

Appendix 1 Summary of micro-drilling test data and scratch test data

Lithology	Core No.	Micro-drilling time (s)	Drillability of micro-drilling test	MSE of micro-drilling test (MPa)	MSE of scratch test (MPa)	Drillability of scratch test	Error of drillability model Eq. 16	Core No.	Micro-drilling time (s)	Drillability of micro-drilling test	MSE of micro-drilling test (MPa)	MSE of scratch test (MPa)	Drillability of scratch test	Error of drillability model Eq. 16	
Sandstone	B201-1	14.62	3.87	203.69	105.45	3.97	0.0270	B202-7	54.56	5.77	758.46	142.84	5.03	0.1282	
		16.89	4.08	235.22	107.90	4.05	0.0058		57.23	5.84	795.55	145.62	5.10	0.1270	
		15.57	3.96	216.89	108.89	4.09	0.0317		43.98	5.46	611.50	147.05	5.13	0.0600	
	B201-2	114.16	6.83	1586.30	224.68	6.61	0.0336	B203-1	35.79	5.16	497.75	119.03	4.40	0.1483	
		108.67	6.76	1510.05	215.77	6.46	0.0442		29.35	4.88	408.29	120.08	4.43	0.0921	
		111.39	6.80	1547.83	234.28	6.75	0.0072		25.40	4.67	353.43	118.18	4.37	0.0634	
	B202-1	21.40	4.42	297.87	114.32	4.26	0.0371		22.80	4.51	317.31	115.29	4.28	0.0501	
		26.20	4.71	364.54	121.27	4.46	0.0532		28.00	4.81	389.54	119.32	4.40	0.0838	
		23.00	4.52	320.09	118.48	4.38	0.0318		37.90	5.24	527.05	117.25	4.34	0.1718	
		14.70	3.88	204.81	108.44	4.07	0.0500	30.50	4.93	424.27	114.53	4.26	0.1357		
		13.50	3.75	188.14	106.76	4.02	0.0699	39.07	5.29	543.30	114.92	4.27	0.1918		
		12.10	3.60	168.69	105.48	3.98	0.1053	B204-1	6.29	2.65	87.99	93.03	3.54	0.3338	
		10.90	3.45	152.02	95.67	3.64	0.0551		7.06	2.82	98.69	90.25	3.43	0.2176	
	11.23	3.49	156.61	101.48	3.84	0.1008	6.07		2.60	84.93	92.96	3.54	0.3591		
	B202-2	21.40	4.42	297.87	122.71	4.50	0.0186	B204-2	15.79	3.98	219.95	114.01	4.25	0.0666	
		13.60	3.77	189.53	104.03	3.93	0.0430		14.57	3.86	203.00	104.84	3.95	0.0231	
		22.20	4.47	308.98	122.71	4.50	0.0065		13.73	3.78	191.33	109.36	4.10	0.0852	
		21.00	4.39	292.31	106.45	4.01	0.0876	J41-3	179.14	7.48	2488.88	355.23	8.20	0.0953	
		17.90	4.16	249.25	113.65	4.23	0.0176		319.59	8.32	4439.73	375.74	8.39	0.0088	
		16.00	4.00	222.86	111.74	4.18	0.0440		144.56	7.18	2008.56	367.83	8.32	0.1594	
		19.10	4.26	265.92	120.45	4.44	0.0427		218.34	7.77	3033.36	370.83	8.35	0.0743	
	B202-3	16.10	4.01	224.25	108.23	4.07	0.0140	Y172	68.75	6.10	955.56	168.11	5.60	0.0830	
		125.78	6.97	1747.71	236.53	6.78	0.0274		88.66	6.47	1232.11	208.11	6.34	0.0203	
		116.12	6.86	1613.53	224.68	6.61	0.0371	181.79	7.51	2525.69	283.28	7.41	0.0126		
	B202-4	133.79	7.06	1858.97	233.39	6.74	0.0462	Y173	73.18	6.19	1017.09	170.35	5.64	0.0889	
		131.69	7.04	1829.80	295.45	7.56	0.0734		183.71	7.52	2552.35	283.28	7.41	0.0146	
		145.31	7.18	2018.98	293.66	7.54	0.0492		96.71	6.60	1343.92	208.18	6.34	0.0388	
			134.07	7.07	1862.85	300.75	7.62	0.0782		39.53	5.30	549.69	168.91	5.61	0.0581

