		4							
		5							
	Reddish brown silty clay. Stiff and slightly moist	6		AY	1		12	5 11	
		7						20 26	
		8						4	
	Reddish brown silty clay. Soft and moist	9		AY	2		24	6 8 16	
		10							
	Grey brown silty clay with dark grey pockets to 1/16". Pushed by hand. Med. soft&moist.	11		BO	1	3	24		Pushed by hand
		12							
	Brown silty clay with red and grey layers Soft and moist	13		BO	2	3	24		
		14							
		15							
	Red clay Soft and moist	16		BO	3	3	24		Pushed by hand
		17							
	Reddish brown silty clay Gummy texture	18		BO	4	3	24		Pushed by hand
		19							
		20							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 168 SHEET No. 2 OF 5
PROJECT WEATHER INSPECTOR
SITE TEMP. °F STARTED .M. 19
LOCATION (LATITUDE) (DEPARTURE) BEARING DIP ° FINISHED .M. 19
CONTRACTOR ELEVATIONS: DATUM
METHOD OF BORING: SOIL CASING DIAM. DRILL PLATFORM
ROCK GROUND SURFACE
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		20							
	Reddish brown silty clay firm and moist	21		CO	5	3	19		Pushed by hand
		22							
		23							
	As Above	24		CO	6	3	18		Pushed by hand
	Reddish brown silty clay. Grey silt pockets to 1/16". Bits of smooth & sub-angular rock. Firm and moist	25							
		26		CO	7	3	18		Pushed by hand
		27							
	Reddish brown silty clay. Grey silt pockets. Rock chips up to 1/8". Firm&moist	28		CO	8	3	20		
		29							Pushed by hand
		30							
	Reddish brown silty clay with Subangular stone to ¼"	31		CO	9	3	21		Pushed by hand
		32							
		33							First 6" sank by
	As Above	34		CO	10	3			itself. Remainder pushed by hand.
		35							
	Reddish brown silty clay. Very soft and moist	36		CO	11	3	15		Pushed by hand
		37							
	Greyish borwn silty clay Soft and moist	38		CO	12	3	20		Pushed by hand
		39							
		40							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 168 SHEET No. 3 OF 5

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. / DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
	Reddish brown	40							4½" under own weight
	grey clay.	41							Remainder by hand
	Soft and moist			CO	13	3	17		
		42							
									6" under own weight
	Mixture of reddish	43							Remainder by hand
	brown clay and fine			CO	14	3	18		
	sand	44							
		45							
	Reddish brown clay							6	
	and fine sand.	46		AY	15		24	6	
								5	
		47						5	
		48						3	
	As above			AY	16		24	1	
		49						3	
								5	
		50							
	Very soft-wet								
	brownish red clay	51		CO	17	3	14		Pushed by hand
		52							
	Reddish brown	53							
	clay. Soft and			CO	18	3	12		Fell to 54'6"
	moist.	54							
	Greyish brown	55							
	silty clay			CO	19	3	20		8" under own weight
	Soft and moist	56							Pushed by hand
		57							
	Reddish brown and								
	grey silty clay	58		CO	20	3	20		Pushed by hand
	Soft and moist								
		59							
	As above with grey								
	silt pocket to 1/16"	60		CO	21	3	17		Pushed by hand

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS

NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.

PROJECT

SITE

LOCATION (LATITUDE) (DEPARTURE) BEARING

CONTRACTOR

METHOD OF BORING: SOIL

ROCK

JOB No. 1684 HOLE No. 168 SHEET No. 4 OF 5

WEATHER INSPECTOR

TEMP. °F STARTED .M. 19

DIP ° FINISHED .M. 19

ELEVATIONS: DATUM

DRILL PLATFORM

GROUND SURFACE

WATER LEVELS

CASING DIAM.

CORE DIAM.

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: M - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	SAMPLE TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		60							
		61							
		62							11" under own weight
	Reddish brown silty clay. Very soft and moist.	63		CO	22	3	19		Remainder by hand
		64							
	Till (sand, clay and subangular rock 1/4" to 1-1/2")	65		CO	23	3	6		Pushed by hand
		66							
	Hard grey till or bedrock	67		AY	24		14	42	
		68						58	
								94	
		69							Hammered casing to 69'
		70							Drilled to 74' from 68' to 79'
	Gravel (mostly rounded) and broken stones. Definitely not bedrock.	71							Till and boulder (70' bedrock)
		72							Casing hammered to 74'
		73							No samples retained between 68' and 74' (till and boulder chips)
		74							
		75							
		76							
		77							
		78							
	Bedrock	79							
		80							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 168 SHEET No. 5 OF 5

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT - SAND - CLAY - GRAVEL

* SAMPLE CONDITION: GOOD - DISTURBED - FAIR - LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		81			DY-25				Poor recovery
		82							cave-ins and
		83							broken core
		84			DY-26				
		85							
		86							
		87			DY-27				
		88							
		89							88'6" End of hole
									Hole grouted

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 169 SHEET No. 1 OF 5

PROJECT Welland Rail/Road Tunnel WEATHER INSPECTOR R. Manuel

SITE TEMP. °F STARTED 24 M. July 1968

LOCATION 36' SE of test shaft (LATITUDE) (DEPARTURE) BEARING DIP 90 ° FINISHED 26 M. July 1968

CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.

METHOD OF BORING: SOIL Vane test and split spoon CASING DIAM. NX DRILL PLATFORM

ROCK GROUND SURFACE 571.5

CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		0							
		10							Wash casing down to 20'-0"
		20							
	Dry firm reddish brown silty clay Very plastic	21		AY	1		18		Split spoon #1 20'-0" to 22'-0"
		22						10	Vane test 21'-6"
		23							24 x 40 lb = 960 lb
	As Above	24		AY	2		20		Split spoon #2 Vane test #2
		25						13	24 x 50 lb = 1200 lb+
	As Above	26		AY	3		18		Split spoon #3 Vane test #3
		27						9	24 x 30 lb = 720 lb
		28							Split spoon #4 Vane test #4
	As above Just a bit softer	29		AY	4		8		24 x 32 lb = 768 lb 24 x 18 lb = 432 lb
		30						5	Split spoon #5
	Reddish brown silty clay. Grey clay layers	31		AY	5		24		Vane test #5 24 x 20 = 480 lb 24 x 8 = 192 lb
		32						8	
		33							Split spoon #6 Vane test #6
	As above	34		AY	6		24		24 x 13 = 312 lb 24 x 6 = 144 lb
		35						6	L = 45° Split spoon #7
	As above	36		AY	7		24		Vane test #7 24 x 16 = 384 lb 24 x 6 = 144 lb
		37						7	L = 15°

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 169 SHEET No. 2 OF 5

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		38							Vane test #8
									24 x 15 = 360 lb
	As above			AY	8		24		24 x 2.5 = 66 lb
		39							L = 10°
								5	
		40							Vane test #9
									24 x 11 = 264 lb
	As above	41		AY	9		24		18 x 3.5 = 63 lb
									L = 20°
		42						4	
									Vane test #10
		43							18 x 14 = 252 lb
	As above			AY	10		24		12 x 6 = 72 lb
		44							L = 15° 25 lb scale
								5	
		45							Vane test #11
									18 x 16 = 288 lb
	As above	46		AY	11		24		12 x 5 = 60 lb
									L = 20°
		47						6	
									Vane test #12
		48							12 x 25 = 300 lb
	As above			AY	12		24		12 x 7 = 84 lb
		49							
								5	
		50							Vane test #13
									18 x 9 = 167 lb
	As above	51		AY	13		24		12 x 8 = 96 lb
		52						5	
									Vane test #14
		53							18 x 15 = 270 lb
	As above			AY	14		24		12 x 8.5 = 102 lb
		54							L = 15°
								5	
		55							Vane test #15
									18 x 12 = 216 lb
	As above	56		AY	15		20		12 x 8 = 96 lb
									L = 10°
		57						5	

