

Appendix B

Soil Compaction Test Results



Field Compaction Testing Record

Client Name:	Nova Scotia Lands Inc. (NSLI)	Date:	60639002	Comments
Project:	Harrisefield Construction Oversight	Project Number:	60639002	Standard compacts received daily and kept with nuclear densimeter
Siter:	Former C&D Landfill, 1275 Old Sambro Road, Harrisefield, Nova Scotia	Technicians:	Englobe	Road/SCA/Asph. Subgrade: 98% Standard Proctor Maximum Dry Density (MDD); +/-2% Optimum Moisture Content (OMC)
Machine:	Englobe	Moisture Std. Count:	-	*General Fill/Recreational landfill Subgrade: 98% MDD; +/-3% OMC
Serial Number:	Englobe	Density Std. Count:	-	*Landfill Bernal/Southern Slope Fill: 98% MDD; +/-1.5% OMC

Tracking Information										Proctor Information										In-Situ Testing Results									
Daily Test (#)	Re-Test (#)	Date (yy/mm-dd)	Time (hh:mm)	Tech.	Test Depth (mm)	Location Description	Location (Align/Grid Ref)	Location (Lift)	Material (ID)	OMC (%)	MDD (kg/m3)	Density (Count)	Density (kg/m3)	Moist. (Count)	Moist. (%)	MC (% OMC)	Density (% MDD)	Test Result (Pass/Fail)	Comments										
1	-	2020-09-10	8:45	JO	150	Southern Slope Fill	East Half	SG	SP001-Till	10.8%	1,995	1,959	1,995	130	8.6%	-2.2%	100.0%	PASS											
2	-	2020-09-10	9:30	CS	150	Southern Slope Fill	East Half	1	SP002-Till	10.4%	2,065	1,609	2,069	171	11.4%	1.0%	100.2%	PASS*	Passed by technician on the basis of observed lift quality (CS). Performed secondary verification test (Test 3)										
3	-	2020-09-10	9:30	CS	Ice and rutting	Southern Slope Fill	East Half	1	SP002-Till	10.4%	2,065	1,721	2,099	123	7.7%	-2.7%	101.6%	PASS	Areas noted along edges require additional compaction. ARCP fixed.										
4	-	2020-09-10	12:30	JO	150	Southern Slope Fill	East Half	3	SP002-Till	10.4%	2,065	1,774	2,071	127	8.1%	-2.3%	100.3%	PASS											
5	13	2020-09-10	15:05	JO	150	Southern Slope Fill	East Half	5	SP002-Till	10.4%	2,065	1,790	2,061	129	8.3%	-2.1%	99.8%	PASS											
6	-	2020-09-10	17:10	JO	150	Southern Slope Fill	East Half	6	SP002-Till	10.4%	2,065	1,701	2,078	171	9.1%	-1.3%	100.6%	PASS											
1	0	2020-09-11	11:00	JO	150	Southern Slope Fill	East half	7	SP002-Till	10.4%	2,065	1,708	2,088	127	8.4%	-2.0%	101.1%	PASS											
2	-	2020-09-11	15:00	JO	150	Southern Slope Fill	East half	8	SP002-Till	10.4%	2,065	1,778	2,078	116	7.6%	-2.8%	100.6%	PASS											
3	-	2020-09-11	15:00	JO	150	Southern Slope Fill	East half	8	SP002-Till	10.4%	2,065	1,708	2,066	140	9.5%	-0.9%	100.0%	PASS											
1	-	2020-09-12	10:15	JO	150	Southern Slope Fill	East Half	9	SP002-Till	10.4%	2,065	1,580	2,111	142	9.7%	-0.7%	102.2%	PASS											
2	-	2020-09-12	12:00	JO	150	Southern Slope Fill	East Half	10	SP002-Till	0.104	2,065	1,879	2,040	112	7.6%	-2.8%	98.8%	PASS											
3	-	2020-09-12	13:30	JO	150	Southern Slope Fill	East Half	11	SP002-Till	0.104	2,065	1,768	2,068	121	8.2%	-2.2%	100.1%	PASS											
4	-	2020-09-12	15:10	JO	150	Southern Slope Fill	East Half	12	SP002-Till	0.104	2,065	1,716	2,056	140	9.8%	-0.6%	100.5%	PASS											
1	-	2020-09-14	11:00	JO	150	Southern Slope Fill	East half	13	SP002-Till	10.4%	2,065	1,653	2,075	143	9.9%	-0.5%	99.8%	PASS											
2	-	2020-09-14	17:00	JO	150	Southern Slope Fill	East half	14	SP002-Till	0.104	2,065	1,672	2,056	149	10.4%	0.0%	98.3%	PASS											
3	-	2020-09-14	17:15	JO	150	Southern Slope Fill	West Half	SG	SP002-Till	0.104	2,065	1,783	2,029	138	9.7%	-0.7%	98.3%	PASS											
1	-	2020-09-15	12:15	JO	150	Southern Slope Fill	West Half	2	SP002-Till	0.104	2,065	1,655	2,064	151	10.6%	0.2%	100.0%	PASS											
2	-	2020-09-15	14:50	JO	150	Southern Slope Fill	West Half	4	SP002-Till	0.104	2,065	1,763	2,061	127	8.7%	-1.7%	99.8%	PASS											
3	-	2020-09-15	14:55	JO	150	Southern Slope Fill	West Half	4	SP001-Till	0.108	1,995	2,011	2,008	103	7.0%	-3.8%	100.7%	PASS	Passed by technician on the basis of observed lift quality. Moisture slightly below specified range. Dry density very good. (CS Reviewed)										
1	-	2020-09-16	15:15	DB/CS	150	Southern Slope Fill	West Half	7	SP002-Till	0.104	2,065	1,735	2,074	123	8.3%	-2.1%	100.4%	PASS											
1	-	2020-09-17	12:24:00 PM	JO	150	Southern Slope Fill	West Half	10	SP001-Till	0.108	1,995	1,977	1,985	121	8.5%	-2.3%	98.5%	PASS											
2	-	2020-09-17	3:46:00 PM	JO	150	Southern Slope Fill	Full Slope	2	SP001-Till	0.108	1,995	1,907	2,011	121	8.4%	-2.4%	100.8%	PASS											
3	-	2020-09-17	5:42:00 PM	JO	150	Southern Slope Fill	Full Slope	3	SP002-Till	0.104	2,065	1,894	2,035	110	7.4%	-3.0%	98.5%	PASS											
4	-	2020-09-17	6:21:00 PM	JO	150	Southern Slope Fill	Full Slope	4	SP002-Till	10.4%	2,065	1,734	2,041	143	10.0%	-0.4%	98.8%	PASS											
1	-	2020-09-18	10:42:00 AM	JO	150	Southern Slope Fill	Full Slope	6	SP002-Till	10.4%	2,065	1,681	2,060	144	10.1%	-0.3%	99.8%	PASS											
2	-	2020-09-18	11:52:00 AM	JO	150	Southern Slope Fill	Full Slope	7	SP002-Till	10.4%	2,065	1,726	2,062	132	9.1%	-1.3%	99.9%	PASS											
3	-	2020-09-18	12:12:00 PM	JO	150	Southern Slope Fill	Full Slope	7	SP002-Till	10.4%	2,065	1,636	2,071	149	10.4%	0.0%	100.3%	PASS											
4	-	2020-09-18	2:24:00 PM	JO	150	Southern Slope Fill	Full Slope	8	SP002-Till	10.4%	2,065	1,759	2,073	118	8.0%	-2.4%	100.4%	PASS											
1	-	2020-09-19	11:24:00 AM	JO	150	Southern Slope Fill	Full Slope	9	SP002-Till	10.4%	2,065	1,755	2,030	147	10.5%	0.1%	98.3%	PASS											
2	-	2020-09-19	12:15:00 PM	JO	150	Southern Slope Fill	Full Slope	10	SP002-Till	10.4%	2,065	1,714	2,096	119	8.0%	-2.4%	101.5%	PASS											
3	-	2020-09-19	15:30:00 PM	JO	150	Southern Slope Fill	Full Slope	11	SP002-Till	10.4%	2,065	1,884	2,033	113	7.7%	-2.7%	98.5%	PASS											
1	-	2020-09-21	9:30:00 AM	JO	150	Southern Slope Fill	Full Slope	12	SP001-Till	10.8%	1,995	1,845	1,990	147	10.6%	-0.2%	99.7%	PASS											
2	-	2020-09-21	12:50:00 PM	JO	150	Southern Slope Fill	Full Slope	14	SP002-Till	10.4%	2,065	1,691	2,078	132	9.0%	-1.4%	100.6%	PASS											



Field Compaction Testing Record

Client Name:	Nova Scotia Lands Inc. (NSLI)		
Project:	Harrisefield Construction Oversight		
Site:	Former C&D Landfill, 1275 Old Sambro Road, Harrisefield, Nova Scotia		
Machine:	Englobe		
Serial Number:	Englobe		
Date:	Project Number:	60639002	
	Technicians:	Englobe	
	Moisture Std. Count:	-	
	Density Std. Count:	-	

Standard counts received daily and kept with nuclear densimeter
 Road SG/AM to 98% Standard Proctor Maximum Dry Density (MDD); +/-2% Optimum Moisture Content (OMC)
 *General Fills/Recreational landfill Subgrade: 98% MDD; +/-3% OMC
 *Landfill Berms/Southern Slope Fill: 98% MDD; +/-1.5% OMC

Daily Test (#)	Re-Test (#)	Tracking Information				Proctor Information				In-Situ Testing Results						Comments		
		Date (yy/mm-dd)	Time (hh:mm)	Tech.	Test Depth (mm)	Location (Align/Grid Ref)	Location Description	Material (ID)	OMC (%)	MDD (kg/m3)	Density (kg/m3)	Moist. (Count)	Moist. (%)	MC (% OMC)	Density (% MDD)		Test Result (Pass/Fail)	
3	-	2020-09-21	12:55:00 PM	JO	150	Full Slope	Southern Slope Fill	SP001-Till	10.8%	1,995	1,970	144	10.5%	-0.3%	98.7%	PASS		
4	-	2020-09-21	2:40:00 PM	JO	150	Full Slope	Southern Slope Fill	SP002-Till	10.4%	2,065	2,121	125	8.3%	-2.1%	102.7%	PASS	Not meeting spec (excessive moisture), ARCP informed. Material is deflecting and rutting. Appears moist. Suspect basing density due to	
1	-	2020-09-25	9:00:00 AM	JO	150	Full Slope	Southern Slope Fill	SP004-Till	10.7%	2,025	2,090	147	10.9%	3.2%	103.2%	FAIL		
1	-	2020-09-28	8:45:00 AM	JO	150	Full Slope	Southern Slope Fill	SP004-Till	10.7%	2,025	2,058	125	8.4%	-2.3%	101.6%	PASS		
2	-	2020-09-28	9:24:00 AM	JO	300	Full Slope	Southern Slope Fill	SP004-Till	10.7%	2,025	2,069	140	9.5%	-1.2%	102.2%	PASS		
3	-	2020-09-28	9:35:00 AM	JO	300	Full Slope	Southern Slope Fill	SP004-Till	10.7%	2,025	2,081	133	8.9%	-1.8%	102.8%	PASS		
4	-	2020-09-28	9:42:00 AM	JO	300	Full Slope	Southern Slope Fill	SP004-Till	10.7%	2,025	2,050	148	10.2%	-0.5%	101.2%	PASS		
5	-	2020-09-28	10:00:00 AM	JO	300	Full Slope	East Berm	SP004-Till	10.7%	2,025	2,061	159	11.0%	0.3%	101.8%	PASS	At the request of ARCP, AECOM discussed with Geologists if any readings OVER OMC could be allowed. New OMC tolerance of .5% to +1%.	
6	-	2020-09-28	11:55:00 AM	JO	150	Full Slope	East Berm	SP004-Till	10.7%	2,025	2,043	161	11.3%	0.6%	100.9%	PASS		
7	-	2020-09-28	12:00:00 PM	JO	150	Full Slope	East Berm	SP004-Till	10.7%	2,025	2,035	158	11.1%	0.4%	100.5%	PASS		
8	-	2020-09-28	3:55:00 PM	JO	150	East Half	North Berm	SP004-Till	10.7%	2,025	2,047	154	10.7%	0.0%	101.1%	PASS		
1	-	2020-09-29	7:50:00 AM	JO	150	Full Slope	North Berm	SP004-Till	10.7%	2,025	2,055	164	11.5%	0.8%	101.5%	PASS		
2	-	2020-09-29	7:55:00 AM	JO	150	Full Slope	North Berm	SP004-Till	10.7%	2,025	2,023	165	11.8%	1.1%	99.9%	PASS		
3	-	2020-09-29	3:50:00 AM	JO	150	Full Slope	North Berm	SP004-Till	10.7%	2,025	2,016	173	12.4%	1.7%	99.6%	FAIL	Fail moisture, test at 300mm.	
4	-	2020-09-29	3:51:00 AM	JO	300	Full Slope	North Berm	SP004-Till	10.7%	2,025	309	2020	171	12.3%	1.5%	99.8%	FAIL	Fail moisture. Move locations.
5	-	2020-09-29	3:54:00 AM	JO	150	Full Slope	North Berm	SP004-Till	10.7%	2,025	1,986	145	10.3%	-0.4%	98.1%	PASS		
6	-	2020-09-29	3:57:00 AM	JO	150	Full Slope	North Berm	SP004-Till	10.7%	2,025	1,964	174	12.9%	2.3%	97.3%	FAIL	Fail moisture and at the limit for Density. Notified contractor to continue compacting. To retest tomorrow.	
7	-	2020-09-29	4:00:00 PM	JO	150	Full Slope	North Berm	SP004-Till	10.7%	2,025	2,074	163	11.3%	0.6%	102.4%	PASS		
8	-	2020-09-29	4:02:00 PM	JO	150	Full Slope	North Berm	SP004-Till	10.7%	2,025	2,033	150	10.5%	-0.2%	100.4%	PASS		
1	-	2020-09-30	9:15:00 AM	DE	150	East Half	Southern Slope Fill	SP004-Till	10.4%	2,025	1,775	196	12.3%	3.5%	98.1%	FAIL	Failure due to moisture and compaction. ARCP informed.	
1	-	2020-10-01	11:00:00 AM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,025	140	10.2%	-0.2%	99.2%	FAIL	ARCP to remove top 6" (150mm) of material and replace with new material.	
2	-	2020-10-01	2:42:00 PM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,029	151	10.6%	0.2%	100.2%	PASS	Material passed. Checked in another area.	
3	-	2020-10-01	2:44:00 PM	JO	250	Full Slope	North Ditch	SP002-Till	10.4%	2,065	2,091	152	10.4%	0.0%	101.3%	PASS		
4	-	2020-10-01	2:15:00 PM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,076	151	10.4%	0.0%	102.5%	PASS		
1	-	2020-10-02	10:00:00 AM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,047	156	11.1%	0.7%	101.1%	PASS		
2	-	2020-10-02	10:01:00 AM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,065	2,086	147	10.1%	-0.3%	101.0%	PASS		
3	-	2020-10-02	1:52:00 PM	JO	250	Full Slope	North Ditch	SP002-Till	10.4%	2,065	2,074	159	11.1%	0.7%	100.4%	PASS		
4	-	2020-10-02	1:55:00 PM	JO	250	Full Slope	North Ditch	SP002-Till	10.4%	2,065	2,095	144	9.9%	-0.5%	101.5%	PASS		
1	-	2020-10-03	10:15:00 AM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,063	163	11.4%	1.0%	101.9%	PASS		
2	-	2020-10-03	10:18:00 AM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,010	147	10.4%	0.0%	99.3%	PASS		
3	-	2020-10-03	11:28:00 AM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,083	154	11.2%	0.8%	97.3%	PASS		
4	-	2020-10-03	11:34:00 AM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,071	135	9.6%	-0.8%	97.9%	PASS		
5	-	2020-10-03	12:42:00 PM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,088	165	11.5%	1.1%	97.0%	PASS	Passed, asked to roll over once more to increase compaction.	
6	-	2020-10-03	12:47:00 PM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,012	164	11.8%	1.4%	99.4%	PASS		
7	-	2020-10-03	2:12:00 PM	JO	250	Full Slope	North Ditch	SP004-Till	10.4%	2,025	2,055	165	11.6%	1.2%	101.5%	PASS		



Field Compaction Testing Record

Client Name:	Nova Scotia Lands Inc. (NSLI)		Date:	60639002		Project Number:	60639002		Comments:	Standard compacts received daily and kept with nuclear densimeter Road/SG/ABO Slope 98% Standard Proctor Maximum Dry Density (MDD); +/-2% Optimum Moisture Content (OMC) General Fill/Recompaction/Infill Subgrade 98% MDD; +/-3% OMC Landfill Berms/Southern Slope Fill 98% MDD; +/-1.5% OMC	
Project:	Harrisefield Construction Oversight		Technicians:	Englobe		Moisture Std. Count:	-				
Site:	Former C&D Landfill, 1275 Old Sambro Road, Harrisefield, Nova Scotia		Moisture Std. Count:	-		Density Std. Count:	-				
Machine:	Englobe										
Serial Number:	Englobe										