Lithology	Core No.	Micro-drilling time (s)	Drillability of micro-drilling test	MSE of micro-drilling test (MPa)	MSE of scratch test (MPa)	Drillability of scratch test	Error of drillability model Eq. 16	Core No.	Micro-drilling time (s)	Drillability of micro-drilling test	MSE of micro-drilling test (MPa)	MSE of scratch test (MPa)	Drillability of scratch test	Error of drillability model Eq. 16	
	B202-5	61.09	5.93	849.16	161.23	5.45	0.0812	Y176	45.91	5.52	638.31	161.88	5.47	0.0101	
		64.33	6.01	894.17	167.65	5.59	0.0700		31.63	4.98	439.96	153.05	5.27	0.0576	
		55.46	5.79	770.96	158.79	5.40	0.0682	M1	19.26	4.27	268.14	135.75	4.85	0.1372	
	B202-6	12.93	3.69	180.22	100.33	3.80	0.0295		24.06	4.59	334.82	145.67	5.10	0.1111	
		11.27	3.49	157.16	98.06	3.72	0.0651		24.46	4.61	340.37	138.76	4.93	0.0687	
			13.45	3.75	187.44	102.73	3.88	0.0358	---	---	---	---	---	---	---
Shale	J9	43.04	5.43	598.45	130.06	4.70	0.1333	W1-7	54.39	5.77	756.10	242.34	6.87	0.1913	
		36.65	5.20	509.69	135.07	4.84	0.0693		35.47	5.15	493.30	198.71	6.18	0.2000	
		36.43	5.19	506.63	141.54	5.00	0.0364		48.21	5.59	670.26	222.29	6.57	0.1747	
	D5-1	4.38	2.13	61.46	60.21	2.03	0.0494	Y1-1	9.28	3.21	129.52	80.81	3.05	0.0514	
		5.31	2.41	74.38	61.81	2.12	0.1212		9.28	3.21	129.52	79.78	3.00	0.0653	
		5.05	2.34	70.77	63.71	2.22	0.0489		9.06	3.18	126.47	85.53	3.25	0.0210	
	D5-2	4.13	2.05	57.99	65.57	2.32	0.1349	Y1-2	17.34	4.12	241.47	102.27	3.87	0.0603	
		4.51	2.17	63.27	68.68	2.48	0.1427		15.39	3.94	214.39	97.71	3.71	0.0595	
		3.47	1.79	48.82	55.12	1.72	0.0426		19.70	4.30	274.26	110.06	4.12	0.0411	
	D5-3	8.54	3.09	119.24	87.03	3.31	0.0687	Y1-3	15.19	3.93	211.61	102.18	3.86	0.0153	
		5.18	2.37	72.57	76.48	2.86	0.2042		12.62	3.66	175.91	94.79	3.60	0.0147	
		4.54	2.18	63.68	71.01	2.60	0.1909		15.20	3.93	211.75	82.03	3.10	0.2101	
	W1-1	5.48	2.45	76.74	64.58	2.27	0.0753	Y1-4	2.88	1.53	40.63	52.88	1.57	0.0315	
		3.35	1.74	47.15	55.43	1.74	0.0036		6.33	2.66	88.55	55.53	1.74	0.3448	
		4.22	2.08	59.24	60.40	2.04	0.0196		2.13	1.09	30.21	53.77	1.63	0.4962	
	W1-2	3.65	1.87	51.32	61.05	2.07	0.1102	Y1-5	3.92	1.97	55.07	52.54	1.55	0.2127	
		3.38	1.76	47.57	60.05	2.02	0.1476		44.54	5.48	619.28	166.77	5.57	0.0167	
		3.40	1.77	47.85	63.10	2.19	0.2396		24.23	4.60	337.18	162.45	5.48	0.1911	
	W1-3	3.16	1.66	44.51	53.78	1.63	0.0163	Y1-6	102.91	6.69	1430.04	236.76	6.79	0.0153	
		3.37	1.75	47.43	55.26	1.73	0.0146		85.57	6.42	1189.19	228.86	6.67	0.0390	
		3.20	1.68	45.07	58.45	1.92	0.1456		83.09	6.38	1154.74	230.73	6.70	0.0503	
	W1-4	2.13	1.09	30.21	50.54	1.42	0.2987	J41-1	36.45	5.19	506.91	127.44	4.63	0.1069	
		2.92	1.55	41.18	55.57	1.75	0.1298		21.96	4.46	305.65	127.57	4.64	0.0404	
		2.40	1.26	33.96	53.14	1.59	0.2598		30.53	4.93	424.68	133.10	4.78	0.0300	
			2.36	1.24	33.40	50.46	1.41	0.1392	J41-2	147.89	7.21	2054.81	203.47	6.26	0.1315

Lithology	Core No.	Micro-drilling time (s)	Drillability of micro-drilling test	MSE of micro-drilling test (MPa)	MSE of scratch test (MPa)	Drillability of scratch test	Error of drillability model Eq. 16	Core No.	Micro-drilling time (s)	Drillability of micro-drilling test	MSE of micro-drilling test (MPa)	MSE of scratch test (MPa)	Drillability of scratch test	Error of drillability model Eq. 16	
	W1-5	2.56	1.36	36.18	55.98	1.77	0.3068		137.83	7.11	1915.08	208.98	6.35	0.1060	
		2.47	1.30	34.93	53.49	1.61	0.2373		145.43	7.18	2020.64	209.37	6.36	0.1147	
	W1-6	52.17	5.71	725.26	227.55	6.65	0.1655								
		49.17	5.62	683.59	214.63	6.45	0.1471								
		60.40	5.92	839.58	235.81	6.77	0.1448								
Igneous Rock	H1	144.12	7.17	2002.45	244.82	6.90	0.0373								
		112.16	6.81	1558.52	256.68	7.07	0.0380								
		144.15	7.17	2002.87	232.25	6.72	0.0629								
	H2	134.59	7.07	1870.08	231.66	6.71	0.0510								
		164.89	7.37	2290.94	239.89	6.83	0.0723								
		112.95	6.82	1569.50	229.56	6.68	0.0205								
	H3	122.01	6.93	1695.34	240.61	6.84	0.0126								
		177.21	7.47	2462.07	248.80	6.96	0.0682								
		133.87	7.06	1860.08	237.54	6.80	0.0376								
	YB1	329.20	8.36	4573.21	362.92	8.27	0.0108								
342.05		8.42	4751.70	356.67	8.21	0.0244									
312.19		8.29	4336.94	351.12	8.16	0.0155									
Carbonate Rock	M2	199.83	7.64	2776.26	309.36	7.72	0.0098								
		207.70	7.70	2885.58	311.34	7.74	0.0054								
	M3	521.42	9.03	7243.15	398.61	8.60	0.0473								
		318.17	8.31	4420.00	383.02	8.46	0.0176								
	D5-4	36.67	5.20	509.97	144.56	5.07	0.0240								
		50.26	5.65	698.73	148.12	5.16	0.0876								
		54.78	5.78	761.52	154.34	5.30	0.0825								