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 169 SHEET No. 3 OF 5

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER; M - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR

** SHIPPING CONTAINER: R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		58							Vane test #16
									18 x 15 = 270 lb
	As above	59	X	AY	16		24		12 x 6 = 72 lb
									L = 35°
		60						5	
									Vane test #17
									18 x 5 = 90 lb
	As above	61	X	AY	17		24		12 x 7 = 84 lb
									L = 30°
		62						5	
									Vane test #18
		63							18 x 14 = 252 lb
	As above		X	AY	18		24		12 x 6 = 72 lb
		64							L = 45°
								5	
		65							Vane test #19
									18 x 14 = 252 lb
	As above	66	X	AY	19		24		12 x 8 = 96 lb
									L = 45°
		67						6	
									Vane test #20
	Reddish brown	68							18 x 18 = 324 lb
	silty clay layer		X	AY	20		24		12 x 6 = 72 lb
	material	69							L = 15°
								5	
		70							Vane test #21
									18 x 15 = 270 lb
	As above	71	X	AY	21		24		12 x 6 = 72 lb
									L = 5°
		72						6	
									Vane test #22
		73							18 x 16 = 188 lb
									12 x 5 = 60 lb
	Split spoon	74							L = 45°
	dropped into hole								
	plugged up. Put	75							
	casing down 4'-6"								
	to get past	76							
	disturbed clay								
		77							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 169 SHEET No. 4 OF 5

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK ..... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		78							
		79							
		80							Vane test #23
									at 80'=0"
									18 x 15 = 270 lb
									12 x 8 = 96 lb
									End of hole

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: St. Lawrence Seaway Authority — JOB No. 1684

PROJECT: Welland Rail/Road Tunnel — HOLE No. 169

SITE: Welland, Townline Road — SHEET No. 5 OF 5

Torque Assembly: 25 and 50 lb Spring Balance

Vane No.: 242

RESULTS OF VANE TESTS

Elevation (Feet)	Shear Strength P.S.F. Natural	Remoulded	Sensitivity
550.0	2,840	-	-
547.5	3,520	-	-
545.0	2,120	-	-
542.5	2,340	1,275	1.8
540.0	1,490	566	2.6
537.5	920	425	2.2
535.5	1,130	425	2.7
533.0	1,130	177	6.4
530.5	825	186	4.4
528.0	754	212	3.6
525.5	900	177	5.1
523.0	940	248	3.8
520.5	478	283	1.7
518.0	796	301	2.6
515.5	637	284	2.2
513.0	796	212	3.8
510.5	-	248	-
508.0	744	212	3.5
505.5	745	283	2.6
503.0	1,015	212	4.8
500.5	796	212	3.8
498.0	901	177	5.1
591.5	796	212	3.8

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 173 SHEET No. 1 OF 3
PROJECT Welland Rail/Road Tunnel WEATHER ..... INSPECTOR R.Manuel
SITE Existing Canal, 10' W. of Waterline TEMP. ..... °F STARTED 8 .M. Aug. 1968
LOCATION 15' N. of Sta. 1105 (LATITUDE) (DEPARTURE) BEARING ..... DIP 90 ° FINISHED 12 .M. Aug. 1968
CONTRACTOR ..... ELEVATIONS: DATUM G.S.C.
METHOD OF BORING: SOIL Power Auger 6" Ø CASING DIAM. ..... DRILL PLATFORM .....
ROCK ..... CORE DIAM. ..... GROUND SURFACE 572
WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	*	SAMPLE ** TYPE	No.	SIZE (IN.)	RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		5							
	Very dense, hard silty clay	6		CO	1	5	2'-6		1'-0" 300 P.S.I. 2'-0" 750 P.S.I.
		7							3'-0" 4'-0"
		8							
		9							
		10							
	Reddish brown silty clay Grey clay layers	11		CO	2	5	3		1'-0" 250 P.S.I. 2'-0" 500 P.S.I. 3'-0" 750 P.S.I.
		12							4'-0"
		13							
		14							
		15							
	As Above	16							1'-0" 275 P.S.I. 2'-0" 475 P.S.I.
		17							3'-0" 525 P.S.I. 4'-0" 755 P.S.I.
		18		CO	3	5	4'-4		
		19							
		20							
		21							1'-0" 100 P.S.I. 2'-0" 400 P.S.I.
	As Above	22		CO	4	5	3'-9		3'-0" 600 P.S.I. 4'-0" 950 P.S.I.
		23							
		24							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 173 SHEET No. 2 OF 3

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		25							
		26							1'-0" 350 P.S.I. 2'-0" 600 P.S.I. 3'-0" 800 P.S.I.
	As Above	27		CO	3	5	3'-9		4'-0" 1000 P.S.I.
		28							
		29							
		30							
		31							1'-0" 50 P.S.I. 2'-0" 300 P.S.I. 3'-0" 475 P.S.I.
	As Above	32		CO	6	5	4'-4		4'-0" 525 P.S.I.
		33							
		34							
		35							
		36							1'-0" 50 P.S.I. 2'-0" 250 P.S.I. 3'-0" 400 P.S.I.
	As Above	37		CO	7	5	4'-4		4'-0" 750 P.S.I.
		38							
		39							
		40							
		41							1'-0" 150 P.S.I. 2'-0" 400 P.S.I.
	As Above	42		CO	8	5	4'-4		3'-0" 500 P.S.I. 4'-0" 750 P.S.I.
		43							
		44							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 173 SHEET No. 3 OF 3

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: H - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		45							
		46							1'-0" 250 P.S.I.
									2'-0" 475 P.S.I.
	As Above	47		CO	9	5	4'-4		3'-0" 600 P.S.I.
									4'-0" 750 P.S.I.
		48							
		49							
		50							
		51							1'-0" is Cave in
									Material. 3'-0" is
	As Above	52		CO	10	5	3		as Above - Max. P.S.I.
									is 600 P.S.I.
		53							
									1'-0" 100 P.S.I.
		54							2'-0" 200 P.S.I.
	Silty clay and sand								3'-0" 850 P.S.I.
		55		CO	11	5	3		
		56							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.I.S.A. JOB No. 1684 HOLE No. 174 SHEET No. 1 OF 2

PROJECT Welland Rail/Road Tunnel WEATHER ____ INSPECTOR R.Manual

SITE Existing Welland Canal TEMP. ____ °F STARTED 13 M. Aug. 1968

LOCATION Station 957+00; 9' W. of bank (LATITUDE) (DEPARTURE) BEARING ____ DIP 90 ° FINISHED 14 M. Aug. 1968

CONTRACTOR Peninsula Soils Investigation ELEVATIONS: DATUM G.S.C.

METHOD OF BORING: SOIL Auger CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE 572

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D. (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		5							
	Pressure								
	1'-0" = 250 P.S.I.	6							
	2'-0" = 575 P.S.I.								Rods wouldn't turn
	3'-0" = 950 P.S.I.	7							Material wouldn't stay
	4'-0" = 1100 P.S.I.			BO	1	5	4'-4		in tube. Sample lost.
		8							
		9							
		10							
									Pressure
	Material:	11							1'-0" = 250 P.S.I.
	Reddish brown								2'-0" = 475 P.S.I.
	silty clay	12							3'-0" = 625 P.S.I.
	Very hard			BO	2	5	4'-4		4'-0" = 875 P.S.I.
		13							
		14							
		15							
	Pressure	16							Rods wouldn't turn
	1'-0" = 500 P.S.I.								Material wouldn't stay
	2'-0" = 750 P.S.I.	17		BO	3	5	4'-4		in tube. Sample lost
	3'-0" = 925 P.S.I.								
	4'-0" = 1150 P.S.I.	18							
		19							
		20							
	Material	21							Pressure
	Reddish brown								1'-0" = 250 P.S.I.
	silty clay	22		BO	4	5	4'-4		2'-0" = 425 P.S.I.
	Very dry and hard								3'-0" = 575 P.S.I.
		23							4'-0" = 850 P.S.I.
		24							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.I.S.A. JOB No. 1684 HOLE No. 174 SHEET No. 2 OF 2

PROJECT ..... WEATHER ..... INSPECTOR .....