Tracking Information												Proctor Information					In-Situ Testing Results				
Daily Test (#)	Re-Test (#)	Date (yy/mm-dd)	Time (hh:mm)	Tech.	Test Depth (mm)	Location Description	Location (Align/Grid Ref)	Location (Lift)	Material (ID)	OMC (%)	MDD (kg/m3)	Density (kg/m3)	Moist. (Count)	Moist. (%)	MC (% OMC)	Density (% MDD)	Test Result (Pass/Fail)	Comments			
8	-	2020-10-03	2:19:00 PM	JO	250	North Ditch	Full Slope	9	SP004-Till	10.4%	2,025	630	152	10.8%	0.4%	99.8%	PASS				
1	-	2020-10-06	10:30:00 AM	JO	250	North Ditch - East	East Slope	1	SP004-Till	10.4%	2,025	576	153	10.8%	0.4%	101.7%	PASS				
2	-	2020-10-06	1:15:00 PM	JO	250	North Ditch - East	East Slope	2	SP004-Till	10.4%	2,025	561	164	11.7%	1.3%	101.5%	PASS				
3	-	2020-10-06	2:30:00 PM	JO	250	North Ditch - East	East Slope	3	SP004-Till	10.4%	2,025	567	163	11.6%	1.2%	101.3%	PASS				
4	-	2020-10-06	3:30:00 PM	JO	250	North Ditch - Slope	West Half	1	SP004-Till	10.4%	2,025	579	2037	11.9%	1.5%	100.6%	PASS				
5	-	2020-10-06	4:15:00 PM	JO	250	North Berm - Slope	West Half	1	SP004-Till	10.4%	2,025	595	164	11.9%	1.5%	99.9%	PASS				
6	-	2020-10-06	5:00:00 PM	JO	250	North Ditch - Slope	West Half	2	SP004-Till	10.4%	2,025	576	2053	11.1%	0.7%	101.4%	PASS				
7	-	2020-10-06	6:00:00 PM	JO	250	North Berm - Slope	West Half	2	SP004-Till	10.4%	2,025	580	164	11.8%	1.4%	100.6%	PASS				
1	-	2020-10-08	1:00:00 PM	JO	250	Southern Slope Fill	West Half	16	SP004-Till	10.4%	2,025	554	2,088	149	10.2%	-0.2%	103.1%	PASS			
1	-	2020-10-09	9:15:00 AM	JO	250	Southern Slope Fill	Full Slope	17	SP004-Till	10.4%	2,025	589	2,110	116	7.7%	-2.7%	104.2%	PASS			
2	-	2020-10-09	9:30:00 AM	JO	250	Southern Slope Fill	Full Slope	17	SP004-Till	10.4%	2,025	610	2,035	148	10.6%	0.2%	100.5%	PASS			
3	-	2020-10-09	2:30:00 PM	JO	250	North Ditch	West Half	10	SP004-Till	10.4%	2,025	526	1,980	166	12.4%	2.0%	97.8%	FAIL	Roll over a few passes. 2 passes recorded. Rerest.		
3	1	2020-10-09	3:00:00 PM	JO	250	North Ditch	West Half	10	SP004-Till	10.4%	2,025	586	2,032	163	11.7%	1.3%	100.3%	PASS			
1	-	2020-10-13	10:30:00 AM	CS	250	SE Corner Berm	SE Berm Fill	2	SP004-Till	10.4%	2,025	620	2,059	139	8.8%	-1.6%	101.7%	PASS			
1	-	2020-11-17	12:30:00 PM	DB	250	BDA H	NW portion of BDA H Infill		SP004-Till	10.4%	2,025	601	2,027	158	11.5%	1.1%	100.1%	PASS			
2	-	2020-11-17	12:45:00 PM	DB	250	BDA H	NW portion of BDA H Infill		SP004-Till	10.4%	2,025	574	2,064	151	10.7%	0.3%	101.9%	PASS			
1	-	2020-11-19	1:15:00 PM	JO	250	BDA H	BDA H/Turnaround Subgrade	Top/SG	SP004-Till	10.4%	2,025	585	2,037	157	11.4%	1.0%	100.6%	PASS			
2	-	2020-11-19	1:30:00 PM	JO	250	BDA H	BDA H/Turnaround Subgrade	Top/SG	SP004-Till	10.4%	2,025	555	2,052	166	12.1%	1.7%	101.3%	PASS			
1	-	2020-12-07	3:15:00 PM	DB	250	BDA ABO extension	west of asphalt pad	Top/SG	SP004-Till	10.4%	2,025	609	2,009	155	11.9%	1.5%	99.2%	PASS	survey point 20201207001		
2	-	2020-12-07	3:25:00 PM	DB	250	BDA ABO extension	west of asphalt pad	Top/SG	SP004-Till	10.4%	2,025	628	1,977	163	12.7%	2.3%	97.6%	PASS	survey point 20201207002		
1	-	2021-06-15	9:30:00 AM	Englobe	100	South West Landfill Cap	Landfill Cap	Top/SG	SP004-Till	10.4%	2,065	-	2,014	-	6.4%	-4.0%	97.5%	PASS	Passed based on field observations. Density is good		
2	-	2021-06-15	9:40:00 AM	Englobe	50	North West Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,835	-	4.5%	-4.5%	85.3%	FAIL			
3	-	2021-06-15	9:50:00 AM	Englobe	100	West Landfill Cap	Landfill Cap	Top/SG	SP004-Till	10.4%	2,065	-	2,093	-	5.3%	-5.1%	101.4%	PASS	Passed based on field observations. Density is good		
4	-	2021-06-15	10:10:00 AM	Englobe	50	West Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,823	-	2.7%	-6.3%	84.8%	FAIL	Recompacted		
5	-	2021-06-15	10:30:00 AM	Englobe	100	North Landfill Cap	Landfill Cap	Top/SG	SP004-Till	10.4%	2,065	-	1,872	-	6.5%	-3.9%	90.7%	FAIL			
6	-	2021-06-15	10:45:00 AM	Englobe	100	Top Landfill Cap	Landfill Cap	Top/SG	SP004-Till	10.4%	2,065	-	2,004	-	6.1%	-4.3%	97.0%	PASS	Passed based on field observations. Density is good		
7	-	2021-06-15	1:00:00 AM	Englobe	100	South Landfill Cap	Landfill Cap	Top/SG	SP004-Till	10.4%	2,065	-	2,004	-	7.4%	-3.0%	97.0%	PASS	Passed based on field observations. Density is good		
1	-	2021-06-23	9:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,964	-	9.7%	0.7%	91.3%	Fail			
2	-	2021-06-23	9:40:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,908	-	10.3%	1.3%	88.7%	Fail			
3	-	2021-06-23	9:50:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	SP004-Till	10.4%	2,065	-	1,964	-	9.7%	-0.7%	95.1%	Pass			
4	-	2021-06-23	10:10:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	SP004-Till	10.4%	2,065	-	1,908	-	10.3%	-0.1%	92.4%	Fail	Recompacted		
5	-	2021-06-23	10:30:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	SP004-Till	10.4%	2,065	-	2,009	-	9.6%	-0.8%	97.3%	Pass			
1	-	2021-06-28	9:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,790	-	2.8%	-6.1%	83.3%	Fail			



Field Compaction Testing Record

Client Name:	Nova Scotia Lands Inc. (NSLI)	
Project:	Harrietsfield Construction Oversight	Date:
Site:	Former C&D Landfill, 1275 Old Sambro Road, Harrietsfield, Nova Scotia	Project Number:
Machine:	Englobe	Technicians:
Serial Number:	Englobe	Moisture Std. Count:
		Density Std. Count:

Standard results provided daily, and kept with nuclear densimeter
 Road/SG/Asph/Topsoil: **98%** Standard Proctor Minimum Dry Density (MDD); **+/-2%** Optimum Moisture Content (OMC)
 *General Fill/Recreational and/or Subgrade: **98%** MDD; **+/-3%** OMC
 *Landfill Berms/Southern Slope Fill: **98%** MDD; **-3** to **+1.5%** OMC

Tracking Information										Proctor Information					In-Situ Testing Results				
Daily Test (#)	Re-Test (#)	Date (yyyy-mm-dd)	Time (hh:mm)	Tech.	Test Depth (mm)	Location Description	Location (Align/Grid Ref)	Location (Lift)	Material (ID)	OMC (%)	MDD (kg/m3)	Density (Count)	Density (kg/m3)	Moist. (Count)	Moist. (%)	MC (% OMC)	Density (% MDD)	Test Result (Pass/Fail)	Comments
2		2021-06-28	9:40:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,857	-	5.2%	-3.8%	86.4%	Fail	
3		2021-06-28	9:50:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,800	-	5.1%	-3.9%	83.7%	Fail	
4		2021-06-28	10:10:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,788	-	5.7%	-3.3%	83.2%	Fail	
5		2021-06-28	10:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	2,023	-	6.2%	-2.8%	94.1%	Fail	
6		2021-06-28	10:45:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,823	-	5.0%	-4.0%	84.8%	Fail	
1		2021-07-06	9:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,746	-	7.0%	-2.0%	81.2%	Fail	
2		2021-07-06	9:40:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	-	1,853	-	7.7%	-1.3%	86.2%	Fail	



Field Compaction Testing Record

Client Name:	Nova Scotia Lands Inc. (NSLI)		
Project:	Harrisefield Construction Oversight		
Site:	Former C&D Landfill, 1275 Old Sambro Road, Harrisefield, Nova Scotia		
Machine:	Englobe		
Serial Number:	Englobe	Moisture Std. Count:	-
	Englobe	Density Std. Count:	-
	Project Number:	60639002	
	Technicians:	Englobe	
	Date:		
	Comments	Standard counts received daily and kept with nuclear densimeter Road/SG/Asphalt: 98% Standard Proctor Maximum Dry Density (MDD); +/-2% Optimum Moisture Content (OMC) *General Fill/Recompaction/landfill Subgrade: 98% MDD; +/-3% OMC *Landfill Berms/Southern Slope Fill: 98% MDD; +/-1.5% OMC	

Tracking Information										Proctor Information					In-Situ Testing Results				
Daily Test (#)	Re-Test (#)	Date (yy/mm/dd)	Time (hh:mm)	Tech.	Test Depth (mm)	Location Description	Location (Align/Grid Ref)	Location (Lift)	Material (ID)	OMC (%)	MDD (kg/m3)	Density (kg/m3)	Moist. (Count)	Moist. (%)	MC (% OMC)	Density (% MDD)	Test Result (Pass/Fail)	Comments	
3		2021-07-06	9:50:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	1,752	-	8.0%	-1.0%	81.5%	Fail		
4		2021-07-06	10:10:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	1,838	-	5.0%	-4.0%	85.5%	Fail		
5		2021-07-06	10:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	1,753	-	8.6%	-0.4%	81.5%	Fail		
1		2021-07-09	9:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	1,296	-	8.1%	-0.9%	60.3%	Fail		
2		2021-07-09	9:40:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	1,855	-	7.2%	-1.8%	86.3%	Fail		
3		2021-07-09	9:50:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	1,752	-	6.4%	-2.6%	81.5%	Fail		
4		2021-07-09	10:10:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	2,161	-	5.3%	-3.7%	100.5%	Pass		
5		2021-07-09	10:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,150	1,946	-	4.7%	-4.3%	90.5%	Fail		
1		2021-07-13	9:30:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,888	-	3.3%	-5.7%	88.4%	Fail		
2		2021-07-13	9:40:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,732	-	4.0%	-5.0%	81.1%	Fail		
3		2021-07-13	9:50:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	2,044	-	7.5%	-1.5%	95.7%	Fail		
4		2021-07-13	10:10:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,949	-	7.9%	-1.1%	91.2%	Fail		
5		2021-07-13	10:30:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,852	-	6.8%	-2.2%	86.7%	Fail		
6		2021-07-13	9:30:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,751	-	6.2%	-2.8%	82.0%	Fail		
7		2021-07-13	9:40:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,909	-	3.4%	-5.6%	89.4%	Fail		
8		2021-07-13	9:50:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,804	-	3.4%	-5.6%	84.5%	Fail		
9		2021-07-13	10:10:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,851	-	4.3%	-4.7%	86.7%	Fail		
10		2021-07-13	10:30:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,813	-	3.6%	-5.5%	84.9%	Fail		
11		2021-07-13	9:30:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	2,002	-	6.2%	-2.8%	93.7%	Fail		
12		2021-07-13	9:30:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,992	-	5.7%	-3.3%	93.9%	Fail		
2		2021-07-13	9:40:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	2" Gravel	5.6%	2,204	2,194	-	3.7%	-1.9%	99.5%	Pass		
3		2021-07-13	9:50:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	2" Gravel	5.6%	2,204	2,211	-	3.9%	-1.7%	100.3%	Pass		
4		2021-07-13	10:10:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	2" Gravel	5.6%	2,204	1,790	-	3.5%	-2.1%	81.2%	Fail		
5		2021-07-13	10:30:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	2" Gravel	5.6%	2,204	1,873	-	3.4%	-2.2%	85.0%	FAIL		
6		2021-07-13	9:30:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	2" Gravel	5.6%	2,204	1,955	-	3.6%	-2.0%	88.7%	FAIL		
7		2021-07-13	9:40:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	2" Gravel	5.6%	2,204	1,817	-	9.0%	3.4%	82.4%	FAIL		
8		2021-07-13	9:50:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	2" Gravel	5.6%	2,204	2,245	-	3.0%	-2.6%	101.9%	Pass		
9		2021-07-13	10:10:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	2" Gravel	5.6%	2,204	2,205	-	3.3%	-2.3%	100.0%	Pass		
10		2021-07-13	10:30:00 AM	Englobe	100	Landfill Cap	Landfill Cap	Top/SG	2" Gravel	5.6%	2,204	1,937	-	3.9%	-1.7%	87.9%	Fail		
11		2021-07-13	9:30:00 AM	Englobe	Grade	Landfill Cap	Landfill Cap	Top/SG	2" Gravel	5.6%	2,204	1,733	-	4.7%	-0.9%	76.6%	Fail		
1		2021-07-27	9:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,920	-	5.6%	-3.5%	89.9%	Fail		
2		2021-07-27	9:40:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,892	-	5.1%	-3.9%	88.6%	Fail		
3		2021-07-27	9:50:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	1,952	-	3.3%	-5.7%	91.4%	Fail		



Field Compaction Testing Record

Client Name:	Nova Scotia Lands Inc. (NSLI)		
Project:	Harrietsfield Construction Oversight	Date:	60639002
Site:	Former C&D Landfill, 1275 Old Sambre Road, Harrietsfield, Nova Scotia	Project Number:	60639002
Machine:	Englobe	Technicians:	Englobe
Serial Number:	Englobe	Moisture Std. Count:	-
		Density Std. Count:	-
Standard results provided daily and kept with nuclear densimeter Road/SG/Asphalt/Gravel: 98% Standard Proctor Maximum Dry Density (MDD); +/-2% Optimum Moisture Contentend (OMC) *General Fills/Recreational andfill Subgrade: 98% MDD; +/-3% OMC * Landfill Berms/Southern Slope Fill: 98% MDD; -3 to + 1.5% OMC			

Tracking Information										Proctor Information					In-Situ Testing Results				
Daily Test (#)	Re-Test (#)	Date (yy/mm-dd)	Time (hh:mm)	Tech.	Test Depth (mm)	Location Description	Location (Align/Grid Ref)	Location (Lift)	Material (ID)	OMC (%)	MDD (kg/m3)	Density (Count)	Density (kg/m3)	Moist. (Count)	Moist. (%)	MC (% OMC)	Density (% MDD)	Test Result (Pass/Fail)	Comments
4		2021-07-27	10:10:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	-	2,007	-	4.7%	-4.3%	94.0%	Fail	
5		2021-07-27	10:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	-	1,909	-	5.2%	-3.8%	89.4%	Fail	
6		2021-07-27	9:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	-	1,836	-	5.7%	-3.3%	86.0%	Fail	
7		2021-07-27	9:30:00 AM	Englobe	50	Landfill Cap	Landfill Cap	Top/SG	Crusher Dust	9.0%	2,136	-	1,881	-	3.5%	-5.5%	88.1%	Fail	



Field Compaction Testing Record

Client Name:	Nova Scotia Lands Inc. (NSLI)		
Project:	Harrietsfield Construction Oversight	Date:	
Site:	Former C&D Landfill, 1275 Old Sambre Road, Harrietsfield, Nova Scotia	Project Number:	60639002
Machine:	Englobe	Technicians:	Englobe
Serial Number:	Englobe	Moisture Std. Count:	-
		Density Std. Count:	-

Comments

Standard results recorded daily and kept with nuclear densimeter
 Road/SG/Asphalt/Gravel - 98% Standard Proctor Minimum Dry Density (MDD); +/-2% Optimum Moisture Content (OMC)
 *General Fills/Recap/Operational and/or Subgrade - 98% MDD; +/-3% OMC
 *Landfill Berms/Southern Slope Fill - 98% MDD; +/-3% to +1.5% OMC

Tracking Information				Proctor Information				In-Situ Testing Results												
Daily Test (#)	Re-Test (#)	Date (yyyy-mm-dd)	Time (hh:mm)	Tech.	Test Depth (mm)	Location Description	Location (Align/Grid Ref)	Location (Lift)	Material (ID)	OMC (%)	MDD (kg/m3)	Density (Count)	Density (kg/m3)	Moist. (Count)	Moist. (%)	MC (% OMC)	Density (% MDD)	Test Result (Pass/Fail)	Comments	

Appendix C

Laboratory Rest Results – Geotechnical



SUMMARY OF LABORATORY DATA

Client: Aecom

Project Number: 1901423-00-0

Project: Laboratory Testing

Location:

LOCATION	SAMPLE No.	DESCRIPTION	SPMDD (KG/M ³)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC INDEX	PARTICLE SIZE DISTRIBUTION			
							GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)
2019-12-09-001	1	Sandy silt, some clay, trace gravel	1995	10.8	23.63	17.15	7	27	46	20
2019-12-09-002	1	Sand and silt, some gravel, some clay	2065	10.4	22.90	16.23	12	37	40	11

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client: Aecom
1701 Hollis Street SH400, PO Box 576 CRO
Halifax, Nova Scotia B3J 3M8

Our Project No: 1901423-00-0-001-001

Client Contract No.:

Client PO.:

CC:

Attn: Cody Siphkema
PHONE: (902) 428-2021 **FAX:**

Project: Geotechnical Services

Source: **Sampled by:** Client
Sample No: 2019-12-09-001 **Date Sampled:** **Date Received:** 12-Dec-19
Location: **Date Tested:** 16-Dec-19