SITE ..... TEMP. ..... °F STARTED ..... .M. ..... 19.....

LOCATION ..... (LATITUDE) (DEPARTURE) BEARING ..... DIP ..... ° FINISHED ..... .M. ..... 19.....

CONTRACTOR ..... ELEVATIONS: DATUM .....

METHOD OF BORING: SOIL ..... CASING DIAM. ..... DRILL PLATFORM .....

ROCK .... GROUND SURFACE .....

CORE DIAM. ..... WATER LEVELS .....

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		25							
	Material	26							Pressure
	As Above								1'-0" = 375 P.S.I.
		27		BO	5		4'-4		2'-0" = 525 P.S.I.
									3'-0" = 675 P.S.I.
		28							4'-0" = 850 P.S.I.
		29							
		30							
	Material	31							Pressure
	As Above								1'-0" = 275 P.S.I.
		32							2'-0" = 475 P.S.I.
				BO	6		4'-4		3'-0" = 775 P.S.I.
		33							4'-0" = 1150 P.S.I.
		34							
		35							
		36							Pressure
	Material								1'-0" = 250 P.S.I.
	As Above	37							2'-0" = 550 P.S.I.
				BO	7		4'-4		3'-0" = 750 P.S.I.
		38							4'-0" = 1000 P.S.I.
		39							
		40							
									Pressure
	Reddish Brown Silty	41							1'-0" = 250 P.S.I.
	Clay for 3'-0"& 1'-0"								2'-0" = 500 P.S.I.
	Silty Sand and Med.	42		BO	8		4'-4		3'-0" = 650 P.S.I.
	to Coarse Gravel								4'-0" = 1000 P.S.I.
		43							
		44							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A.
PROJECT Welland Rail/Road Tunnel
SITE Existing Welland Canal
LOCATION Station 933+50 (LATITUDE) 8'W.of bank (DEPARTURE) BEARING
CONTRACTOR Peninsula Soils Investigation
METHOD OF BORING: SOIL Power Auger (Penn Drill) ROCK

JOB No. 1684 HOLE No. 175 SHEET No. 1 OF 2
WEATHER INSPECTOR R.Manuel
TEMP. °F STARTED 14 .M. Aug. 19 68
DIP 90 ° FINISHED 15 .M. Aug. 19 68
ELEVATIONS: DATUM G.S.C.
CASING DIAM. DRILL PLATFORM
GROUND SURFACE 573
CORE DIAM. WATER LEVELS

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER
** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. — DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		5							
	Brown very hard clay.	6							Pressure at drill head
	Dry.								1'-0" = 525 P.S.I.
		7							2'-0" = 750 P.S.I.
				BO	1	5	3'		3'-0" = 1000 P.S.I.
		8							4'-0" lifted drill
		9							
		10							
	As Above	11							Pressure
	with med. gravel								1'-0" = 675 P.S.I.
		12							2'-0" = 1250 P.S.I.
				BO	2	5	2'		3'-0" lifted drill
		13							
									Pressure Too Much
		14							After 2'-0"
		15							
		16							1'-0" = 850 P.S.I.
									2'-0" = 1250 P.S.I.
	As Above	17		BO	3	5	1'-2		
		18							Too Much Pressure
									After 1' - 2'
		19							
		20							
									1'-0" - 1250 P.S.I.
		21							Pressure too much
									after 1'-0"
		22		BO	4	5	0		Sample lost
									Shellby was bent
		23							Must have been on rock
		24							

COMPLETE IN DUPLICATE

FORM 176

H. G. ACRES & COMPANY LIMITED - CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

FIELD BOREHOLE LOG

CLIENT S.L.S.A. JOB No. 1684 HOLE No. 175 SHEET No. 2 OF 2

PROJECT ____ WEATHER ____ INSPECTOR ____

SITE ____ TEMP. ____ °F STARTED ____ .M. ____ 19____

LOCATION ____ (LATITUDE) (DEPARTURE) BEARING ____ DIP ____ ° FINISHED ____ .M. ____ 19____

CONTRACTOR ____ ELEVATIONS: DATUM ____

METHOD OF BORING: SOIL ____ CASING DIAM. ____ DRILL PLATFORM ____

ROCK ____ GROUND SURFACE ____

CORE DIAM. ____ WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: A - SPLIT TUBE; B - THIN WALL TUBE; C - PISTON SAMPLER; D - CORE BARREL; E - AUGER; F - WASH; K - SLOTTED SAMPLER

** SHIPPING CONTAINER: N - INSERT; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; Y - CORE BOX; Z - DISCARDED

LOG	DESCRIPTION: COLOUR; CONSISTENCY DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; ODOUR; ETC.	ELEV. DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE No.	SAMPLE SIZE (IN.)	SAMPLE RET'D (IN.)	BLOWS PER 6 INCH	NOTES: BORING, TESTING AND SAMPLING PROCEDURES; WATER LOSS AND GAIN; DRILLING AND TESTING EQUIPMENT. ETC.
		25							
	Reddish brown silty clay with fine gravel	26							1'-0" = 400 P.S.I.
		27		BO	5	5	4-4		2'-0" = 625 P.S.I.
		28							3'-0" = 1000 P.S.I.
		29							4'-0" = 1175 P.S.I.
		30							
		31							1'-0" = 250 P.S.I.
	As Above	32		BO	6	5	4-4		2'-0" = 475 P.S.I.
		33							3'-0" = 650 P.S.I.
		34							4'-0" = 850 P.S.I.
		35							
		36		BO	7	5	2		1'-0" = 150 P.S.I.
		37							2'-0" = 750 P.S.I.
	Brown silty sand	38		AQ	1		2	18	Split Spoon
		39						27	
		40						30	
	As Above	41		AQ	2		2	18	
		42						20	Split Spoon
		43						30	
		44						35	

COMPLETE IN DUPLICATE

FORM 176

WATER-PRESSURE TESTS

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 102-B

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
136	131	78	5	0.3	.06	
131	126	75	5	1.9	.38	
130	125	72	5	47.7	9.54	Max. Cap. of Pump
125	120	70	5	47.0	9.40	Max. Cap. of Pump

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 104

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
93	98	62	5	0.1	0.02	Hole caved in below the 98-foot depth

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 105

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER-PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
114.5	109.5	110	5	0.1	0	
109.5	104.5	45	5	64	12.8	
108.5	103.5	45	5	51	10.2	
107.5	102.5	50	5	45	11.0	
106.5	101.5	50	5	66	3.3	
113.2	108.2	110 ?	5	10	2.0	
112.2	107.2	110 ?	5	39	7.8	
111.2	106.2	110 ?	5	46	9.2	
110.2	104.2	55	5	65	13.0	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel — HOLE No. 107-B

SITE Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
123	128	126	5	1.3	.26	
128	133	133	5	13.2	2.64	
133	138	136	5	12.9	2.58	
138	143	145	10	9.3	.93	
143	148	145	5	1.6	.32	
148	153	150	5	10	2.0	

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 108-B

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
74	79	50	10	130	13.0	
74	79	55	10	140	14.0	
79	84	86	10	24.5	2.45	
84	89	90	10	0.2	0.02	
89	94	90	10	0	0	
94	99	99	10	4.1	0.41	
99	104	104	10	0.6	0.06	
104	109	109	5	0	0	
109	114	114	10	5.1	0.51	
114	119	118	5	0	0	
119	124	124	10	16.2	1.62	
124	129	127	10	4.8	0.48	Slight leak
129	134	132	10	3.9	0.39	
134	139	138	5	0	0	
73	78	55	10	151	15.1	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 109

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
67	72	40	10	74.8	7.48	
72	77	45	4.5	60.3	13.4	Ran out of water
72	77	45	5	63.9	12.8	
77	82	50	4	50	12.5	Ran out of water
82	87	55	5	0.1	0.01	Refusal
87	92	60	9	6.2	0.62	
92	97	67	5	25	0.50	
97	102	70	5	0.5	0.05	Refusal
102	107	76	5	27.7	5.54	
107	112	88	5	8.5	1.70	
112	117	90	10	8.7	0.87	
117	122	97	10	24.5	2.45	
122	127	102	10	51.5	5.15	
127	132	108	5	3.3	0.66	
132	137	111.5	5	2.6	0.52	
137	142	116.5	5	2.2	0.44	
142	147	120.0	5	2.6	0.52	
145	150	125.0	5	3.6	0.72	

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 111

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
122.5	117.5	83	5	4.8	0.96	
117.5	112.5	76	5	3.4	0.68	
107.5	112.5	72	5	2.4	0.48	
107.5	102.5	65	5	0.2	0.04	Meter checked O.K.
102.5	97.5	60	5	0.1	0.02	
97.5	92.5	55	5	1.4	0.28	
92.5	87.5	53	10	25.6	2.60	Packer tightened
87.5	82.5	46	10	97.0	9.70	Packer in casing

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 114

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
147.6	142.6	101	5	3.0	0.60	
142.6	137.6	93	5	1.5	0.30	
137.6	132.6	90	5	2.3	0.46	
132.6	127.6	84	5	1.9	0.38	
127.6	122.6	77	5	1.9	0.38	Slight leaks at rods
122.6	117.6	72	5	1.2	0.24	
119	114	70	5	6.9	1.38	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 115

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER-PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
126	121	95	5	2.1	0.42	Slight leak at casing
121	116	92	5	2.8	0.56	Slight leak at casing
118.5	113.5	84	5	1.8	0.36	No leak
115	110	78	10	21.2	2.12	Interconnection with piezometer tip at 122-foot level in hole 114

FORM 10. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 116

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
130	125	85	5	1.0	0.02	
125	120	80	5	2.2	0.44	
122.5	117.5	77	10	27.5	2.75	
121.5	116.5	75	10	42.0	4.20	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 117

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
133	128	70	5	0.1		Check water meter
128	123	65	5	2.9	0.58	
124	119	60	7	10.4	1.34	Interconnection with hole 115

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 118

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
128.5	123.5	80	5	0.2	0.04	
123.5	118.5	75	5	16.0	3.20	Cement coming up at 115-I
121	116	75	5	32.7	6.54	
118.5	113.5	65	5	24.0	4.80	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 119

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER-PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
121	116	85	5	2.0	0.40	
116	111	80	5	53.0	10.6	
113	108	75	10	75.5	7.55	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 120

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
120.4	115.4	85	5	2.0	0.04	
115	110	80	5	30.1	6.02	
114	109	50	5	20.5	4.01	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 121

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
124.2	119.2	85	5	0.2	0.04	
119.2	114.2	80	5	4.0	0.8	
116.7	111.7	75	5	0.9	0.18	
114.2	109.2	70	5	12.7	2.54	

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 122

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
128.2	123.2	85	5	0.4	0.08	
123.2	118.2	70	5	0.4	0.08	
120.2	115.2	65	5	0.8	0.16	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 123

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
179	174	90	5	0.4	0.08	
174	169	85	5	0.3	0.06	
169	164	83	5	2.1	0.42	
164	159	75	5	7.6	1.52	
159	154	70	5	4.1	0.82	
154	149	66	5	3.0	0.06	
149	144	62	5	1.0	0.20	
144	139	57	5	0.5	0.10	
139	134	56	5	0.0	0	
134	129	47	5	0.1	0.02	
129	124	40	5	8.5	1.70	
124	119	35	5	10.0	2.00	
119	114	37	10	36.0	3.60	
114	109	35	5	8.1	1.62	
109	104	38	5	6.5	1.30	
104	99	30	5	4.9	0.98	
99	94	36	5	0.6	0.12	
94	89	30	5	0.7	0.14	
89	84	30	5	0.0	0	
84	79	25	5	0.4	0.08	
79	74	23	10	72.5	7.25	

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 124

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
180	175	100	5	0.2	0.04	
175	170	97	5	0	0	
170	165	94	5	0.2	0.04	
165	160	90	5	0.2	0.04	
160	155	87	5	0.2	0.04	
155	150	85	5	0.5	0.10	
150	145	83	5	0.3	0.06	
145	140	81	5	0.1	0.02	
140	135	78	5	0.9	0.18	
135	130	75	5	0	0	
130	125	72	5	0	0	
125	120	70	5	0.2	0.04	
120	115	68	5	0.2	0.04	
115	110	65	5	0.8	0.16	
110	105	63	5	0.8	0.16	
105	100	60	5	0.3	0.06	
100	95	58	5	0.4	0.08	
95	90	55	5	0.2	0.04	
90	85	53	5	0.7	0.14	
85	80	50	5	0.8	0.16	
80	75	48	5	1.0	0.20	
75	71	30	5	76.2	15.2	Max cap. of pump

FORM NO. 81-F

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 125

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
180	175	95	5	0.4	.08	
175	170	93	5	1.4	.28	
170	165	90	5	0.2	.04	
165	160	88	5	0.2	.04	
160	155	85	5	0.4	.08	
155	150	83	5	0.7	.14	
150	145	80	5	1.2	.24	
145	140	78	5	0.1	0.40	
140	135	75	5	2.0	0.40	
135	130	73	5	4.7	0.94	
130	125	70	5	2.7	0.54	
125	120	70	5	4.7	0.94	
120	115	68	5	0	0	
115	110	65	5	7.7	1.54	
110	105	63	5	3.0	0.6	
105	100	60	5	4.0	0.8	
100	95	58	5	0.2	0.04	
95	90	58	5	0.6	0.12	
90	85	55	5	0	0	
85	80	53	5	0.1	0.02	
80	75	38	5	59.0	11.8	Max cap. of pump
75	70	38	5	59.0	11.8	Max cap. of pump

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 126

SITE: Welland Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
180	175	98	5	0.4	.08	
175	170	95	5	0.6	.12	
170	165	93	5	0.5	.10	
165	160	90	5	0.1	.02	
160	155	87	5	0.2	.04	
155	150	85	5	0.5	.10	
150	145	85	5	0.5	.10	
145	140	83	5	0.5	.10	
140	135	80	5	1.0	.20	
135	130	78	5	4.0	.80	Slight leak in rods
130	125	75	5	3.0	.60	
125	120	73	5	3.0	.60	
120	115	70	5	0.6	.12	
115	110	67	5	0.3	.60	
110	105	65	5	3.0	.60	
105	100	63	5	3.4	.68	
100	95	60	5	1.0	.20	
95	90	58	5	0.1	.02	
90	85	55	5	-	-	
85	80	53	5	0.3	.06	
80	75	20	5	62.0	12.4	Max cap. of pump
75	70	30	5	60.0	12.0	Max cap. of pump
70	67	30	5	60.0	12.0	Max cap. of pump

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 128

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
180	175	98	5	0.3	.06	
175	170	95	5	–	–	
170	165	95	5	24.1	4.82	
165	160	93	5	4.7	0.94	
160	155	90	5	2.5	0.5	
155	150	87	5	0.8	0.16	
150	145	84	5	0.4	0.08	
145	140	83	5	1.0	0.20	
140	135	80	5	2.0	0.4	
135	130	78	5	0.9	0.18	
130	125	75	5	4.8	0.96	
125	120	73	5	4.5	0.90	
120	115	70	5	1.2	0.24	
115	110	67	5	4.1	0.82	
110	105	65	5	6.4	1.28	
105	100	63	5	0.2	0.04	
100	95	60	5	0.6	0.12	
95	90	57	5	3.7	0.74	
90	85	55	5	2.9	0.58	
85	80	53	5	0.1	0.02	
80	75	50	5	29.0	5.8	
75	70	30	5	37.5	7.5	Max cap. of pump