PHYSICAL PROPERTY TESTS

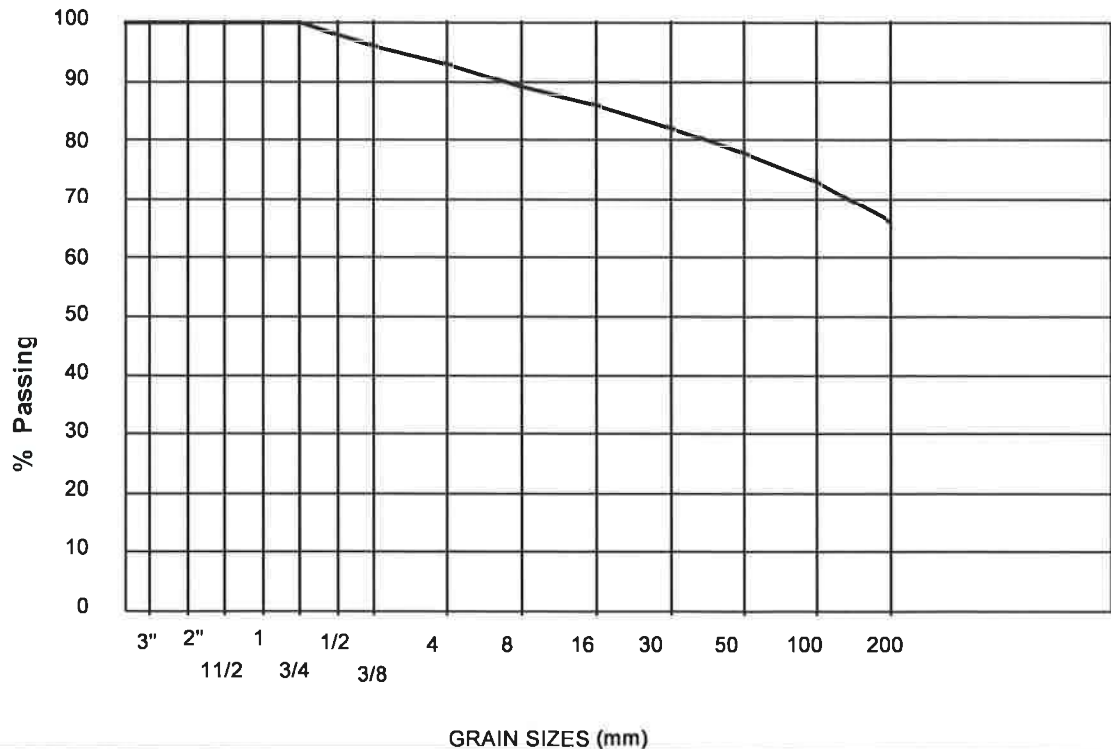
Soil Type	Clay	Liquid Limit	23.63	Flat and Elongated Particles, %	
Gravel, %	7	Plastic Limit	17.15	Coarse Spec. Gravity, (kg/m3)	
Sand, %	27	Plasticity Index	6.48	Fractured Faces, %	
Silt and Clay, %	66	Coarse Absorption, %		Soundness Loss, %	
Petrographic No.		Fine Absorption, %		Max. Dry Density, (kg/m3)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

GRAIN SIZE CURVE

Spec Band

NO SPEC

Sieve Size	Percent Passing	Spec. Band
6"	100	
4"	100	
3"	100	
2"	100	
1 1/2"	100	
1"	100	
3/4"	100	
1/2"	98	
3/8"	96	
4	93	
8	89	
16	86	
30	82	
50	78	
100	73	
200	66.0	



Comments:

Record No: 558 Englobe Tech: JM

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.



CERTIFIED LABORATORY
FOR TESTING CONCRETE

project manager Glenn Graham



Client	Accom
Project	Lab Testing
Borehole	2019-12-09-001
Depth	
Sample No.	1
Date Received	9-Dec-2019
Sample Description	
Comments :	

Moisture Content = 3.2%

Metric Sieve Analysis		
Sieve Size	Metric	% Passing
ASTM	(mm)	
4"	112	100
3"	80	100
2"	56	100
1 1/2"	40	100
1"	28	100
3/4"	20	100
1/2"	14	98
3/8"	10	96
No. 4	5	93
No. 8	2.36	89
No. 16	1.18	86
No. 30	0.6	82
No. 50	0.3	78
No. 100	0.15	73
No. 200	0.075	66.1
Hydrometer	0.0255	60.1
Analysis	0.0171	54.2
	0.0107	44.9
	0.0079	38.1
	0.0055	30.7
	0.0030	22.4
	0.0013	16.1



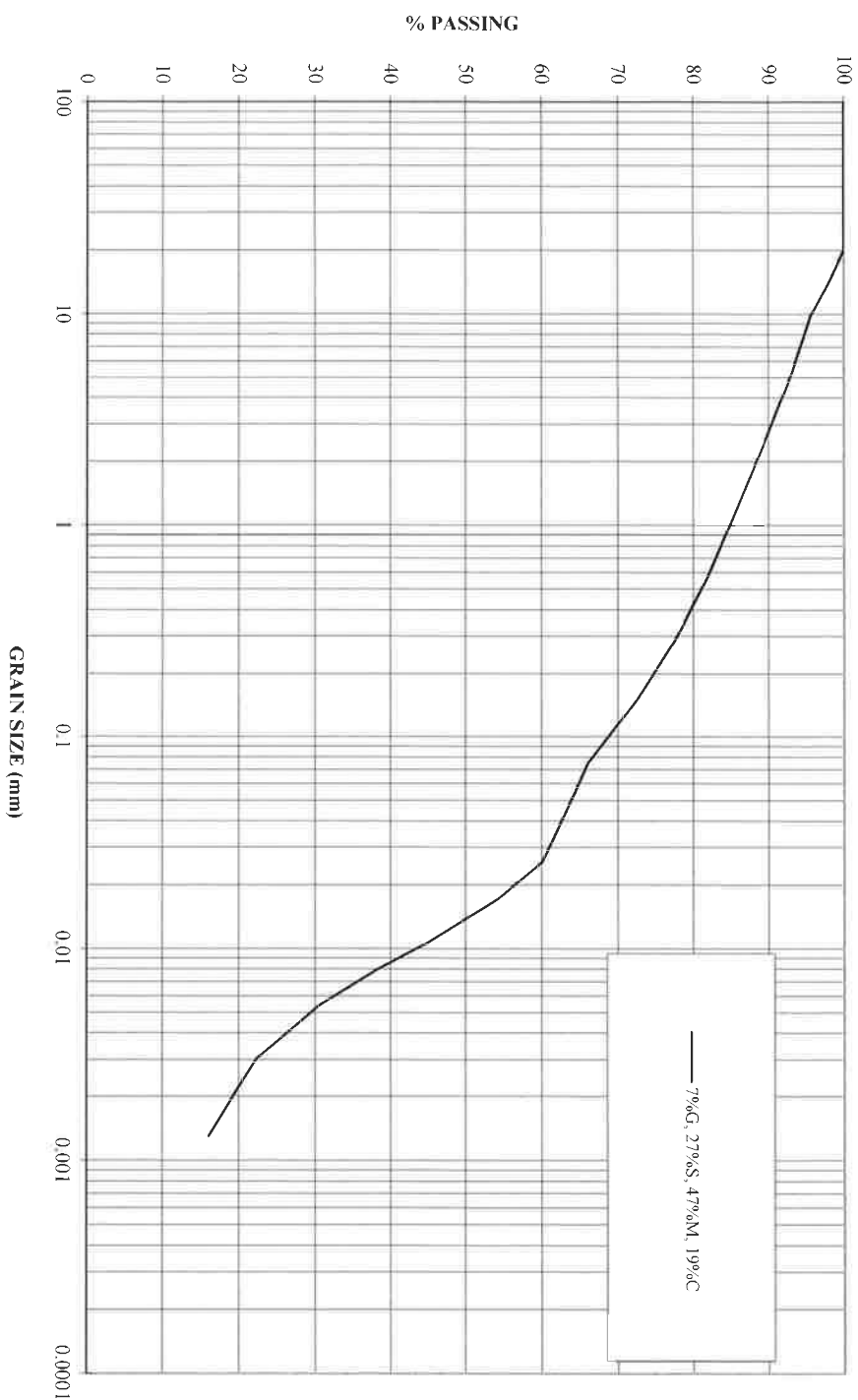
Client:
Sample:
Sample Taken By:

Aecom
2019-12-09-001
Client

Project:
Date Sample Rec'd:
Report Date:

Lab Testing
9-Dec-2019
11-Dec-2019

GRAIN SIZE DISTRIBUTION



GRAVEL		SAND		SILT		CLAY	
COARSE	FINE	COARSE	FINE				

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
Aecom
1701 Hollis Street SH400, PO Box 576 CRO
Halifax, Nova Scotia B3J 3M8

Our Project No: 1901423-00-0-001-001
Date: 17-Dec-19
Client Project No.:
Client PO.:
CC:

Attn: Cody Siphkema

Project: Geotechnical Services

Date Sampled: _____ Sampled By: Client Date Received: 12-Dec-19

Wet Density (kg/m3)	2085	2160	2219	2194	0	0
Dry Density (kg/m3)	1940	1971	1987	1921	0	0
Moisture Content %	7.5	9.6	11.7	14.2	0	0

Compaction Standard:

ASTM D698

Method: C

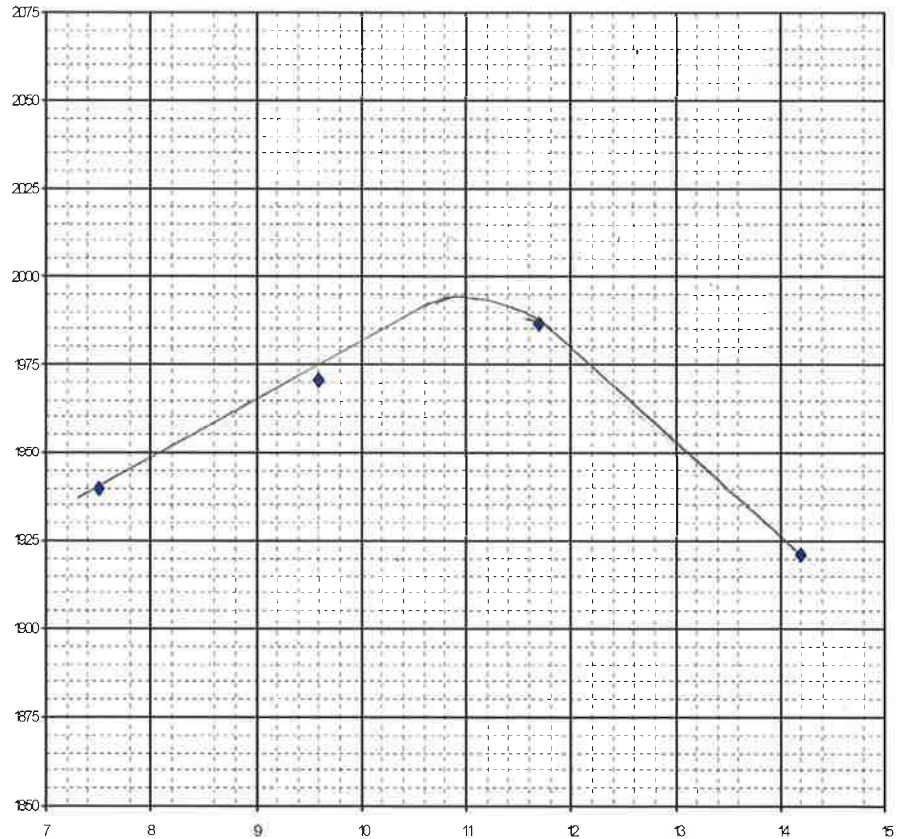
Optimum Moisture (%): 10.8

Maximum Dry Density:
1995 kg/m3

Source:
2019-12-09-001

Location:

Soil Description:



Clay

Moisture %

Comments:

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
 Aecom
 1701 Hollis Street SH400, PO Box 576 CRO
 Halifax, Nova Scotia B3J 3M8

Our Project No: 1901423-00-0-001-001
Date: 17-Dec-19
Client Project No.:
Client PO.:
CC:
Attn: Cody Siphkema

Project: Geotechnical Services

Date Sampled: **Sampled By:** Client **Date Received:** 12-Dec-19

Wet Density (kg/m3)	2091	2240	2232		0	0
Dry Density (kg/m3)	1956	2051	1986		0	0
Moisture Content %	6.9	9.2	12.4		0	0

Compaction Standard:

ASTM D698

 Method: C

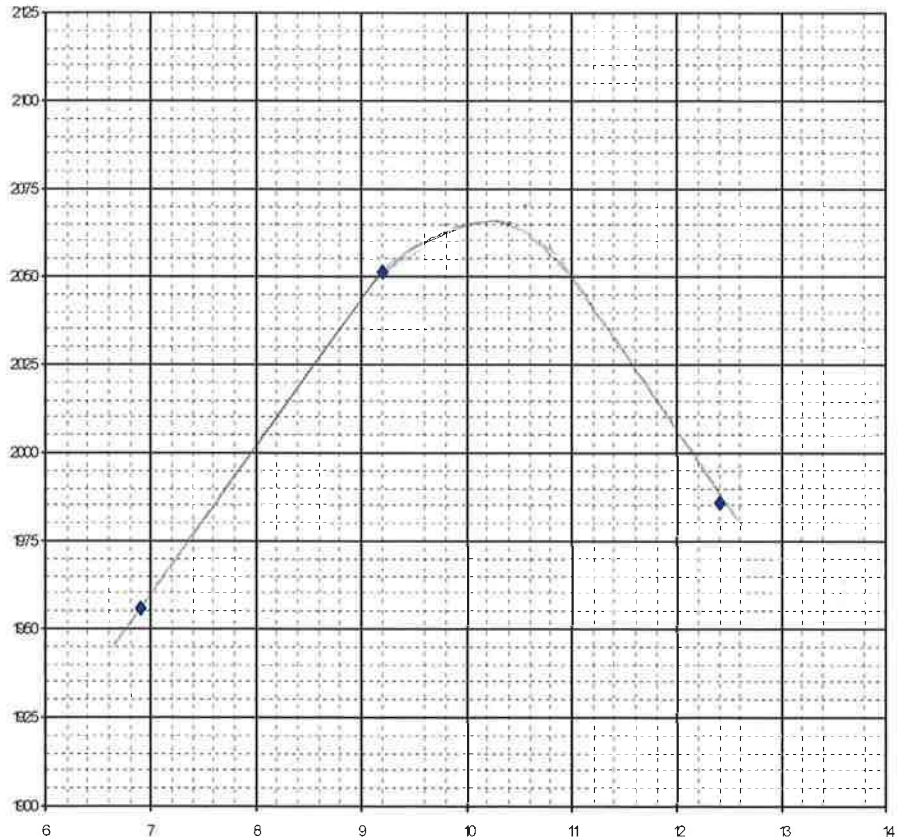
 Optimum Moisture (%): 10.4

 Maximum Dry Density:
2065 kg/m3

 Source:
2019-12-09-002

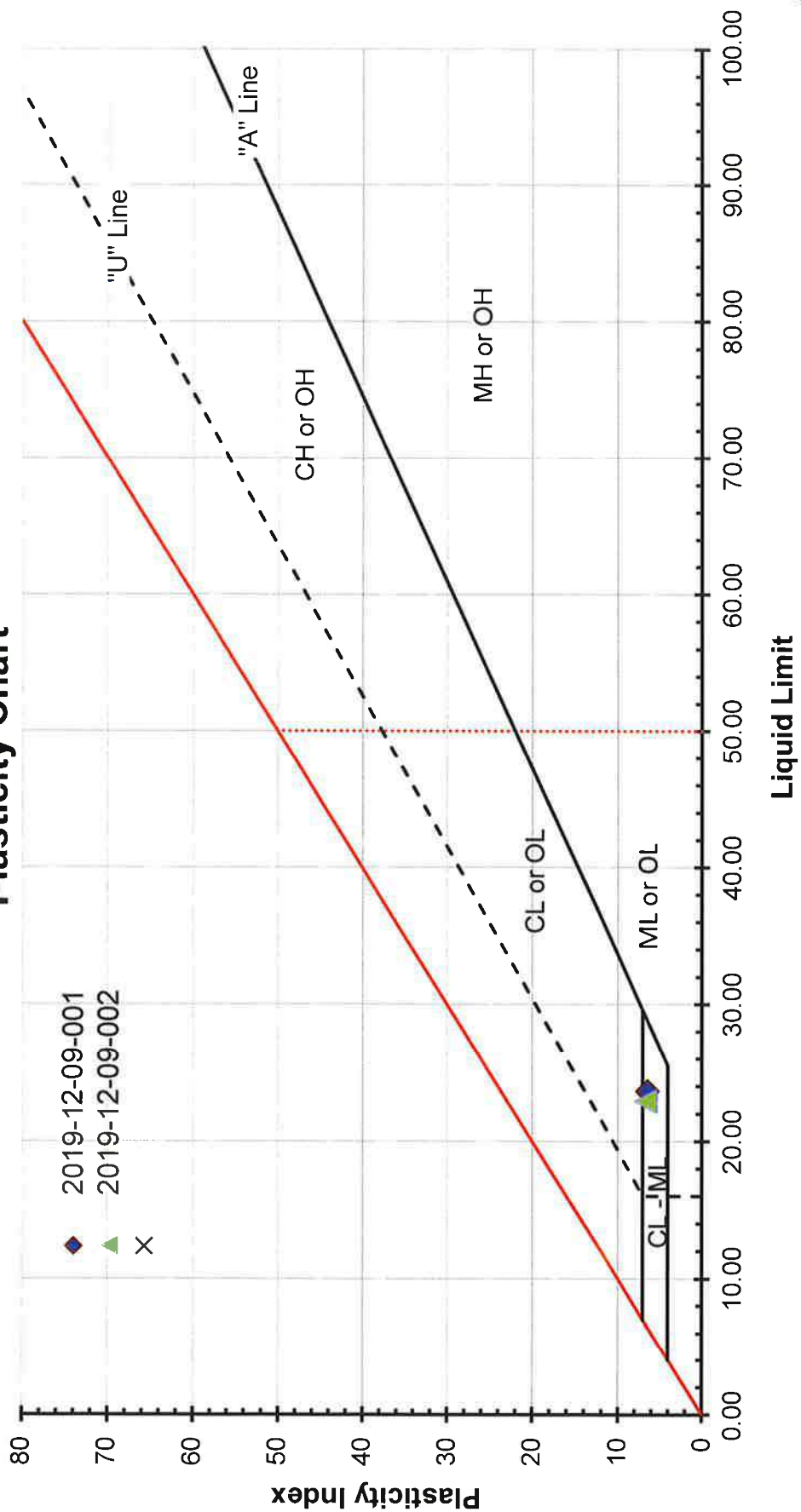
Location:

Soil Description:


Clay
Moisture %

Comments:

Plasticity Chart



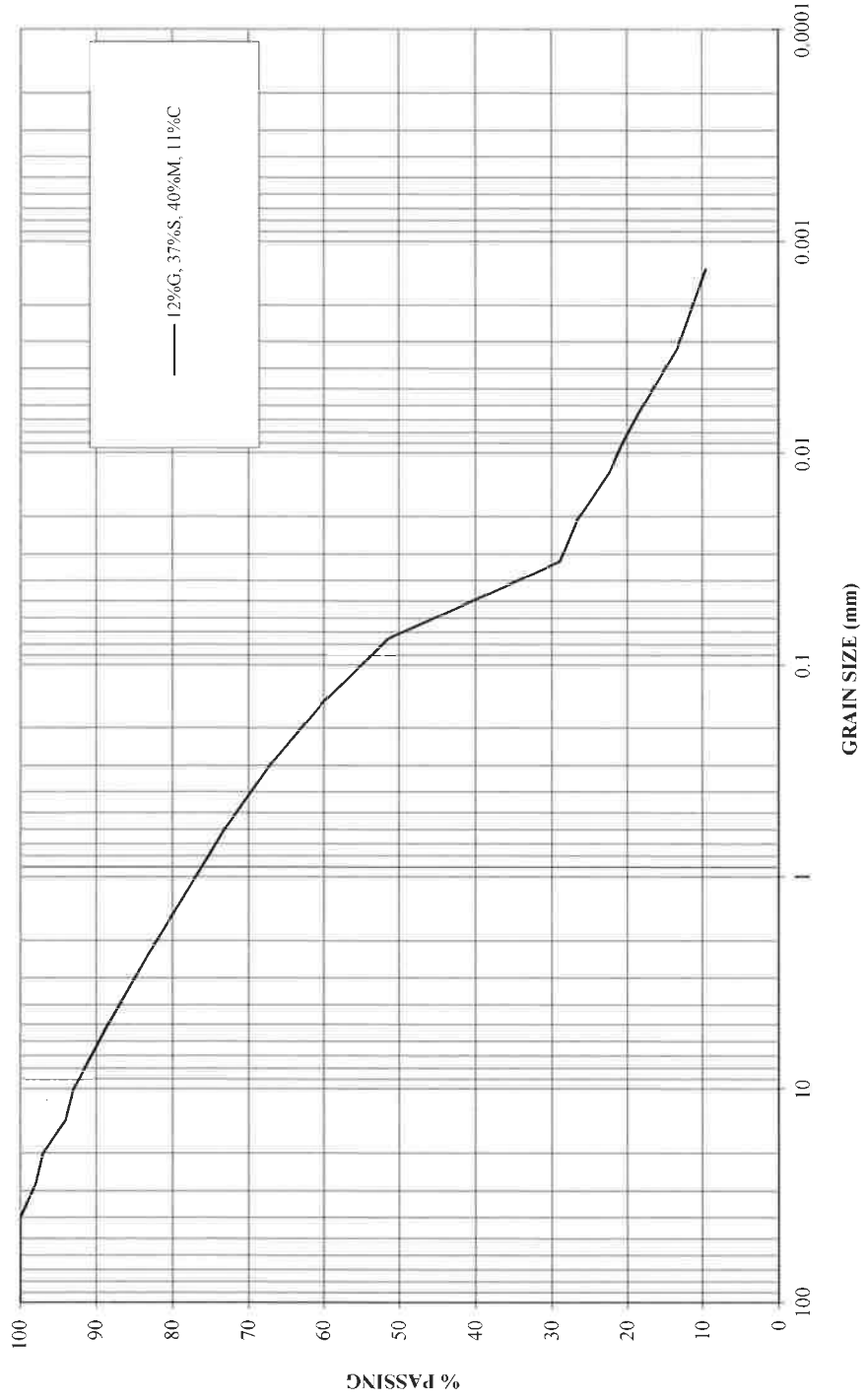
- 2019-12-09-001
- 2019-12-09-002
- X



Client: Aecom
 Sample: 2019-12-09-002
 Sample Taken By: Client

Project: Lab Testing
 Date Sample Rec'd.: 9-Dec-2019
 Report Date: 11-Dec-2019

GRAIN SIZE DISTRIBUTION



GRAVEL		SAND		SILT		CLAY	
COARSE	FINE	COARSE	FINE				



Client	Aecom
Project	Lab Testing
Borehole	2019-12-09-002
Depth	
Sample No.	2
Date Received	9-Dec-2019
Sample Description	
Comments :	

Moisture Content = 2.6%

Metric Sieve Analysis		
Sieve Size	Metric	% Passing
ASTM	(mm)	
4"	112	100
3"	80	100
2"	56	100
1 1/2"	40	100
1"	28	98
3/4"	20	97
1/2"	14	94
3/8"	10	93
No. 4	5	88
No. 8	2.36	83
No. 16	1.18	78
No. 30	0.6	73
No. 50	0.3	67
No. 100	0.15	60
No. 200	0.075	51.3
Hydrometer	0.0326	29.0
Analysis	0.0209	26.7
	0.0124	22.4
	0.0088	20.6
	0.0063	18.3
	0.0032	13.3
	0.0014	9.5



SUMMARY OF LABORATORY DATA

Client: Aecom

Project Number: 2003814.000

Project: Laboratory Testing

Location: Borrow Pit-01

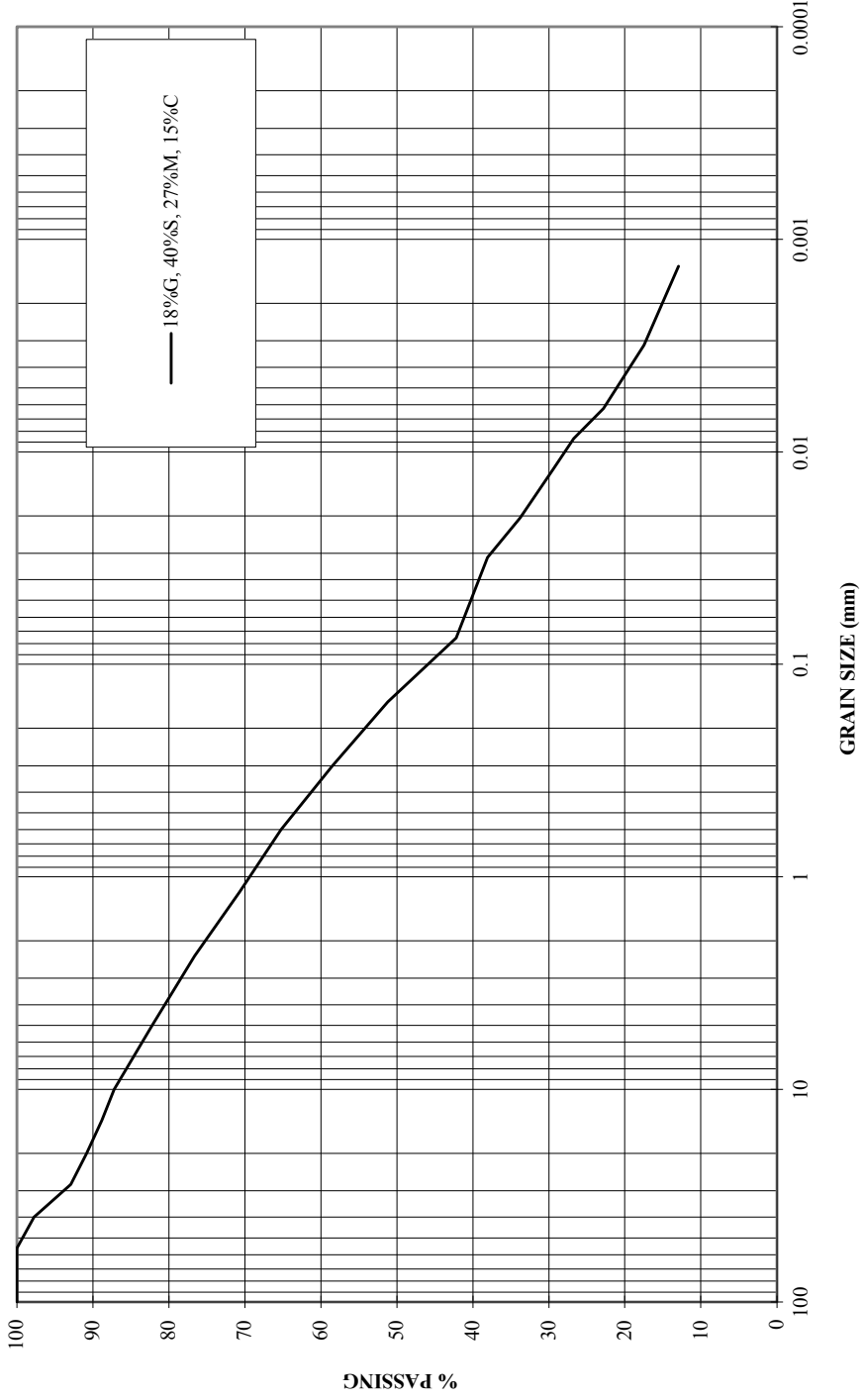
LOCATION	SAMPLE NO.	DESCRIPTION	SPMDD		LIQUID LIMIT	PLASTIC INDEX	MOISTURE CONTENT (%)	PARTICLE SIZE DISTRIBUTION					
			(KG/M ³)	(%)				GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)		
Borrow Pit-01	1	Silty SAND, some gravel, some clay	1977	11.2	2025	10.7	20	5	7.5	18	40	27	15

Standard Proctor Maximum Dry Density (SPMDD) rock correction - 9.2% retained on 20mm sieve.



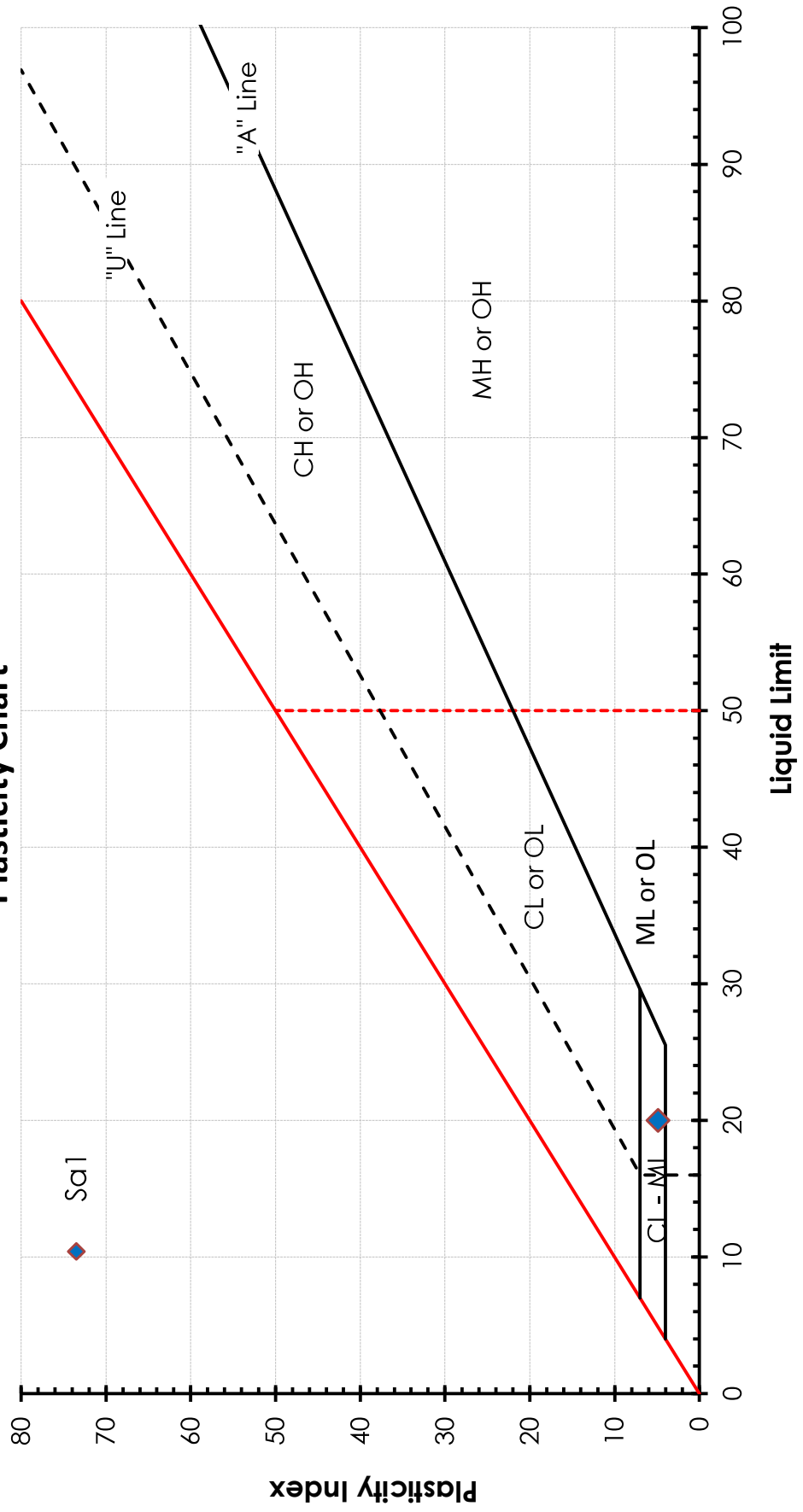
Client: _____ Project: Geotechnical Services
 Sample: Borrow Pit Date Sample Rec'd.: 15-Sep-2020
 Sample Taken By: _____ Client Report Date: 21-Sep-2020

GRAIN SIZE DISTRIBUTION



GRAVEL	SAND			SILT	CLAY
	COARSE	FINE	COARSE		

Plasticity Chart





MOISTURE-DENSITY RELATIONS OF SOILS REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
AECOM
164 Charlotte Street, Suite 2B
Sydney, NS
B1P 1C3

Our Project No: 2003814.000
Date: 28-Sep-20
Client Project No.:
Client PO.:
CC:

Attn: Cody Siphkema

Project:

Date Sampled: _____ Sampled By: _____ Date Received: _____

Wet Density (kg/m3)	2191	2190	2130	0	0
Dry Density (kg/m3)	1974	1930	1963	0	0
Moisture Content %	11	13.5	8.5	0	0

Compaction Standard:

ASTM D1557

Method: C

Optimum Moisture (%): 10.7

Maximum Dry Density:
1977 kg/m3

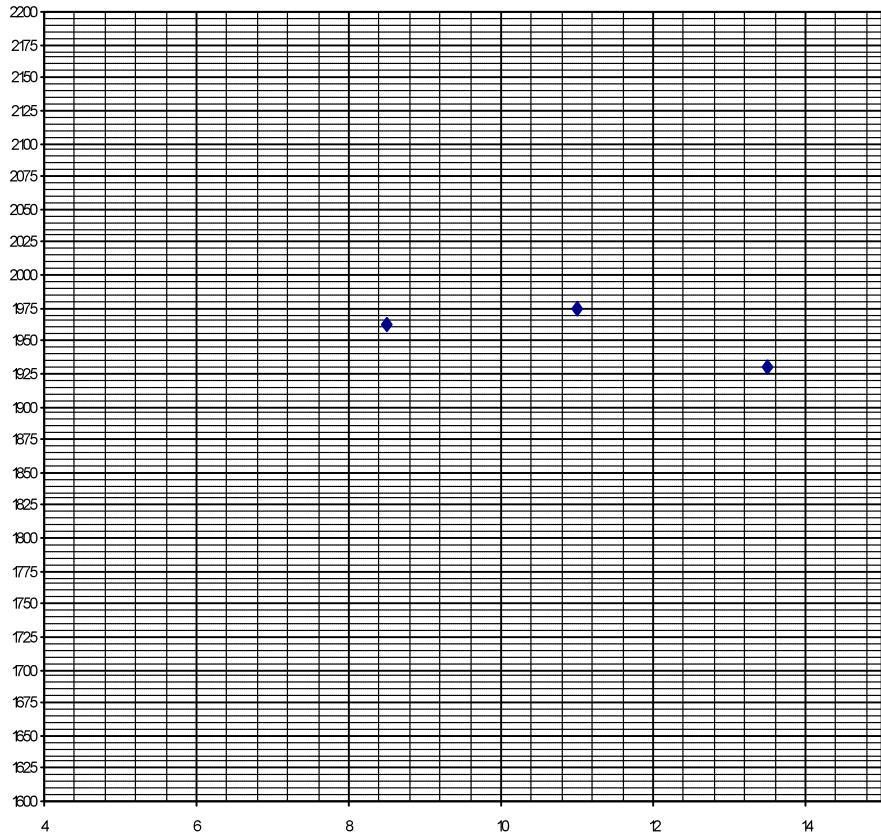
Corrected Maximum Dry Density:

2025 kg/m3

Source:

Location:

Soil Description:



Borrow Pit-01

Moisture %

Comments:

Record No. 2600

Englobe Tech:

PER



CERTIFIED LABORATORY
FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
AECOM
1701 Hollis Street
Halifax, Nova Scotia
B3J 2T9

Our Project No: 02105460.000.0001.0001
Date: 16-Jun-21
Client Project No.:
Client PO.:
CC:

Attn: Rory McNeil

Project: AECOM - Harrietsfield Landfill Site QC

Date Sampled: 15-Jun-21

Sampled By:

Date Received: 15-Jun-21

Wet Density (kg/m3)	2168	2307	2332		0	0
Dry Density (kg/m3)	2045	2136	2120		0	0
Moisture Content %	6	8	10		0	0

Compaction Standard:

ASTM D698

Method: A

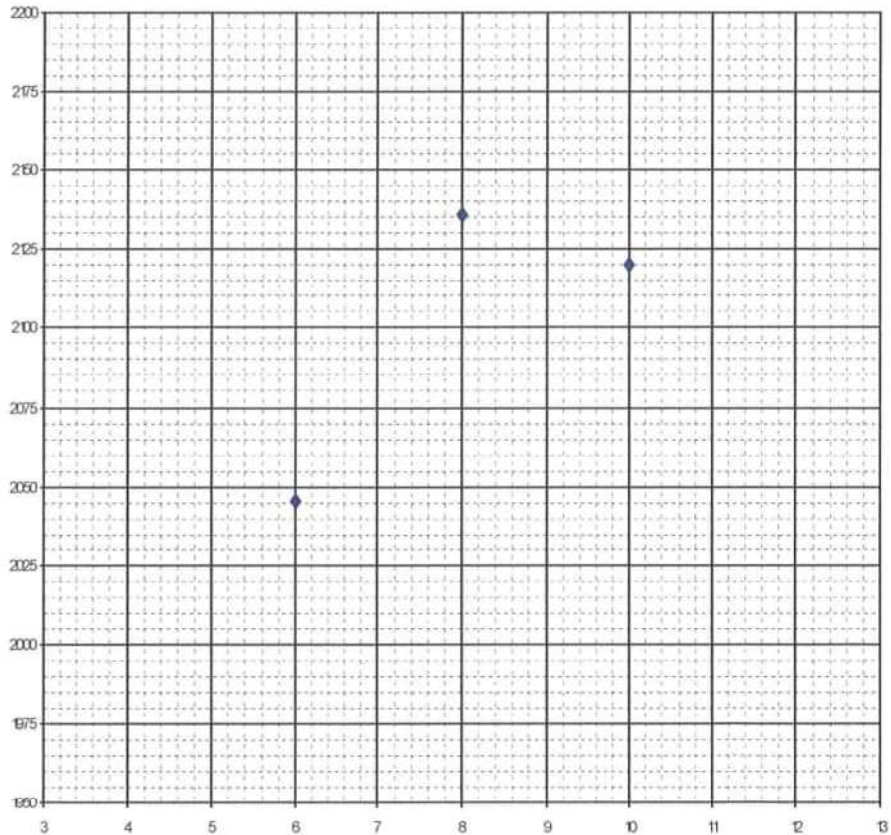
Optimum Moisture (%): 9.0

Maximum Dry Density:
2150 kg/m3

Source:
Harrietsfield Landfill

Location:

Soil Description:



Crusher Dust

Moisture %

Comments: No sieve analysis requested.



SUMMARY OF LABORATORY DATA

Client: Aecom

Project Number: 2003814.000

Project: Laboratory Testing

Location: Borrow Pit-02 (2020-09-28)

LOCATION	SAMPLE NO.	DESCRIPTION	SPMDD		LIQUID LIMIT	PLASTIC INDEX	MOISTURE CONTENT (%)	PARTICLE SIZE DISTRIBUTION					
			(KG/M ³)	(%)				GRAVEL (%)	SAND (%)	SILT (%)	CLAY (%)		
Borrow Pit-02	1	GRAVEL, some sand, trace silt, trace clay	1960	12.8	2250	-	26	12	5.5	70	13	9	8

Standard Proctor Maximum Dry Density (SPMDD) rock correction - 9.2% retained on 20mm sieve.

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client: AECOM
164 Charlotte Street, Suite 2B
Sydney, NS
B1P 1C3
Attn: Cody Siphkema
PHONE: (902) 717-4006 **FAX:**

Our Project No: 2003814.000
Client Contract No.:
Client PO.:
CC:

Project:
Source: Borrow Pit 02
Sample No: Borrow Pit 02
Location:

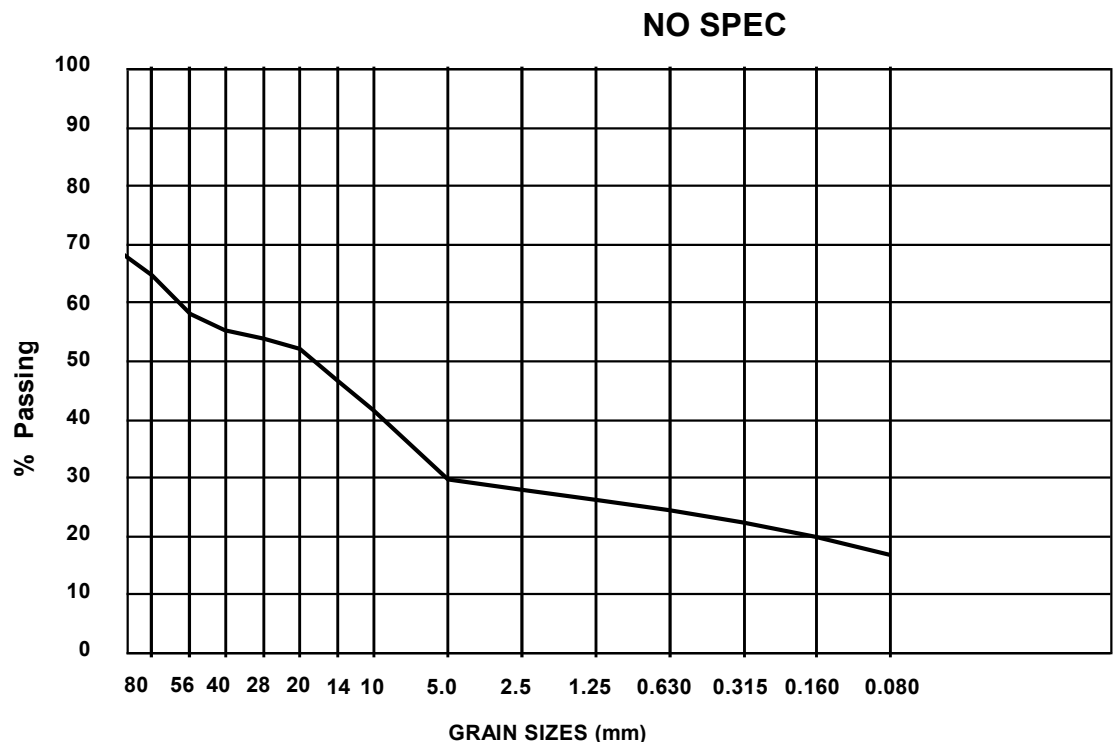
Date Sampled: 28-Sep-20
Sampled by: Client
Date Received: 28-Sep-20
Date Tested: 06-Oct-20

PHYSICAL PROPERTY TESTS					
Soil Type		Liquid Limit	26.5	Flat and Elongated Particles, %	
Gravel, %	70	Plastic Limit	14.7	Coarse Spec. Gravity	
Sand, %	13	Plasticity Index	11.8	Fractured Faces, %	
Silt and Clay, %	17	Coarse Absorption, %		Petrographic No.	
Moisture Cont., %	5.5	Fine Absorption, %		Max. Dry Density, (kg/m3)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

GRAIN SIZE CURVE

Spec Band

Sieve Size (mm)	Percent Passing	Spec. Band
150	100	
112	69	
80	65	
56	58	
40	55	
28	54	
20	52	
14	46	
10	42	
5.0	30	
2.5	28	
1.25	26	
0.630	25	
0.315	23	
0.160	20	
0.080	16.9	

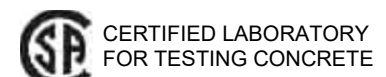


Comments:

Record No: 12344

Englobe Tech: YA

PER



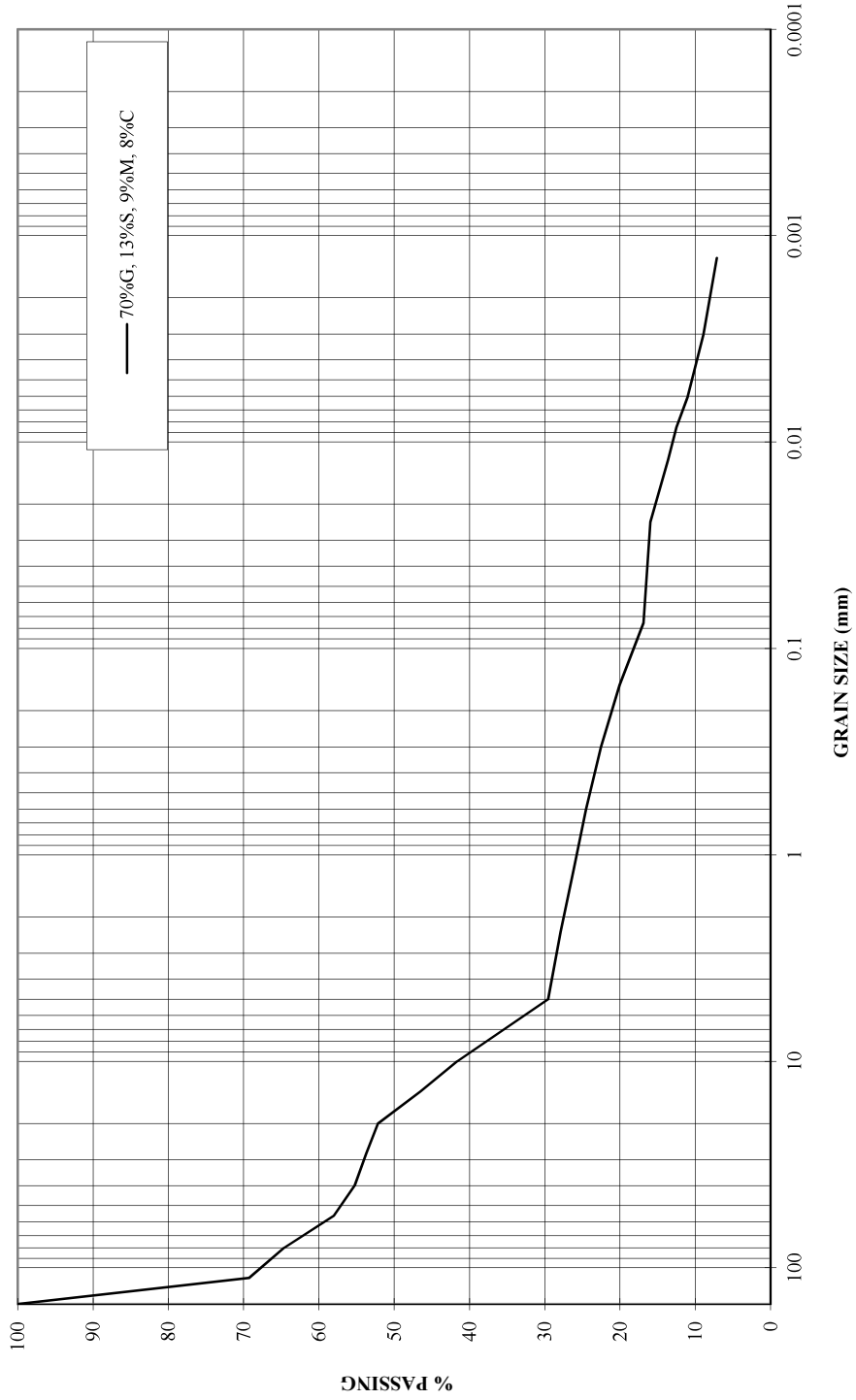
Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager Glenn Graham



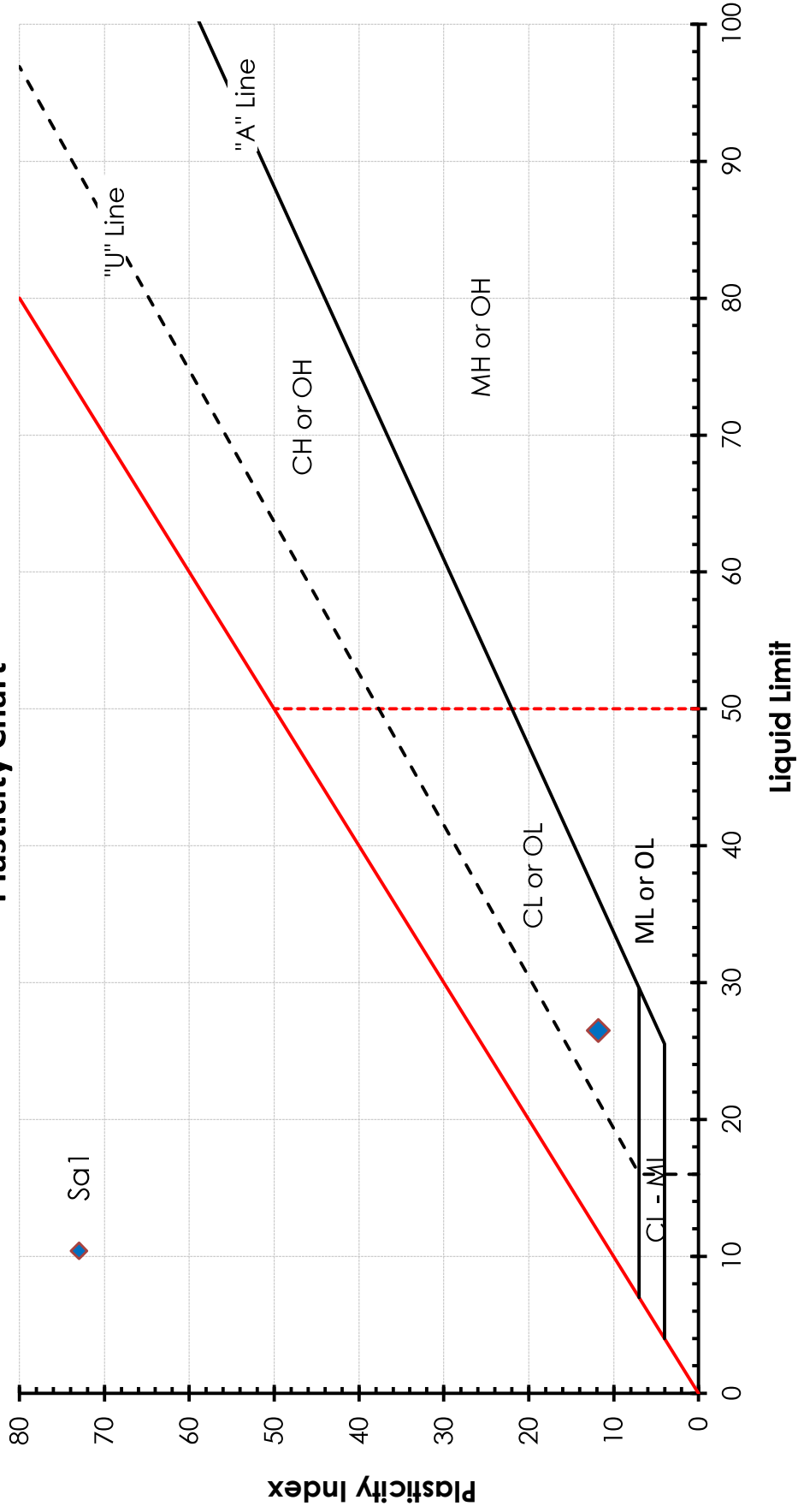
Client:	Aecom	Project:	Geotechnical Services
Sample:	Borrow Pit-02	Date Sample Rec'd.:	28-Sep-2020
Sample Taken By:	Client	Report Date:	20-Oct-2020

GRAIN SIZE DISTRIBUTION



GRAVEL		SAND		SILT		CLAY	
COARSE	FINE	COARSE	MEDIUM	FINE			

Plasticity Chart



97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
AECOM
164 Charlotte Street, Suite 2B
Sydney, NS
B1P 1C3

Our Project No: 2003814.000
Date: 06-Oct-20
Client Project No.:
Client PO.:
CC:

Attn: Cody Sipkema

Project:

Date Sampled: 28-Sep-20

Sampled By: JD

Date Received: 28-Sep-20

Wet Density (kg/m3)	2154	2218	2106		0	0
Dry Density (kg/m3)	1939	1954	1828		0	0
Moisture Content %	11.1	13.5	15.2		0	0

Compaction Standard:

ASTM D1557

Method: C

Optimum Moisture (%): 12.8

Maximum Dry Density:
1960 kg/m3

Corrected Maximum Dry Density:

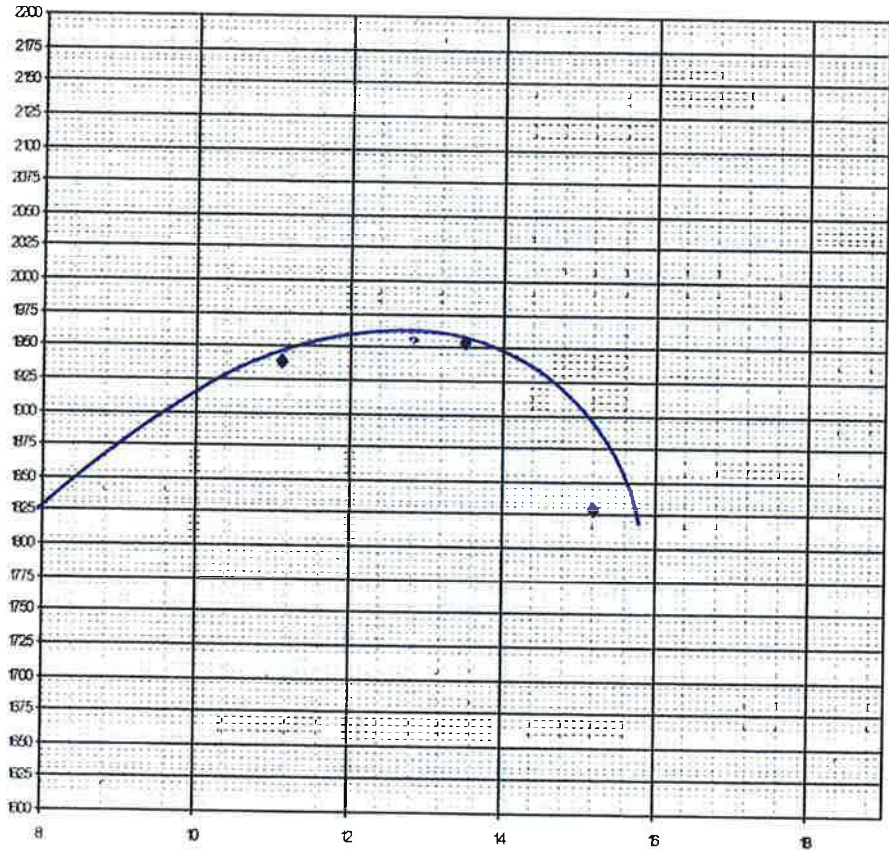
2250 kg/m3

Source:

Borrow Pit 02

Location:

Soil Description:



Borrow Pit 02

Moisture %

Comments:

Record No. 2602

Englobe Tech: YA

PER



CERTIFIED LABORATORY
FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.