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 130

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
178	173	98	5	1.2	0.24	
175	170	95	5	0.6	0.12	
170	165	93	5	3.2	0.64	
165	160	90	5	1.0	0.20	
160	155	87	5	1.3	0.26	
155	150	85	5	1.1	0.22	
150	145	83	5	5.0	1.0	
145	140	80	5	3.2	0.64	
140	135	78	5	0.9	0.18	
135	130	73	5	4.2	0.84	
130	125	73	5	8.0	1.6	
125	120	70	5	5.0	1.0	
120	115	68	5	8.8	1.76	
115	110	65	5	5.5	1.10	
110	105	63	5	32.5	6.50	
105	100	60	5	5.8	1.16	
100	95	57	5	4.7	0.94	
95	90	55	5	2.6	0.52	
90	85	53	5	6.5	1.30	
85	80	25	5	66.0	13.2	
80	75	50	5	20.0	4.0	Max cap. of pump
75	70	35	5	50.0	10.0	Max cap. of pump
73.5	68.5	40	5	74.0	14.8	Max cap. of pump

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 132

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
174	169	96	5	1.1	0.22	
169	164	90	5	5.1	1.02	Unable to set closer
164	159	90	5	11.3	2.26	
159	154	88	5	5.3	1.06	
154	149	87	5	1.3	0.26	
149	144	84	5	2.7	0.54	
144	139	81	5	2.9	0.58	
139	134	79	5	5.5	1.10	
134	129	77	5	4.6	0.92	
129	124	75	5	2.6	0.52	
124	119	72	5	13.1	2.62	
119	114	70	5	7.6	1.52	
114	109	68	5	7.1	1.42	
109	104	65	5	4.2	0.84	
104	99	63	5	2.1	0.42	
99	94	60	5	1.3	0.26	
94	89	58	5	2.0	0.40	
89	84	55	5	1.3	0.26	
84	79	53	5	2.3	0.46	
79	74	50	5	3.3	0.66	
77	72	49	2	26.9	13.45	Throttle held manually
73.5	68.5	46	2	26.6	13.30	Throttle held manually

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 133

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
93.3	88.3	60	5	17.5	3.5	
88.3	83.3	55	5	42.0	8.4	Water coming up around casing

FORM NO 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 135

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
91	86	40	5	51.0	10.2	Max cap. of pump
86	81	55	5	38.0	7.6	

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 140

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
114.5	109.5	65	5	2.5	0.50	BX - Packer
109.5	104.5	63	5	1.7	0.34	
104.5	99.5	60	5	0.2	0.04	
99.5	94.5	58	5	0.3	0.06	
94.5	89.5	56	5	0	0	NX - Packer: Top rubber won't go past seam
91	86	54	5	1.1	0.22	
75	70	0	2	15.9	7.9	
70	65	45	5	34.0	6.8	At 71'-11", water coming to surface
68	63	44	5	46.2	9.24	Water coming up 5' beside hole

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 143

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
127.5	122.5	70	5	5.0	1.0	
122.5	117.5	68	5	7.0	1.4	
117.5	112.5	65	5	6.1	1.22	
112.5	107.5	63	5	9.0	1.8	
107.5	102.5	60	5	2.3	0.46	
102.5	97.5	57	5	12.2	2.44	
97.5	92.5	55	5	.5	0.10	
92.5	87.5	53	5	3.5	0.70	
87.5	82.5	50	5	1.5	0.30	
83	78	50	5	8.0	1.60	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 146

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
130	125	75	5	9.0	1.8	
125	120	73	5	6.5	1.3	
120	115	70	5	13.0	2.6	
115	110	68	5	0.8	0.16	
110	105	65	5	11.0	2.2	
105	100	63	5	2.5	0.5	
100	95	60	5	30.0	6.0	Water coming out of casing, rods very tight
95	90	58	5	3.2	0.64	
90	85	55	5	6.0	1.20	
85	80	50	5	4.0	0.80	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 158

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
116	111	75	5	2.2	0.44	
111	106	73	5	0.1	0.02	
106	101	70	5	14.2	2.84	
101	96	68	5	41.8	8.36	Press. gauge won't pass 30 psi
96	91	65	5	10.6	2.12	
91	86	63	5	1.7	0.34	
86	81	60	5	6.9	1.38	
81	76	58	5	33.0	6.6	Press. gauge won't exceed 30 psi
76	71	55	5	60.5	12.1	Press. gauge won't exceed 30 psi
71	66	53	5	47.9	9.58	Press. gauge won't exceed 50 psi

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 159

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
128	123	75	5	0.3	0.06	
123	118	73	5	2.7	0.54	
118	113	70	5	2.8	0.56	
113	108	68	5	3.5	0.70	
108	103	65	5	0	0	
103	98	63	5	0.5	0.10	
98	93	60	5	0.8	0.16	
93	88	58	5	8.5	1.70	
88	83	55	5	1.7	0.34	
83	78	15	5	42.0	8.4	Max press. from pump

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 160

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
113	108	75	5	0.1	0.02	
108	103	73	5	5.8	1.13	
103	98	70	5	39.5	7.9	Water press. will not exceed 30 psi
98	93	68	5	11.2	2.24	
93	88	65	5	1.0	0.20	
88	83	63	5	2.9	0.58	
83	78	60	5	51.5	10.3	Water press. will not exceed 50 psi
78	73	58	5	50.0	10.0	
73	68	55	5	27.0	5.6	45 psi max
68	63	53	5	45.0	9.0	25 psi max

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 161

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
123	118	75	5	2.5	0.50	
118	113	73	5	.0	0.0	
113	108	70	5	5.0	1.0	
108	103	68	5	6.9	1.38	
103	98	65	5	0.1	0.02	
98	93	63	5	0.0	0.0	
93	88	60	5	0.2	0.04	
88	83	58	5	0.2	0.04	
83	78	55	5	0.2	0.04	
78	73	30	5	55.0	11.0	Max press. from pump
76	71	30	5	55.0	11.0	Max press. from pump

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 162

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
134	129	75	5	3.2	.64	
129	124	73	5	39.0	7.80	
124	119	70	5	5.0	1.00	
119	114	30	5	50.0	10.00	Pressure would not go over 30 psi
114	109	30	5	47.5	9.60	Pressure would not go over 30 psi
109	104	30	5	46.0	9.20	Pressure would not go over 30 psi
104	99	30	5	45.0	9.00	Pressure would not go over 30 psi
99	94	30	5	45.0	9.00	Pressure would not go over 30 psi
94	89	65	5	39.0	7.80	
89	84	60	5	47.0	9.40	
84	79	60	5	16.5	3.30	
79	74	55	5	32.0	6.40	
74	69	53	5	8.5	1.70	
69	64	45	5	56.0	11.20	Pump would not go over 45 psi

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 163

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
119	114	-	-	-	-	Core barrel broken, jammed in hole; couldn't put packer past 114 feet
114	109	75	5	0	0	
109	104	73	5	2.3	.46	
104	99	70	5	0	0	
99	94	68	5	2.0	.40	
94	89	65	5	0	0	
89	84	63	5	1.6	.32	
84	79	60	5	0	0	
79	74	30	5	56.0	11.20	Max press. from pump
74	69	30	5	56.0	11.20	Max press. from pump

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 164

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
115	110	75	5	13.0	2.6	
110	105	20	5	42.8	8.56	Max press. of pump
105	100	75	5	16.6	3.33	
100	95	75	5	7.3	1.46	
95	90	75	5	5.1	1.02	
90	85	75	5	2.8	0.56	
85	80	75	5	0.7	0.14	
80	75	40	5	40.3	8.06	Max press. of pump
75	70	27	5	33.7	6.74	Max press. of pump
70	65	60	5	27.8	5.56	Max press. of pump

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 165

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
141	136	75	5	0	0	
136	131	72	5	6.10	1.22	
131	126	69	5	0	0	
126	121	66	5	23.30	4.66	
121	116	63	5	6.3	1.26	
116	111	60	5	10.0	2.0	
111	106	57	5	1.0	0.2	
106	101	54	5	25.4	5.08	
101	96	50	5	7.90	1.58	
96	91	50	5	0	0	
91	86	50	5	1.0	.20	
86	81	50	5	39.8	7.96	

FORM 10 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. 166

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
130	125	75	5	0	0	
125	120	73	5	5.7	1.14	
120	115	71	5	6.2	1.24	
115	110	69	5	8.0	1.30	
110	105	67	5	14.7	2.94	
105	100	65	5	19.9	3.98	
100	95	63	5	31.2	6.24	
95	90	61	5	0.3	0.06	
90	85	59	5	28.8	5.76	
87	82	57	5	18.5	3.70	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 167

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
190	185	80	5	.8	.16	
185	180	78	5	5.0	1.00	
180	175	75	5	5.0	1.00	
175	170	73	5	11.0	2.20	
170	165	70	5	20.0	4.00	
165	160	68	5	2.2	.44	
160	155	65	5	0	0	
155	150	63	5	16.0	3.20	
150	145	60	5	9.5	1.90	
145	140	58	5	1.0	.20	
140	135	55	5	1.0	.20	
135	130	53	5	1.9	.38	
130	125	50	5	45.0	9.00	
125	120	48	5	54.5	10.90	Max press. from pump Casing drill to 119 feet 6 inches, could not do water test above 120 feet.

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 178 (45°)

SITE Welland, Townline Road SHEET No. 1 OF 2

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
241	236	95	5	0	0	
229.8	226.2	95	5	.9	.18	
226.2	222.7	90	5	.3	.06	
222.7	217.7	85	5	.9	.18	
218.3	213.3	80	5	1.2	.24	
213.7	208.7	80	5	1.2	.24	
208.5	203.5	75	5	3.8	.76	
203.3	198.3	75	5	1.2	.24	
197.7	192.7	75	5	19.3	3.86	
194.3	189.3	75	5	1.6	.32	
191	186	75	5	2.6	.52	
183	178	75	5	1.2	1.44	
179.2	174.2	85	5	1.3	.30	
175.3	170.3	65	5	3.0	.60	
171	166	60	5	.8	.16	
165.5	160.5	45	5	.3	.06	
159	154	66	5	24.6	4.81	
155.4	150.4	64	5	0	0	Water meter defective
150.4	145.4	62	5	0	0	Water meter defective
146	141	60	5	33.5	6.7	
142.2	137.2	58	5	0	0	
137.2	132.2	56	5	.6	.12	
131.7	126.7	54	5	0	0	
127	122	52	5	3.1	.62	
119.5	114.5	20	5	43.0	8.60	Max press. obtainable
115.5	111.5	25	5	24.4	5.10	Max press. obtainable
111.5	108.7	46	5	9.5	1.90	

FORM NO 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 178 (45°)

SITE Welland, Townline Road SHEET No. 2 OF 2

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
108.7	103.7	20	5	26.2	5.24	Max press. obtainable
105.5	100.5	42	5	37.4	7.48	
						All tests taken with single packer at end of each drill run.

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. 181

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
221	216	110	5	0	0	
216	211	107	5	1.0	0.2	Slight leakage
211	206	105	5	3.4	0.68	Slight leakage
206	201	103	5	4.2	0.84	Slight leakage
201	196	100	5	6.6	1.32	Slight leakage
196	191	98	5	4.5	0.90	Slight leakage
191	186	95	5	6.4	1.28	Slight leakage
186	181	93	5	8.5	1.70	Slight leakage
181	176	90	5	3.0	0.60	
176	171	87	5	6.2	1.24	
171	166	85	5	13.0	2.60	Slight leakage
166	161	83	5	10.0	2.00	
161	156	80	5	11.0	2.20	
156	151	78	5	8.0	1.60	
151	146	75	5	14.0	2.80	
146	141	72	5	10.9	2.20	
141	136	70	5	3.2	0.64	New meter used
136	131	68	5	15.0	3.00	
131	126	65	5	9.0	1.80	
126	121	62	5	19.1	3.80	Small leak
121	116	60	5	11.7	2.34	
116	111	58	5	30.4	6.08	
111	106	55	5	5.3	1.06	Leakage
106	101	52	5	2.85	0.57	
101	96	50	5	2.7	0.54	Small leak
96	91	47	5	1.2	0.24	
91	86	45	5	1.0	0.20	
86	81	28	5	45.1	9.02	
81	76	30	5	45.7	9.14	
76	71	37	5	31.2	6.24	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel — HOLE No. AAY-1

SITE Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
270	265	145	5	7.3	1.46	
265	260	143	5	6.2	1.24	
260	255	140	5	4.0	.80	Leak
255	250	138	5	4.3	.86	Leak
250	245	135	5	.1	.02	
245	240	133	5	5.7	1.14	
240	235	130	5	.8	.16	
235	230	128	5	.4	.08	
230	225	125	5	.3	.06	
225	220	123	5	.1	.02	
220	215	120	5	9.2	1.84	
215	210	118	5	.1	.02	
210	205	115	5	.25	.50	
205	200	113	5	3.7	.74	
200	195	110	5	1.3	.26	
195	190	108	5	1.1	.22	
190	185	105	5	.2	.04	
185	180	103	5	.65	.13	
180	175	100	5	29.3	5.86	Leak
175	170	98	5	5.0	1.00	
170	165	95	5	6.4	1.28	
165	160	93	5	8.7	1.74	
160	155	90	5	18.1	3.62	
155	150	88	5	14.2	2.84	
150	145	85	5	36.7	7.34	
145	140	83	5	7.7	1.54	
140	135	80	5	.3	.06	
135	130	78	5	7.5	1.50	

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. BBY-1

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
170	165	100	4	0	0	
164	159	98	5	0	0	
159	154	95	5	24.3	4.86	
154	149	93	5	.05	.01	
149	144	90	5	.05	.01	
144	139	88	5	.85	.17	
139	134	85	5	2.05	.41	
134	129	83	5	0	0	
129	124	80	5	1.2	.24	
124	119	78	5	2.15	.43	
119	114	75	5	1.3	.26	
114	109	75	5	46.5	9.30	
109	104	55	5	61.0	12.20	Max pressure from pump
104	99	65	5	60.5	12.10	Max pressure from pump
99	94	60	5.5	39.5	7.81	
94	89	45	5	77.0	14.00	Max pressure
89	84	50	5	5.0	1.00	Packer half in casing

FORM NO 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. EE-X

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
167	162	95	5	.8	.16	
162	157	93	5	0	0	
157	152	90	5	.15	.03	
152	147	88	5	.05	.01	
147	142	85	6	1.1	.18	
142	137	83	3	10.5	3.50	Leak
143	138	83	5	7.1	1.42	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. GE-Y-1

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
205	200	112	5	2.30	.46	
200	195	110	5	3.0	.60	
195	190	108	5	3.5	.70	
190	185	106	5	29.0	5.80	
185	180	104	5	13.0	2.60	
180	175	102	5	6.0	1.20	
175	170	100	5	0	0	
170	165	98	5	0	0	
165	160	96	5	0	0	
160	155	94	5	0	0	
155	150	92	5	.9	.18	
150	145	90	5	0	0	
145	140	88	5	0	0	
140	135	50	5	0		Leak
135	130	84	5	10.0	2.00	
130	125	82	5	12.0	2.40	
125	120	80	5	.1	.02	
120	115	78	5	4.3	.86	
115	110	76	5	0.1	.02	
110	105	74	5	0	0	
105	100	72	5	0	0	
100	95	70	5	0	0	