**FIELD
DENSITY
REPORT**

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client: AECOM 1701 Hollis Street Halifax, Nova Scotia B3J 2T9	Our Project No.: 02105460.000.0001.0001 Client P.O.: Client Contract No.: Client Code No: CC:
--	--

ATTENTION: Rory McNeil

PHONE: (902) 292-2367 **FAX:**

Project: AECOM - Harrietsfield Landfill Site QC

Date Tested: 15-Jun-21 **Englobe Tech:** Leeland Thomson **Contractor:**

Street: 1275 Old Sambro Road

Test No	Location	Elevation (meters)	Dry Density Kg/m3	% Moisture	% Proctor
1	See diagram for locations. Clay base	base	2014	6.4	97.5
2	See diagram for locations. Crusher dust over clay 3 inch.	base	1835	4.5	88.9
3	See diagram for locations. Clay base	base	2093	5.3	100+
4	See diagram for locations. Crusher dust over clay 3 inch.	base	1823	2.7	88.3
5	See diagram for locations. Clay base	base	1872	6.5	90.7
6	See diagram for locations. Clay base	base	2004	6.1	97.0
7	See diagram for locations. Clay base	base	2004	7.4	97.0

Control Information

Proctor Type:	Maximum Dry Density: 2065 Kg/m3	Optimum Moisture: 10.4 %
SoilType: clay	Spec Requirement: 95 % Compaction	

Comments: Field test results were reported on site. Representative requested to use "2065" maximum dry density proctor.

Record No: 21923 **Density Standby:** 0 **Checked By:**

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean

Project No.:

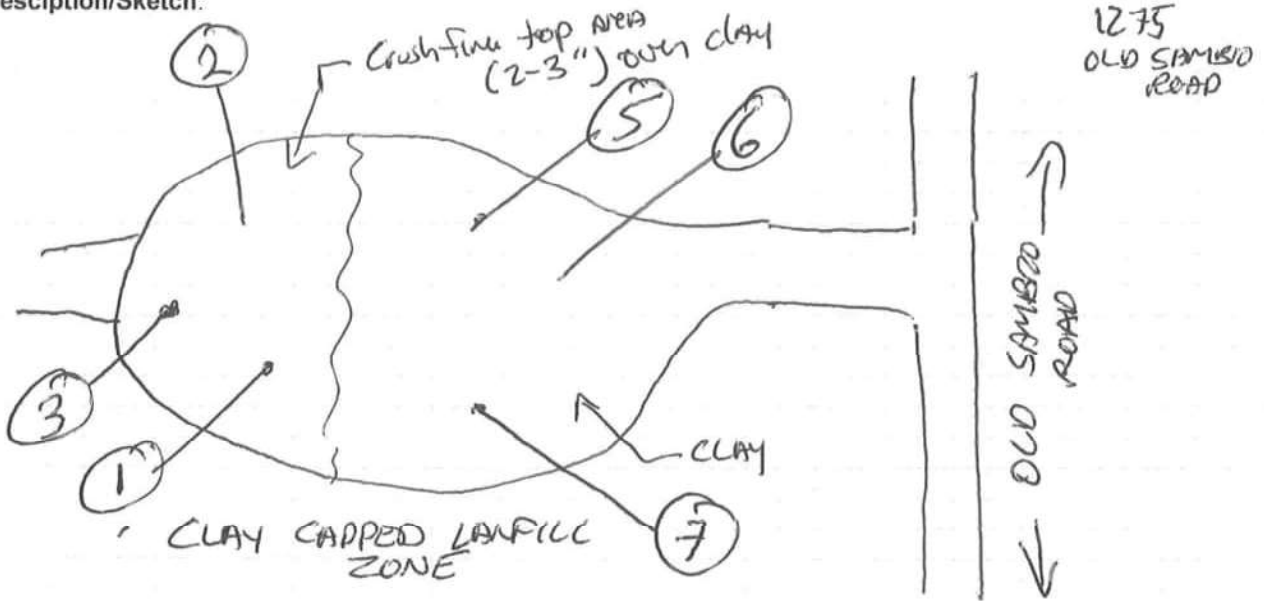
Client: <u>AECOME</u>	Client ref.:
Project:	Date: <u>June 15/21</u>
Location: <u>Harris Field landfill</u>	Page:

Subject:

Weather Conditions

Sunny Rain Snow Cloudy
 Wind Weak Strong Moderate
 Temp. _____ ° C (indoor) _____ ° C (outdoor)

Description/Sketch:



Comments:

NO site plans available, client will
 GPS positions @ later date.

Inspector: Signature: <u>[Signature]</u> Date: <u>June 13/21</u>	Client: Signature: Date:	Project Manager: Signature: Date:
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FIELD DENSITY REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client: AECOM 1701 Hollis Street Halifax, Nova Scotia B3J 2T9
Our Project No.: 02105460.000.0001.0001
Client P.O.:
Client Contract No.:
Client Code No:
CC:

ATTENTION: Rory McNeil
PHONE: (902) 292-2367 FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Date Tested: 23-Jun-21 Englobe Tech: Leeland Thomson Contractor:
Street: 1274 old Sambro Rd.

Table with 6 columns: Test No, Location, Elevation (meters), Dry Density Kg/m3, % Moisture, % Proctor. Contains 2 rows of test data.

Control Information

Proctor Type: Maximum Dry Density: 2150 Kg/m3 Optimum Moisture: 9.0 %
Soil Type: Harrietsfield Landfill Crusher Dust Spec Requirement: 95 % Compaction

Comments: Results reported on site. Locations selected and plotted by client (AECOM).

Record No: 21960 Density Standby: 0 Checked By: AS

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean



FIELD DENSITY REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client: AECOM
Our Project No.: 02105460.000.0001.0001
Client P.O.:
Client Contract No.:
Client Code No:
CC:

ATTENTION: Rory McNeil
PHONE: (902) 292-2367 FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Date Tested: 23-Jun-21 Englobe Tech: Leeland Thomson Contractor:
Street: 1275 Old Sambro Rd.

Table with 6 columns: Test No, Location, Elevation (meters), Dry Density Kg/m3, % Moisture, % Proctor. Contains 3 rows of test data.

Control Information

Proctor Type: Maximum Dry Density: 2065 Kg/m3 Optimum Moisture: 10.4 %
SoilType: Clay (2019-12-09-002) Spec Requirement: 95 % Compaction

Comments: Results reported on site. Locations selected and plotted by client (AECOM).

Record No: 21961 Density Standby: 0 Checked By: AS

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean



FIELD DENSITY REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client: AECOM
Our Project No.: 02105460.000.0001.0001
Client P.O.:
Client Contract No.:
Client Code No:
CC:

ATTENTION: Rory McNeil
PHONE: (902) 292-2367 FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Date Tested: 28-Jun-21 Englobe Tech: Benjamin Lyons Contractor:
Street: 1278 Old Sambro Rd.

Table with 6 columns: Test No, Location, Elevation (meters), Dry Density Kg/m3, % Moisture, % Proctor. Rows 1-6 show data for locations 004 to 009.

Control Information

Proctor Type: Standard Maximum Dry Density: 2150 Kg/m3 Optimum Moisture: 9.0 %
Soil Type: Harrietsfield Landfill Crusher Dust Spec Requirement: 95% Compaction

Comments: Results reported on site. Survey locations recorded by Rory McNeil.

Record No: 21972 Density Standby: 0 Checked By:

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean



FIELD DENSITY REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client: AECOM
Our Project No.: 02105460.000.0001.0001
Client P.O.:
Client Contract No.:
Client Code No:
CC:

ATTENTION: Rory McNeil
PHONE: (902) 292-2367 FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Date Tested: 06-Jul-21 Englobe Tech: Luke MacNeill Contractor:
Street: 1275 Old Sambro Road, Harrietsfield, NS

Table with 6 columns: Test No, Location, Elevation (meters), Dry Density Kg/m3, % Moisture, % Proctor. Contains 5 rows of test data.

Control Information

Proctor Type: Standard Maximum Dry Density: 2150 Kg/m3 Optimum Moisture: 9.0 %
Soil Type: Harrietsfield Landfill Crusher Dust Spec Requirement: 95 % Compaction

Comments: Field test results reported on site to Rory McNeil. First delay was because techs hammer was removed from his truck and a new one had to be brought to him, second delay Rory had a short meeting when tech arrived.

Record No: 22003 Density Standby: 0 Checked By: AS

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
AECOM
1701 Hollis Street
Halifax, Nova Scotia
B3J 2T9

Our Project No: 02105460.000.0001.0001
Date: 08-Jul-21
Client Project No.:
Client PO.:
CC:

Attn: Rory McNeil

Project: AECOM - Harrietsfield Landfill Site QC

Date Sampled: 06-Jul-21

Sampled By:

Date Received: 06-Jul-21

Wet Density (kg/m3)	2095	2211	2222		0	0
Dry Density (kg/m3)	2030	2104	2073		0	0
Moisture Content %	3.2	5.1	7.2		0	0

Compaction Standard:

ASTM D698

Method: C

Optimum Moisture (%): 5.1

Maximum Dry Density:
2104 kg/m3

Corrected Maximum Dry Density:

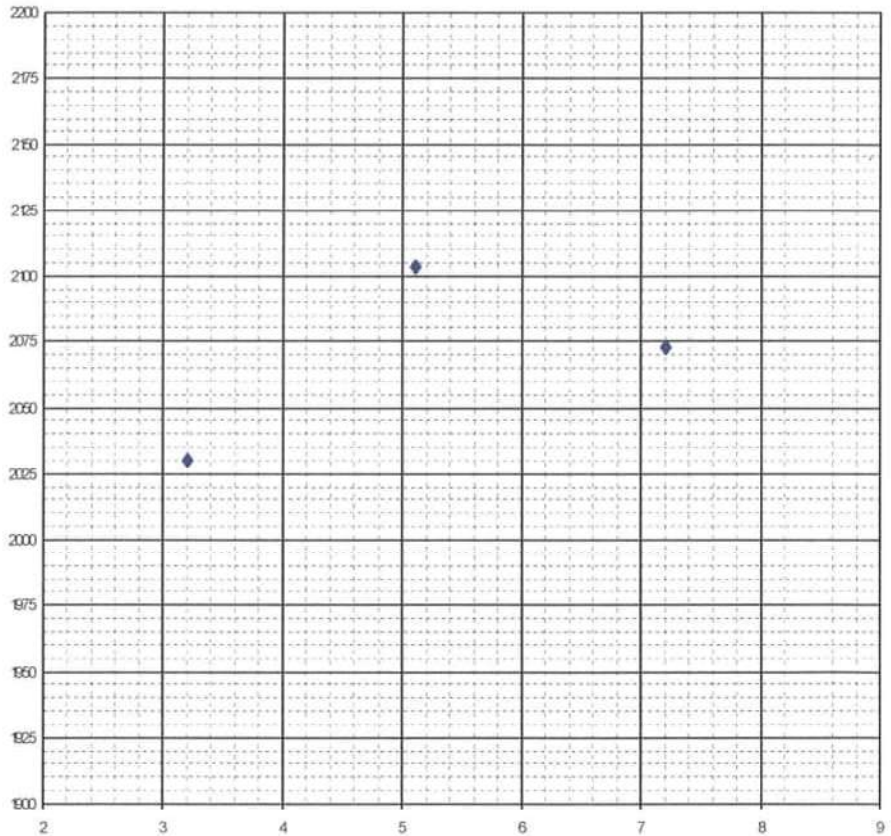
2198 kg/m3

Source:

Harrietsfield Landfill

Location:

Soil Description:



2" gravel

Moisture %

Comments:

Record No. 2655

Englobe Tech: BM

PER



CERTIFIED LABORATORY
FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
AECOM
1701 Hollis Street
Halifax, Nova Scotia
B3J 2T9

Our Project No: 02105460.000.0001.0001
Date: 12-Jul-21
Client Project No.:
Client PO.:
CC:

Attn: Rory McNeil

Project: AECOM - Harrietsfield Landfill Site QC

Date Sampled: 15-Jun-21

Sampled By:

Date Received: 15-Jun-21

Wet Density (kg/m ³)	2168	2307	2317	2332	0	0
Dry Density (kg/m ³)	2045	2136	2126	2120	0	0
Moisture Content %	6	8	9	10	0	0

Compaction Standard:

ASTM D698

Method: A

Optimum Moisture (%): 8.0

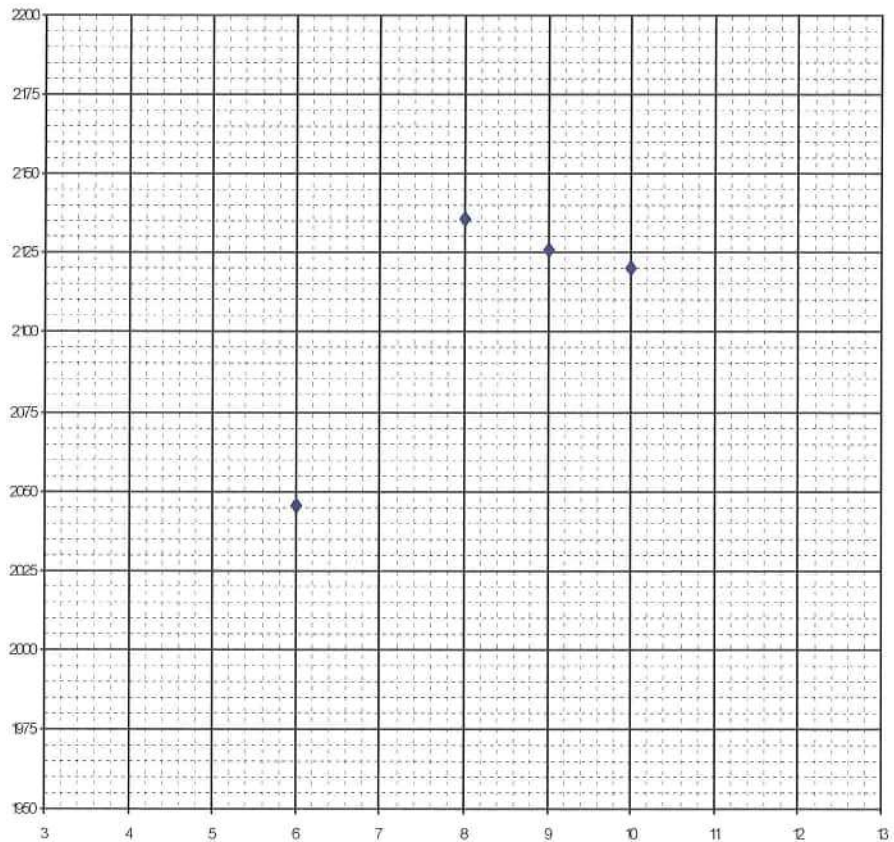
Maximum Dry Density:
2136 kg/m³

Source:

Harrietsfield Landfill

Location:

Soil Description:



Crusher Dust

Moisture %

Comments: No sieve analysis requested.

Record No. 2648

Englobe Tech: B.Mercer

PER



CERTIFIED LABORATORY
FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
AECOM
1701 Hollis Street
Halifax, Nova Scotia
B3J 2T9

Our Project No: 02105460.000.0001.0001
Date: 12-Jul-21
Client Project No.:
Client PO.:
CC:

Attn: Rory McNeil

Project: AECOM - Harrietsfield Landfill Site QC

Date Sampled: 06-Jul-21

Sampled By:

Date Received: 06-Jul-21

Wet Density (kg/m ³)	2095	2211	2224	2222	0	0
Dry Density (kg/m ³)	2030	2104	2096	2073	0	0
Moisture Content %	3.2	5.1	6.1	7.2	0	0

Compaction Standard:

ASTM D698

Method: C

Optimum Moisture (%): 5.6

Maximum Dry Density:
2110 kg/m³

Corrected Maximum Dry Density:

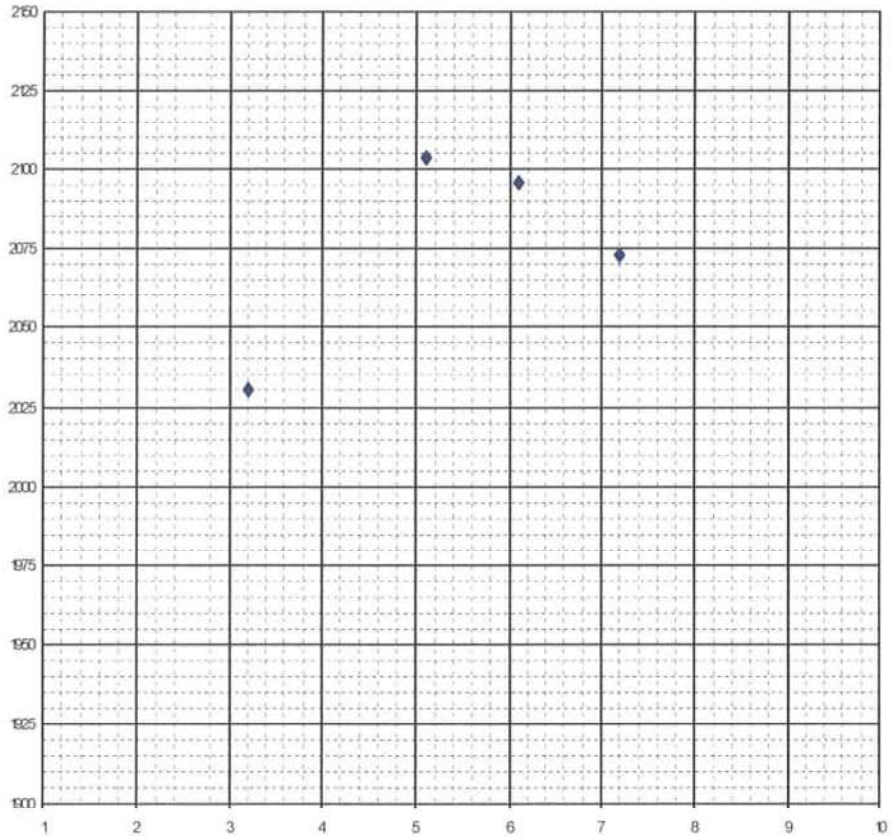
2204 kg/m³

Source:

Harrietsfield Landfill

Location:

Soil Description:



2" gravel

Moisture %

Comments:

Record No. 2655

Englobe Tech: BM

PER



CERTIFIED LABORATORY
FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.