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H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel — HOLE No. GE-Y-2

SITE Welland, Townline Road — SHEET No. 1 OF 1

October 5, 1968

WATER--PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
115	110	76	5	0.1	.02	
110	105	74	5	0	0	
105	100	72	5	0	0	
100	95	70	5	0	0	
95	90	68	5	0	0	
90	85	66	5	0.1	.02	
85	80	64	5	.5	.10	
80	75	62	5	14.30	2.86	
75	70	60	5	27.90	5.58	
70	65	40	5	55.20	11.04	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. GE-Y-2

SITE Welland, Townline Road SHEET No. 1 OF 1

October 25, 1968

WATER-PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
203.5	198.5	110	5	.1	.02	
198.5	193.5	108	5	.15	.03	
193.5	188.5	106	5	.9	.28	
188.5	183.5	104	5	4.6	.92	
183.5	178.5	102	5	1.6	.32	
178.5	173.5	100	5	1.65	.33	Sample taken, temp. 9°C, conductivity 4,300
173.5	168.5	98	5	1.8	.36	
168.5	163.5	96	5	0	0	
163.5	158.5	94	5	0	0	
158.5	153.5	92	5	1.2	.24	
153.5	148.5	90	5	0	0	
148.5	143.5	88	5	.4	.08	
143.5	138.5	86	5	0	0	
138.5	133.5	84	5	.05	.01	
133.5	128.5	82	5	1.0	.20	
128.5	123.5	80	5	6.1	1.22	Sample taken, temp. 12°C, conductivity 10,500
123.5	118.5	78	5	2.30	.46	
118.5	113.5	76	5	24.10	4.82	
113.5	108.5	74	5	21.30	4.26	
108.5	103.5	72	5	19.8	3.98	
103.5	98.5	70	5	18.8	3.76	
98.5	93.5	68	5	18.3	3.66	
93.5	88.5	66	5	13.9	2.78	
88.5	83.5	64	5	15.4	3.08	Sample taken, temp. 9°C, conductivity 3,200
83.5	78.5	62	5	1.7	.34	
78.5	73.5	60	5	8.9	1.78	
73.5	68.5	58	5	3.75	.75	
68.5	63.5	10	5	55.0	11.00	

NB - GE-Y-1 Packer was installed at 185 feet

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel — HOLE No. GWY-1

SITE Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
217	212	120	5	0.9	.18	
212	207	118	5	0.1	.02	Very small leak
207	202	115	5	21.7	4.34	
202	197	113	5	0.15	.03	
197	192	110	5	1.5	.30	
192	187	108	5	0.1	.02	Very small leak
187	182	105	5	2.05	.41	
182	177	103	5	1.05	.21	
177	172	100	5	6.40	1.28	Small leak
172	167	98	5	0.05	.01	
167	162	95	5	0.05	.01	
162	157	93	5	0.05	.01	
157	152	90	5	0.05	.01	
152	147	88	5	0.15	.3	
147	142	85	5	0.075	.015	
142	137	83	5	0.10	.02	
137	132	80	5	0.15	.03	
132	127	78	5	0.10	.02	
127	122	75	5	0.15	.03	
122	117	73	5	8.1	1.62	Water sample temp. 10°C 5,500
117	112	70	5	3.75	.75	
112	107	68	5	3.6	.72	Small leak
107	102	65	5	0.2	.04	
102	97	63	5	0.8	.16	
97	92	60	5	0.6	.12	
92	87	58	5	0	0	

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H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel — HOLE No. G-Y-0

SITE Welland, Townline Road — SHEET No. 1 OF 2

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
216	211	120	5	3.6	0.72	Slight leakage
211	206	118	5	51.3	10.26	Slight leakage
206	201	116	5	51.2	10.24	Slight leakage
201	196	114	5	23.1	4.62	Slight leakage
196	191	112	5	31.1	6.22	Slight leakage
191	186	110	5	55.8	11.16	Slight leakage
186	181	108	5	23.8	4.76	Slight leakage
181	176	106	5	33.7	6.74	Slight leakage
176	171	105	5	21.1	4.22	Slight leakage
171	166	101	5	14.8	2.96	Slight leakage
166	161	100	5	30.9	6.18	Slight leakage
161	156	33	5	56.5	11.30	No leakage
156	151	35	5	57.2	11.44	No leakage
151	146	34	5	57.0	11.40	No leakage
146	141	94	5	53.2	10.64	Slight pressure
141	136	30	5	57.2	11.44	Slight pressure
136	131	30	5	66.0	13.20	Slight pressure
131	126	30	5	57.5	11.70	
126	121	32	5	56.9	11.40	
121	116	94	5	28.8	5.76	
116	111	82	5	30.4	6.18	
111	106	90	5	20.5	4.10	
106	101	78	5	12.8	2.56	
101	96	76	5	13.8	2.76	
96	91	32	5	57.8	11.56	
91	86	26	5	56.8	11.36	
86	81	70	5	20.0	4.00	

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel — HOLE No. G-Y-0

SITE Welland, Townline Road — SHEET No. 2 OF 2

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
81	76	71	5	15.1	3.02	
76	71	24	5	57.2	11.44	
71	68		5	56.9	11.40	68 feet, bottom of "N" casing

FORM NO 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel — HOLE No. G-Y-1

SITE Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
150	145	85	5	1.0	0.2	
145	140	83	5	6.5	1.3	
140	135	81	5	46.5	9.3	
135	130	30	5	50.0	10.0	Pump at max capacity
130	125	30	5	48.5	9.7	Pump at max capacity
125	120	30	5	51.0	10.2	Pump at max capacity
120	115	73	5	33.5	6.7	
115	110	71	5	29.5	5.9	
110	105	69	5	20.5	4.1	
105	100	67	5	27.0	5.2	
100	95	65	5	47.0	9.4	
95	90	25	5	51.0	10.2	Pump at max capacity
90	85	20	5	55.0	11.0	Pump at max capacity
85	80	59	5	51.5	10.3	
80	75	57	5	47.0	9.4	
75	70	15	5	53.5	10.7	Pump at max capacity
70	65	10	5	53.0	10.6	Pump at max capacity

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H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. TY-1

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
263.5	258.5	145	5	5.8	1.26	Leak
258.5	253.5	143	5	.35	.07	
253.5	248.5	141	5	7.3	1.46	Leak
248.5	243.5	139	5	10.4	2.08	Leak
243.5	238.5	137	5	1.3	.26	Seal Y-3
238.5	233.5	135	5	2.6	.52	
233.5	228.5	133	5	16.6	3.32	
228.5	223.5	60	5	34.1	6.82	
223.5	218.5	129	5	10.0	2.0	Bottom Y-2
218.5	213.5	127	5	22.8	4.56	
213.5	208.5	125	5	24.9	4.99	Leak
208.5	203.5	123	5	5.3	1.06	
203.5	198.5	121	5	.02	.004	Small Leak
198.5	193.5	119	5	20.3	4.06	
193.5	188.5	117	5	.35	.07	
188.5	183.5	114	5	.10	.02	
183.5	178.5	112	5	.25	.05	
178.5	173.5	109	5	0	0	
173.5	168.5	107	5	.12	.024	
168.5	163.5	104	5	1.8	.36	
163.5	158.5	102	5	.05	.01	
158.5	153.5	99	5	1.55	.31	
153.5	148.5	97	5	1.4	.28	
148.5	143.5	94	5	3.9	.78	Leak
143.5	138.5	92	5	.6	.12	
138.5	133.5	89	5	.20	.04	
133.5	128.5	87	5	21.0	4.20	Leak
128.5	123.5	84	5	.3	.06	
123.5	118.5	82	5	40.7	8.14	
118.5	117.5	79	5	41.3	8.26	

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. TY-3

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
133.5	128.5	75	5	39.0	7.8	
128.5	123.5	73	5	0	0	
123.5	118.5	70	5	22.5	4.5	