FIELD DENSITY REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client: AECOM 1701 Hollis Street Halifax, Nova Scotia B3J 2T9
Our Project No.: 02105460.000.0001.0001
Client P.O.:
Client Contract No.:
Client Code No:
CC:

ATTENTION: Rory McNeil
PHONE: (902) 292-2367 FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Date Tested: 09-Jul-21 Englobe Tech: Luke MacNeill Contractor:

Street: 1275 Old Sambro Road,, Harrietsfield

Table with 6 columns: Test No, Location, Elevation (meters), Dry Density Kg/m3, % Moisture, % Proctor. Rows 1-5 show test results at grade level.

Control Information

Proctor Type: Standard Maximum Dry Density: 2136 Kg/m3 Optimum Moisture: 8.0 %
Soil Type: Harrietsfield Landfill Crusher Dust Spec Requirement: 95 % Compaction

Comments: Results reported on site to Rory McNeil. Backscatter shots only. 10-12 passes per strip. 5 strips done. Test 1 was just on the loose gravel (not rolled.) Client to bring in bigger equipment to get the wanted compaction %. Test 5 was taken on the top flat area of the landfill.

Record No: 22018 Density Standby: 0 Checked By:

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean





FIELD DENSITY REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client: AECOM 1701 Hollis Street Halifax, Nova Scotia B3J 2T9
Our Project No.: 02105460.000.0001.0001
Client P.O.:
Client Contract No.:
Client Code No:
CC:

ATTENTION: Rory McNeil
PHONE: (902) 292-2367 FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Date Tested: 13-Jul-21 Englobe Tech: Leeland Thomson Contractor: ARCP

Street: 1275 Old Sambro Rd.

Table with 6 columns: Test No, Location, Elevation (meters), Dry Density Kg/m3, % Moisture, % Proctor. Contains 12 rows of test data.

Control Information

Proctor Type: Maximum Dry Density: 2136 Kg/m3 Optimum Moisture: 8.0 %
SoilType: Crusher Dust - Harrietsfield Spec Requirement: 95 % Compaction

Comments: Result reported on site. Samples collected on first 4 locations and submitted to lab for moisture analysis.

Record No: 22044 Density Standby: 0 Checked By: AB

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean



FIELD DENSITY REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client: AECOM 1701 Hollis Street Halifax, Nova Scotia B3J 2T9
Our Project No.: 02105460.000.0001.0001
Client P.O.:
Client Contract No.:
Client Code No:
CC:

ATTENTION: Rory McNeil
PHONE: (902) 292-2367 FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Date Tested: 13-Jul-21 Englobe Tech: Leeland Thomson Contractor: ARCP
Street: 1275 Old Sambro Rd.

Table with 6 columns: Test No, Location, Elevation (meters), Dry Density Kg/m3, % Moisture, % Proctor. Contains 10 rows of test data.

Control Information

Proctor Type: Maximum Dry Density: 2204 Kg/m3 Optimum Moisture: 5.6 %
Soil Type: 2" Gravel - Harrietsfield Spec Requirement: 95 % Compaction

Comments: Results reported on site.

Record No: 22045 Density Standby: 0 Checked By: [Signature]

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:

AECOM
1701 Hollis Street
Halifax, Nova Scotia
B3J 2T9

Our Project No:

02105460.000.0001.0001

Client Contract No.:

Client PO.:

CC:

Attn: Rory McNeil

PHONE (902) 292-2367

FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Source: Harrietsfield

Sample No: 1

Date Sampled: 13-Jul-21

Location:

Sampled by: LT

Date Received: 13-Jul-21

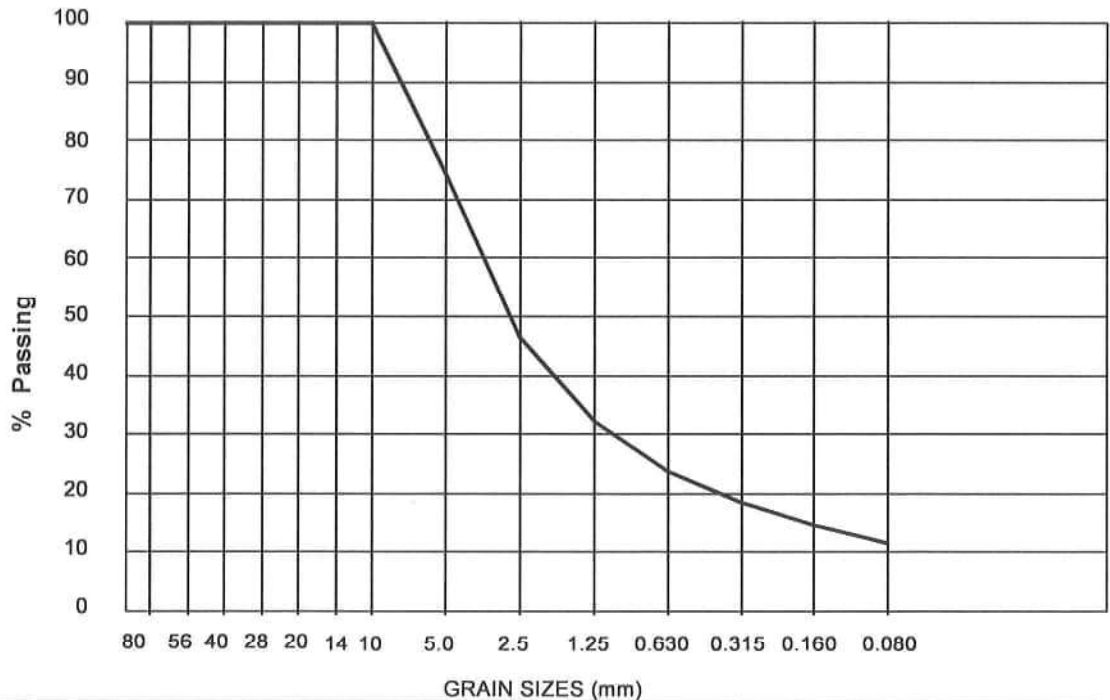
Date Tested: 14-Jul-21

PHYSICAL PROPERTY TESTS					
Soil Type	Crusher Dust	Liquid Limit		Flat and Elongated Particles, %	
Gravel, %	26	Plastic Limit		Coarse Spec. Gravity	
Sand, %	62	Plasticity Index		Fractured Faces, %	
Silt and Clay, %	12	Coarse Absorption, %		Petrographic No.	
Moisture Cont., %	1.6	Fine Absorption, %		Max. Dry Density, (kg/m ³)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

Sieve Size (mm)	Percent Passing	Spec. Band
112		
80		
56		
40		
28		
20		
14		
10	100	
5.0	74	
2.5	47	
1.25	32	
0.630	24	
0.315	19	
0.160	15	
0.080	11.7	

GRAIN SIZE CURVE

**Spec Band
NO SPEC**



Comments: Crusher Dust Depth = 4.5"

Record No: 12587

Englobe Tech: MS

PER

AS



CERTIFIED LABORATORY FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:

AECOM
1701 Hollis Street
Halifax, Nova Scotia
B3J 2T9

Our Project No:

02105460.000.0001.0001

Client Contract No.:

Client PO.:

CC:

Attn: Rory McNeil

PHONE (902) 292-2367

FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Source: Harrietsfield

Sample No: 2

Date Sampled: 13-Jul-21

Location:

Sampled by: LT

Date Received: 13-Jul-21

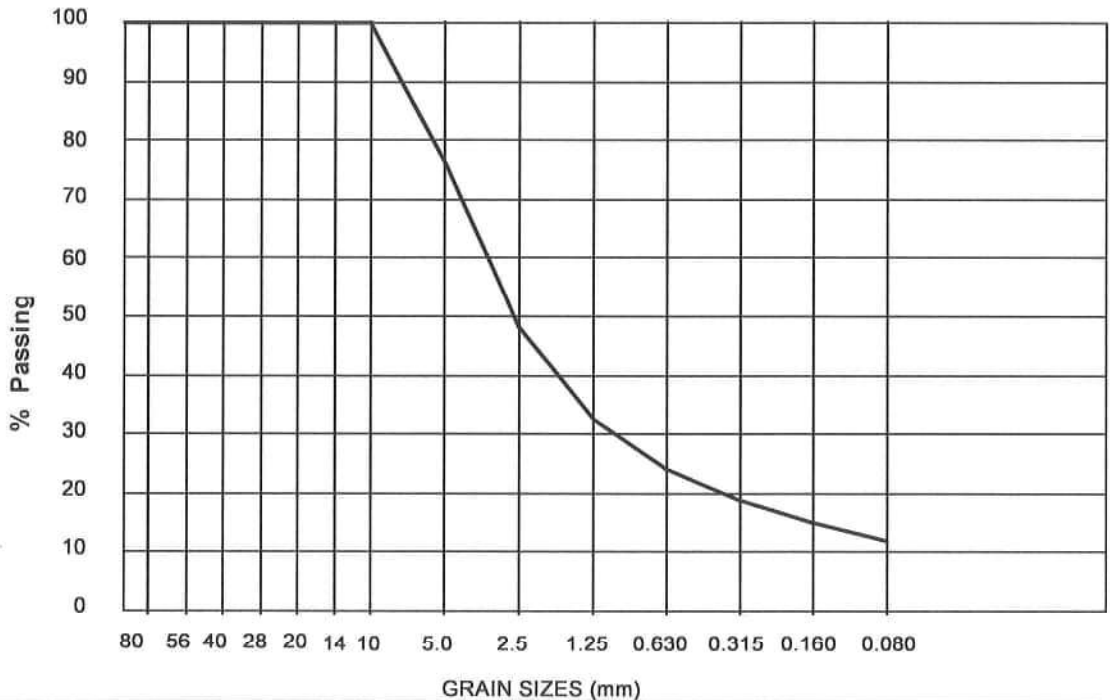
Date Tested: 14-Jul-21

PHYSICAL PROPERTY TESTS					
Soil Type	Crusher Dust	Liquid Limit		Flat and Elongated Particles, %	
Gravel, %	24	Plastic Limit		Coarse Spec. Gravity	
Sand, %	64	Plasticity Index		Fractured Faces, %	
Silt and Clay, %	12	Coarse Absorption, %		Petrographic No.	
Moisture Cont., %	3.9	Fine Absorption, %		Max. Dry Density, (kg/m ³)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

Sieve Size (mm)	Percent Passing	Spec. Band
112		
80		
56		
40		
28		
20		
14		
10	100	
5.0	76	
2.5	48	
1.25	33	
0.630	24	
0.315	19	
0.160	15	
0.080	11.9	

GRAIN SIZE CURVE

**Spec Band
NO SPEC**



Comments: Crusher Dust depth = 1"

Record No: 12588

Englobe Tech: MS

PER

AB



CERTIFIED LABORATORY FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
AECOM
1701 Hollis Street
Halifax, Nova Scotia
B3J 2T9

Our Project No: 02105460.000.0001.0001

Client Contract No.:
Client PO.:
CC:

Attn: Rory McNeil
PHONE (902) 292-2367

FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Source: Harrietsfield

Sample No: 3

Date Sampled: 13-Jul-21

Location:

Sampled by: LT

Date Received: 13-Jul-21

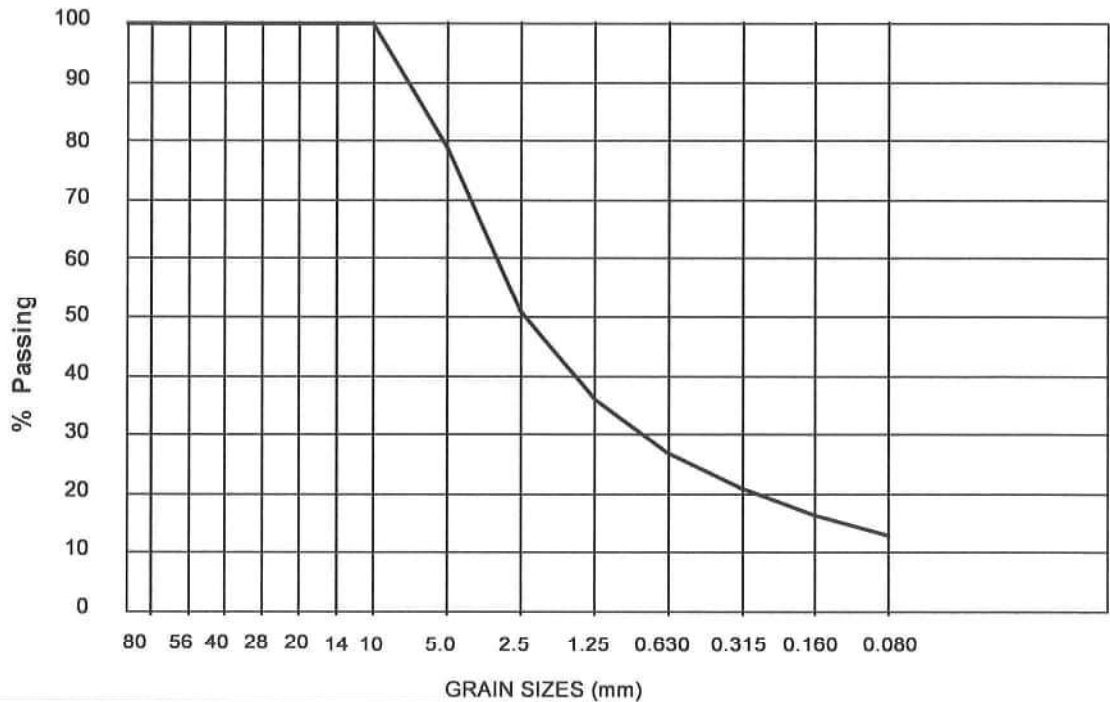
Date Tested: 14-Jul-21

PHYSICAL PROPERTY TESTS					
Soil Type	Crusher Dust	Liquid Limit		Flat and Elongated Particles, %	
Gravel, %	21	Plastic Limit		Coarse Spec. Gravity	
Sand, %	66	Plasticity Index		Fractured Faces, %	
Silt and Clay, %	13	Coarse Absorption, %		Petrographic No.	
Moisture Cont., %	2.9	Fine Absorption, %		Max. Dry Density, (kg/m3)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

Sieve Size (mm)	Percent Passing	Spec. Band
112		
80		
56		
40		
28		
20		
14		
10	100	
5.0	79	
2.5	51	
1.25	36	
0.630	27	
0.315	21	
0.160	16	
0.080	12.9	

GRAIN SIZE CURVE

Spec Band
NO SPEC



Comments: Crusher Dust depth = 2"

Record No: 12589

Englobe Tech: MS/RL

PER

AS



CERTIFIED LABORATORY FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:

AECOM
1701 Hollis Street
Halifax, Nova Scotia
B3J 2T9

Our Project No:

02105460.000.0001.0001

Client Contract No.:

Client PO.:

CC:

Attn: Rory McNeil

PHONE (902) 292-2367

FAX:

Project: AECOM - Harrietsfield Landfill Site QC

Source: Harrietsfield

Sample No: 4

Date Sampled: 13-Jul-21

Sampled by: LT

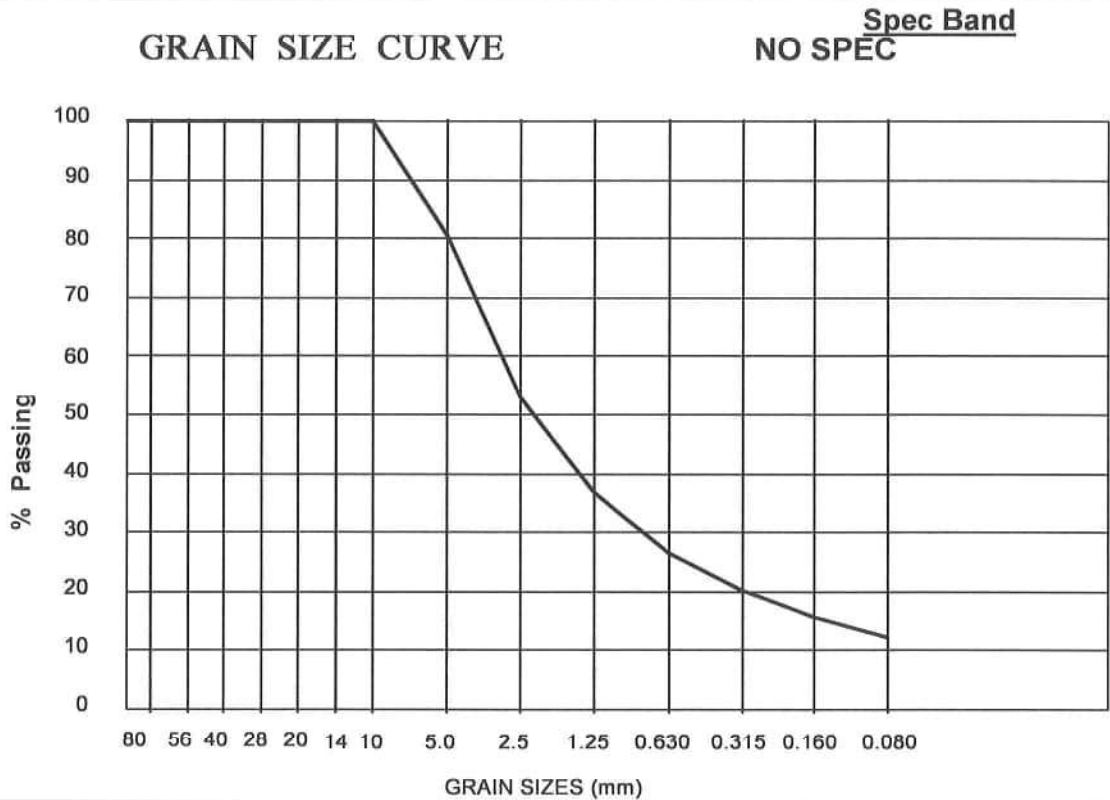
Date Received: 13-Jul-21

Location:

Date Tested: 14-Jul-21

PHYSICAL PROPERTY TESTS					
Soil Type	Crusher Dust	Liquid Limit		Flat and Elongated Particles, %	
Gravel, %	20	Plastic Limit		Coarse Spec. Gravity	
Sand, %	68	Plasticity Index		Fractured Faces, %	
Silt and Clay, %	12	Coarse Absorption, %		Petrographic No.	
Moisture Cont., %	2.8	Fine Absorption, %		Max. Dry Density, (kg/m3)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

Sieve Size (mm)	Percent Passing	Spec. Band
112		
80		
56		
40		
28		
20		
14		
10	100	
5.0	80	
2.5	53	
1.25	37	
0.630	27	
0.315	20	
0.160	16	
0.080	12.3	



Comments: Crusher Dust depth = 5"

Record No: 12590

Englobe Tech: MS

PER

AB



CERTIFIED LABORATORY FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean



**FIELD
DENSITY
REPORT**

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
AECOM
1701 Hollis Street
Halifax, Nova Scotia
B3J 2T9

Our Project No.: 02105460.000.0001.0001
Client P.O.:
Client Contract No.:
Client Code No:
CC:

ATTENTION: Rory McNeil
PHONE: (902) 292-2367 **FAX:**

Project: AECOM - Harrietsfield Landfill Site QC

Date Tested: 27-Jul-21 **Englobe Tech:** Luke MacNeill **Contractor:**

Street: 1275 Old Sambro Road

Test No	Location	Elevation (meters)	Dry Density Kg/m3	% Moisture	% Proctor
1	Survey code 20210727001	base	1920	5.5	89.9
2	Survey code 20210727002	base	1892	5.1	88.6
3	Survey code 20210727003	base	1952	3.3	91.4
4	Survey code 20210727004	base	2007	4.7	94.0
5	Survey code 20210727005	base	1909	5.2	89.4
6	Survey code 20210727006	base	1836	5.7	86.0
7	Survey code 20210727007	base	1881	3.5	88.1

Control Information

Proctor Type: Standard **Maximum Dry Density:** 2136 Kg/m3 **Optimum Moisture:** 8.0 %
SoilType: Harrietsfield Landfill Crusher Dust **Spec Requirement:** 90 % Compaction

Comments: Field test results reported on site to Dave. See picture for the general areas of the shots. Tech was directed to only probe to 2" (50 mm) for all tests.

Record No: 22089

Density Standby: 0

Checked By: BG

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager: Robert McLean



ANALYSIS REPORT
SCC Accreditation No.: 40‡

Mr. Rory McNeil

Date: June 14, 2021

AECOM CANADA LTD

Report: 5858-003S-1A-en

IDENTIFICATION: Interface: 50 mil HDPE MicroDrain Geomembrane (textured side to soil material) Vs Soil (Crusher Dust "6mm minus")
Received: May 31, 2021

STANDARD:

TEST: Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear ASTM D5321/D5321M-20

TEST CONDITIONS: Shear surface 304 x 304 mm;
Data acquisition period (seconds): 1.2;
Flat surfaces grips fixed with 4 bolts + rasp surface in lower box and upper box ;
Normal load: Micro-Stepper Motor;
Rate of horizontal displacement(mm/min); 1;
Tested in machine direction ;
Submerged interface ;
Asperity Height: 5 measurements per specimen according to ASTM D7466 (HDPE Microdrain GMB(textured side));
Thickness: 5 measurements per specimen according to ASTM D5994 (HDPE Microdrain GMB);
Testing configuration - Upper box / Lower box: Soil / HDPE Microdrain GMB (textured side);
Date of test: June 7 & 8, 2021

RESULTS:

Individual Data

Normal Compressive Pressure (kPa):	13.8	72.7	251.5
------------------------------------	------	------	-------

GEOMEMBRANE PROPERTIES

Asperity height (mils):	27	25	26
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Specimen thickness (mils):	64	67	65
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PROPERTIES OF THE SOIL

Water content of compaction (%):	1.6	1.2	1.9
----------------------------------	-----	-----	-----

Dry unit weight after compaction (kg/m ³):	1940	1940	1930
--	------	------	------

Duration of the consolidation (hours):	1	1	1
--	---	---	---

TEST RESULTS


Peak shear stress (kPa):	14.1	61.6	200.5
--------------------------	------	------	-------

Shear stress at large displacement (kPa):	11.8	48.6	167.9
---	------	------	-------

Prepared by:


Julien Gagné, Tech.
Technician

Approved by:


Omar Kamla, Eng.
Project Leader

Date: June 14, 2021

****For any information concerning this report, please contact Omar Kamla.****

The reports are identified by an alphanumeric code, the letter preceding "-en" refers to the revision number, emitted in ascending order. The electronic copy sent by CTT Group is the official report. The reported identification is based on what was observed on the received sample and/or information provided by the customer. The samples in relation to this report are retained for a period of 30 days following transmission of the report. The above reported results refer exclusively to the samples submitted for evaluation. This analysis report cannot be partly used or reproduced, unless in whole, without CTT Group prior written consent. ‡ The ISO/IEC 17025 Scope of Accreditation of CTT Group is available at www.gcttg.com. In this report, the tests which number is followed by the symbol ‡ are not covered by this accreditation. For customer's complete address, please refer to the email.

ANALYSIS REPORT
SCC Accreditation No.: 40‡

Mr. Rory McNeil

Date: June 14, 2021

AECOM CANADA LTD

Report: 5858-003S-1A-en

IDENTIFICATION: Interface: 50 mil HDPE MicroDrain Geomembrane (textured side to soil material) Vs Soil (Crusher Dust "6mm minus")
Received: May 31, 2021

STANDARD:

TEST: Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear
ASTM D5321/D5321M-20

RESULTS (CONT): Individual Data

Estimated peak angle of friction (°): 38


Estimated peak adhesion (kPa): 3-----
Estimated angle of friction at large displacement (°): 33-----
Estimated adhesion at large displacement (kPa): 1

REMARKS: - See graphs and pictures in appendix.

Prepared by:


Julien Gagné, Tech.
Technician

Approved by:


Omar Kamla, Eng.
Project Leader

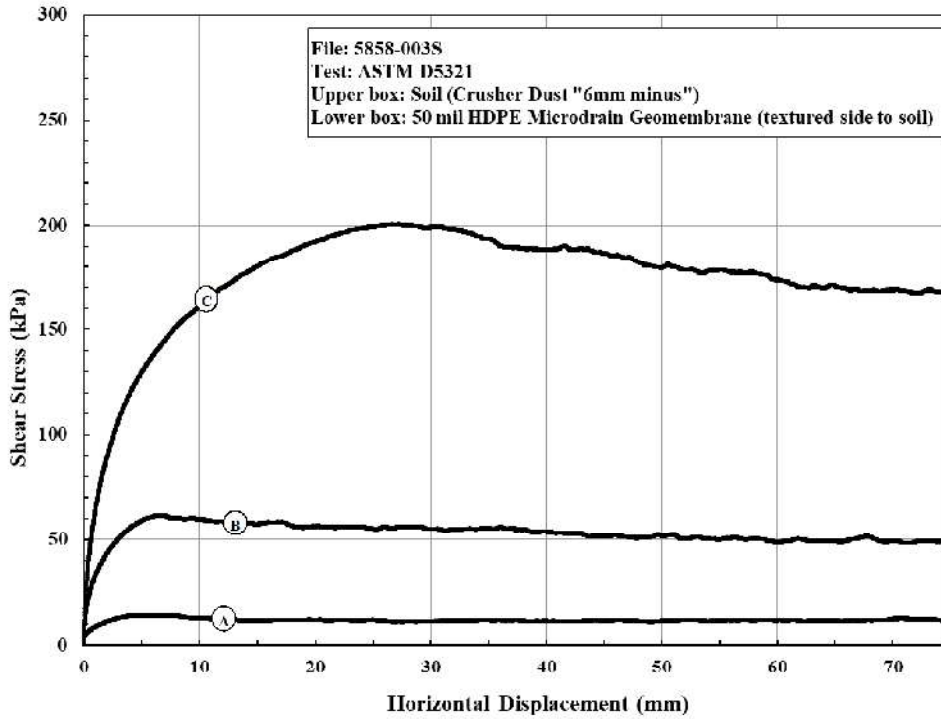
Date: June 14, 2021

****For any information concerning this report, please contact Omar Kamla.****

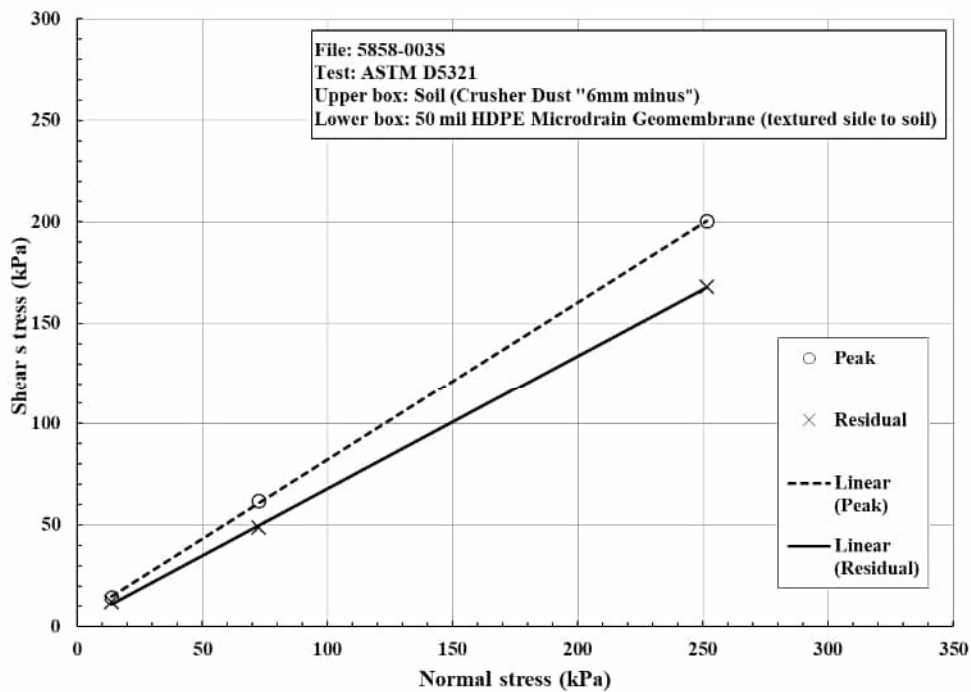
The reports are identified by an alphanumeric code, the letter preceding "-en" refers to the revision number, emitted in ascending order. The electronic copy sent by CTT Group is the official report. The reported identification is based on what was observed on the received sample and/or information provided by the customer. The samples in relation to this report are retained for a period of 30 days following transmission of the report. The above reported results refer exclusively to the samples submitted for evaluation. This analysis report cannot be partly used or reproduced, unless in whole, without CTT Group prior written consent. ‡ The ISO/IEC 17025 Scope of Accreditation of CTT Group is available at www.gcttg.com. In this report, the tests which number is followed by the symbol ‡ are not covered by this accreditation. For customer's complete address, please refer to the email.

APPENDIX

Graphs



Shear Stress vs Horizontal Displacement



Shear Stress vs Normal Stress



Soil (Crusher Dust “6mm minus”) after the test



50 mil HDPE Microdrain Geomembrane after the test – Test at 10kPa



50 mil HDPE Microdrain Geomembrane after the test – Test at 70kPa



50 mil HDPE Microdrain Geomembrane after the test – Test at 250kPa

July 16, 2021

Mr. Brad Hickey

Atlantic Road Construction and Paving Limited

PO Box 89

Eastern Passage, Nova Scotia

B3M 1M7

(Email. Brad.Hickey@arcp.ca)

Subject: Crusher Dust Compaction -

Harrietsfield C&D Landfield Cap Replacement and Site Closure

1275 Old Sambro Road, Harrietsfield, NS

Our ref.: 2108130.000

Mr. Brad Hickey,

At the request of ARCP, Englobe has reviewed compaction efforts to date for the crusher dust (i.e. crushed sand) levelling layer (50 to 100 mm thick) placed above the clay capping layer (300 mm thick). The crushed sand layer will act as a compacted buffer between the clay and the geomembrane cap liner. We understand that achieving the specified compaction of 95% standard Proctor maximum dry density (SPMDD) has been difficult on relatively flat areas and mostly unobtainable on slope areas despite significant efforts by the contractor. Slope areas are as steep as 3.3:1 (horizontal:vertical). Efforts have included adjusting the number of roller passes, type of passes (i.e. static vs. vibratory), size of roller, moisture content of sand and method of moisture conditioning (e.g. adding water to the stockpile, adding water to the placed lift, compacting after rainfall, etc.). We understand that at the start of compaction, the clay cap was stiff to very stiff at the surface, permitting placement and compacting the crusher dust, but became very slick at the surface when wet. Following crusher dust placement, and to assist in evaluating various compaction procedures and moisture conditioning efforts, field density testing has been performed by Englobe, on a request basis on behalf of AECOM. Based on review of test results, compaction results have ranged from approximately 81 to 100 % SPMDD.

Based on our review, multiple factors have negatively impacted the ability to achieve specified compaction,

- 1) Slope Angle – Steep slope angles prevent efficient compaction effort from compaction equipment, significantly reduce friction between the material being compacted and the supporting medium, and promote shoving of the layer downward along the slope face during rolling operations. This is more pronounced with a non-cohesive material such as sand, but to a

lesser degree with a well graded crushed sand such as crusher dust. Such a steep slope also creates a challenge for compaction equipment to both access the slope area and to provide effective compaction when significantly labouring against gravity.

- 2) Field Density Testing Limitations – Much of the testing has been performed by backscatter mode with the source probe at the layer surface by request. With such a thin layer, the density determination by the gauge would include the underlying clay cap material of lower density. The most accurate method of testing is by direct transmission with the probe inserted at depth within the layer being tested. This has been demonstrated by comparison testing performed on July 13, 2021, where direct transmission results showed actual densities were up to 7% higher than by backscatter method. Also, the moisture testing source of the device does not distinguish between depth of layers and would include moisture determination of both the crusher dust and underlying clay cap. Laboratory comparative testing indicated variation in the two sets of moisture values, mostly resulting in higher in situ density of the crusher dust after recalculation.
- 3) Layer Thickness – Due to the thin layer thickness, obtaining uniform compaction and preventing relative shoving under the roller operation would be challenging, particularly on a steep slope and relatively smooth surface that becomes slick when wet.
- 4) Subgrade Condition – We understand that the underlying subgrade fill (i.e. encapsulated waste/debris) was in a saturated and loose condition when placed, both challenged by natural wet condition of the waste material and time of year with freezing conditions and significant rainfalls. Effective compaction of the material was not possible at the time of placement. Some draining /stiffening would have occurred with time, but the material would still be expected to be a challenge as it relates to support and operation of placement and compaction equipment with only 300 mm of clay cap plus crusher dust layer as separation. We expect that there would be subgrade deflection that would inhibit compaction, particularly as compaction efforts continued and vibrations likely further disturbed / weakened the underlying waste fill. We understand that there may be deformation of the encapsulated fill pile and is currently be assessed.

Although there are multiple factors that have negatively affected compaction efforts and reported compaction results, we are of the opinion that the sand levelling layer is adequate for support of the geomembrane liner at its current level of compaction, estimated to range from 86 to 100 % SPMDD. The crusher dust has a relatively high shear angle even in a loose condition, in the order of 33 degrees. At a level of compaction of 90%, under loaded conditions, vertical settlement may be in the order of 5%. We would consider this negligible for the current application, which will have minimal loading. Of more consequence is to confirm that the landfill cross-section is stable and not subject to significant settlements under self consolidation or slope failure, prior to geomembrane liner installation. Further compaction of the crusher dust is not recommended as this may also contribute to further instability. We understand that subsequent site surveys and capping layer thicknesses are being evaluated to further understand reported movements.


Crusher Dust Compaction – Harrietsfield C&D Landfill Cap Replacement and Site Closure
1275 Old Sambro Road, Harrietsfield, NS
Our ref.: 2108130.000

July 16, 2021

We trust the enclosed to your satisfaction. If, however, additional information should be required, please communicate with the undersigned.

Yours truly,

Englobe Corp.



Scott Simms, M.Eng., P.Eng
Team Leader, Geotechnical Engineering