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H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. UY-1

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
220	215	120	5	.35	.07	
215	210	20	3	25.2	8.40	
210	205	115	5	17.7	3.54	
205	200	15	5	41.4	8.28	
200	195	15	5	41.1	8.22	
195	190	15	5	41.0	8.20	
190	185	15	5	43.1	8.62	
185	180	15	5	42.8	8.56	
180	175	100	5	19.0	3.80	Small leak
175	170	98	5	16.8	3.36	
170	165	95	5	12.2	2.44	
165	160	93	5	14.5	2.90	
160	155	25	5	50.5	10.10	
155	150	25	5	47.2	9.44	
150	145	25	5	50.4	10.08	
145	140	83	5	23.5	4.70	
140	135	20	5	49.2	9.84	Pressure erratic
135	130	20	5	49.5	9.9	Pressure erratic
130	125	20	5	49.5	9.9	Pressure erratic
125	120	25	5	53.6	10.72	Pressure erratic
120	115	20	5	50.7	10.14	Pressure erratic
115	110	25	5	50.0	10.0	Pressure erratic
110	105	25	5	55.9	10.78	Pressure erratic
105	100	23	5	53.9	10.68	Pressure erratic
100	95	25	5	49.3	9.86	Pressure erratic
93	88	23	5	55.2	11.04	Unable to tighten leak
88	85	23	5	55.1	11.02	Unable to tighten leak
85	80	25	5	55.0	11.00	
80	75	48	5	6.8	1.36	Pressure hard
75	70	45	5	24.8	5.96	to maintain

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H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. UY-1

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

SECOND TEST WITH DIFFERENT PACKER

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
217.5	212.5	120	5	1.75	.35	
212.5	207.5	118	5	17.0	3.4	
207.5	202.5	85	5	Invalid	± 10	Leak
202.5	197.5	60	5	54.5	10.9	Erratic pressure
197.5	192.5	60	5	54.5	10.9	Erratic pressure
192.5	187.5	110	5	10.8	2.16	Erratic leak
187.5	182.5	100	5	.3	.06	Erratic leak
182.5	177.5	95	5	6.9	1.38	Erratic leak
177.5	172.5	95	5	18.2	3.64	Erratic leak
172.5	167.5	100	5	.4	.08	Erratic leak
167.5	162.5	100	5	2.85	.57	Erratic leak
162.5	157.5	90	5	1.2	.24	Hole gets wider
157.5	152.5	90	5	11.1	2.22	Hole gets wider
152.5	147.5	50	5	53.0	10.6	Hole gets wider
147.5	142.5	45	3	31.7	10.6	Could not tighten packer
142.5	137.5	90	5	34.9	6.98	
137.5	132.5	45	5	51.7	10.34	
132.5	127.5	85	5	14.3	2.86	
127.5	122.5	?	5	-	-	Could not tighten packer
122.5	117.5	75	5	40.9	8.18	Leak
117.5	112.5	?	5	-	-	Could not tighten packer
112.5	107.5	40	5	50.8	10.16	
107.5	102.5	40	5	47.7	9.3	
102.5	97.5	30	5	44.4	8.88	
97.5	92.5	?	5	-	-	Water comes from casing
92.5	87.5	60	5	2.3	.46	
87.5	82.5	35	5	49.0	9.8	
82.5	77.5	55	5	1.6	.32	
77.5	72.5	50	5	35.3	7.06	Small leak from "A" casing
72.5	68.0	45	5	24.0	4.80	

FORM NO 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. UY-2

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
150	145	85	5	.8	.16	
144.3	139.3	83	5	.1	.02	Small leak
139.3	134.3	80	5	.6	.20	Leak from "A" casing
134.3	129.3	78	5	1.0	.20	Meter moved sporadically
129	124	75	5	6.6	1.32	Packer rose 4 inches at start of test
124.3	119.3	70	7	55.6	7.94	
119.3	114.3	40	5	50.5	10.10	Note pressure
114.3	109.3	60	5	51.8	10.36	
109.3	104.3	63	5	21.5	4.30	
104.3	99.3	60	5	1.75	3.50	
99.3	94.3	40	5	Invalid	± 10	Water returned from casing
94.3	89.3	30	5	Invalid	± 10	Water returned from casing
93.3	88.3	40	6	63.6	10.60	
88.3	83.3	50	6	61.7	10.29	
83.3	78.3	48	5	1.2	.24	
79.3	74.3	45	5	36.6	7.32	
						Bottom of casing 70 feet 6 inches

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT: The St. Lawrence Seaway Authority — JOB No. 1684.16

PROJECT: Welland Road-Rail Tunnel — HOLE No. VY-0

SITE: Welland, Townline Road — SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
185	180	95	5	.9	.18	
180	175	93	5	.1	.02	
174	169	90	5	2.8	.56	
169	164	88	5	2.2	.44	
164	159	86	5	.7	.14	
159	154	84	5	0	0	
154	149	82	5	2.7	.54	
149	144	80	5	.3	.06	
144	139	78	5	3.8	.76	
139	134	76	5	5.8	1.16	
134	129	74	5	39.8	7.98	
129	124	72	5	1.2	.24	
124	119	70	5	.4	.08	
119	114	68	5	11.8	2.36	
114	109	66	5	.5	.10	
109	104	64	5	17.6	3.52	
104	99	62	4	.5	.10	
99	94	60	5	3.5	.70	
94	89	58	5	2.3	.56	
89	84	56	5	6.3	1.26	
84	79	54	5	9.6	1.92	
79	74	45	5	35.3	7.06	
74	69	50	5	10.0	2.00	
69	65	48	5	27.5	5.50	65 feet bottom of "N" casing

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. VY-1

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
151	146	85	5	1.1	.22	
146	141	83	5	1.0	.20	
141	136	81	5	10.4	2.10	
136	131	15	5	31.0	6.20	
131	126	60	5	25.0	5.00	
126	121	40	5	24.0	4.80	
121	116	30	5	24.6	4.90	
116	111	40	5	23.5	4.70	
111	106	0	5	21.4	4.30	
106	101	67	5	21.4	4.30	
101	96	0	5	31.2	6.24	
96	91	5	5	39.7	7.94	
91	86	0	5	25.2	5.02	
86	81	35	5	24.3	4.86	
81	76	0	5	31.0	6.20	
76	71	5	5	29.6	5.92	
71	66	50	5	16.0	3.20	

FORM NO. 91-E

H. G. ACRES & COMPANY LIMITED — CONSULTING ENGINEERS
NIAGARA FALLS, CANADA

DRILLING REPORT

CLIENT The St. Lawrence Seaway Authority JOB No. 1684.16

PROJECT Welland Road-Rail Tunnel HOLE No. WY-1

SITE Welland, Townline Road SHEET No. 1 OF 1

WATER–PRESSURE TESTING

DEPTH IN FEET		GAUGE	TIME	WATER READINGS		REMARKS
FROM	TO	PSI	MIN	TOT GAL	IGPM	
170	165	95	5	.13	.03	
164	159	93	5	.2	.04	
159	154	90	5	.38	.04	Pressure hard to maintain
154	149	88	5	1.7	.34	Leak from "A" casing
149	144	85	5	1.47	.30	
144	139	83	5	5.65	1.13	Leak from "A" casing
139	134	80	5	2.9	.58	Leak from "A" casing
134	129	78	5	20.9	4.16	Leak from "A" casing
129	124	45	5	28.1	5.62	
124	119	73	5	11.1	2.22	
119	114	70	5	1.5	.30	
114	109	68	5	0	0	
109	104	65	5	.4	.08	
104	99	63	5	.95	.19	
99	94	60	5	2.0	.40	
94	89	58	5	14.8	2.96	
89	84	15	5	32.1	6.42	
84	79	5	5	36.2	7.24	
79	74	0	5	35.4	7.08	

FORM NO. 91-E