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Appropriate technology options for managing drainage flows from low cost peri urban settlements in South Africa.

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2006-03-13
http://hdl.handle.net/10539/239

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DEPTH OF FLOW MEASUREMENTS AND SEWAGE FLOW DISCHARGE RATE COMPUTATIONS FROM NORTH AND MIDDLE CULVERTS

Ground slope 0.02845

dia, m	A, m^2	Q_f, m^3/s	Q_f in l/s
0.25	0.049087385	0.10030	100.3046

Date	Time of day	Location of measurement	Depth of flow, y in m	Diameter, D in m	y/D	Q/Q_F from chart	sewage flow Q, L/s
16/04/04	06:18	N&M CULVERT	0.155	0.25	0.62	0.71	71.22
	06:48	N&M CULVERT	0.16	0.25	0.64	0.743	74.53
	07:18	N&M CULVERT	0.164	0.25	0.656	0.768	77.03
	07:48	N&M CULVERT	0.22	0.25	0.88	1.05	105.32
	08:18	N&M CULVERT	0.12	0.25	0.48	0.469	47.04
	08:48	N&M CULVERT	0.13	0.25	0.52	0.539	54.06
	09:18	N&M CULVERT	0.14	0.25	0.56	0.6125	61.44
	09:48	N&M CULVERT	0.15	0.25	0.6	0.67	67.20
	10:18	N&M CULVERT	0.15	0.25	0.6	0.67	67.20
	10:48	N&M CULVERT	0.13	0.25	0.52	0.539	54.06
	11:18	N&M CULVERT	0.13	0.25	0.52	0.539	54.06
	11:48	N&M CULVERT	0.14	0.25	0.56	0.6125	61.44
	12:18	N&M CULVERT	0.12	0.25	0.48	0.469	47.04
	12:48	N&M CULVERT	0.15	0.25	0.6	0.67	67.20
	13:18	N&M CULVERT	0.145	0.25	0.58	0.642	64.40
	13:48	N&M CULVERT	0.14	0.25	0.56	0.6125	61.44
	14:18	N&M CULVERT	0.125	0.25	0.5	0.5	50.15
	14:48	N&M CULVERT	0.13	0.25	0.52	0.539	54.06
	15:18	N&M CULVERT	0.14	0.25	0.56	0.6125	61.44
	15:48	N&M CULVERT	0.135	0.25	0.54	0.574	57.57
	16:18	N&M CULVERT	0.14	0.25	0.56	0.6125	61.44
	16:48	N&M CULVERT	0.21	0.25	0.84	1.018	102.11
	17:18	N&M CULVERT	0.22	0.25	0.88	1.05	105.32
	17:48	N&M CULVERT	0.21	0.25	0.84	1.018	102.11
	18:18	N&M CULVERT	0.19	0.25	0.76	0.929	93.18
	18:48	N&M CULVERT	0.18	0.25	0.72	0.865	86.76
	19:18	N&M CULVERT	0.195	0.25	0.78	0.971	97.40
	19:48	N&M CULVERT	0.21	0.25	0.84	1.018	102.11
	20:18	N&M CULVERT	0.175	0.25	0.7	0.8125	81.50
	20:48	N&M CULVERT	0.17	0.25	0.68	0.812	81.45
	21:18	N&M CULVERT	0.178	0.25	0.712	0.861	86.36
	21:48	N&M CULVERT	0.173	0.25	0.692	0.83	83.25
	22:18	N&M CULVERT	0.165	0.25	0.66	0.774	77.64

DEPTH OF FLOW MEASUREMENTS AND SEWAGE FLOW DISCHARGE RATE COMPUTATIONS FROM NORTH AND MIDDLE CULVE

Ground slope 0.02845

dia, m	A, m^2	Q_f, m^3/s	Q_f in l/s
0.25	0.049087385	0.10030	100.3046

Date	Time of day	Location of measurement	Depth of flow, y in m	Diameter, D in m	y/D	Q/Q_F from chart	sewage flow Q,L/s
17/04/04	06:13	N&M CULVERT	0.149	0.25	0.596	0.665	66.70
	06:43	N&M CULVERT	0.143	0.25	0.572	0.6325	63.44
	07:13	N&M CULVERT	0.14	0.25	0.56	0.6125	61.44
	07:43	N&M CULVERT	0.18	0.25	0.72	0.865	86.76
	08:13	N&M CULVERT	0.14	0.25	0.56	0.6125	61.44
	08:43	N&M CULVERT	0.175	0.25	0.7	0.8125	81.50
	09:13	N&M CULVERT	0.19	0.25	0.76	0.929	93.18
	09:43	N&M CULVERT	0.143	0.25	0.572	0.6325	63.44
	10:13	N&M CULVERT	0.15	0.25	0.6	0.67	67.20
	10:43	N&M CULVERT	0.14	0.25	0.56	0.6125	61.44
	11:13	N&M CULVERT	0.135	0.25	0.54	0.574	57.57
	11:43	N&M CULVERT	0.135	0.25	0.54	0.574	57.57
	12:13	N&M CULVERT	0.105	0.25	0.42	0.367	36.81
	12:43	N&M CULVERT	0.2	0.25	0.8	0.976	97.90
	13:13	N&M CULVERT	0.13	0.25	0.52	0.539	54.06
	13:43	N&M CULVERT	0.18	0.25	0.72	0.865	86.76
	14:13	N&M CULVERT	0.135	0.25	0.54	0.574	57.57
	14:43	N&M CULVERT	0.17	0.25	0.68	0.812	81.45
	15:13	N&M CULVERT	0.145	0.25	0.58	0.642	64.40
	15:43	N&M CULVERT	0.13	0.25	0.52	0.539	54.06
	16:13	N&M CULVERT		0.25	0	0	0.00
	16:43	N&M CULVERT	**0.295**	0.25	1.18	off scale	#VALUE!
	17:13	N&M CULVERT	0.15	0.25	0.6	0.67	67.20
	17:43	N&M CULVERT	0.15	0.25	0.6	0.67	67.20
	18:13	N&M CULVERT	0.16	0.25	0.64	0.743	74.53
	18:43	N&M CULVERT	0.16	0.25	0.64	0.743	74.53
	19:13	N&M CULVERT	0.15	0.25	0.6	0.67	67.20
	19:43	N&M CULVERT	0.15	0.25	0.6	0.67	67.20
	20:13	N&M CULVERT	0.15	0.25	0.6	0.67	67.20
	20:43	N&M CULVERT	0.14	0.25	0.56	0.6125	61.44
	21:13	N&M CULVERT	0.135	0.25	0.54	0.574	57.57
	21:43	N&M CULVERT	0.136	0.25	0.544	0.578	57.98
	22:13	N&M CULVERT	0.13	0.25	0.52	0.539	54.06

LOCATION	DIAMETER, IN M	ROUGHNESS	SLOPE	RADIUS	AREA	QF
F1	0.45	0.013	0.026	0.1125	0.159	459.720
F3	0.4	0.013	0.0429	0.1	0.126	431.349
J5	0.5	0.013	0.002857	0.125	0.196	201.828
S-SEWER	0.4	0.013	0.0338	0.1	0.126	382.876

Date of measurement	Time of measurement	Location	Depth of flow y in m	Diameter, D in m	y/D	Q/Q_F	sewage flow Q, m^3/s
2004/09/06	06:00	S-CULVERT	BLOCKED	0.4	#VALUE!	#VALUE!	#VALUE!
	07:00	S-CULVERT	BLOCKED	0.4	#VALUE!	#VALUE!	#VALUE!
	08:00	S-CULVERT	0.2	0.4	0.50	0.5	191.4
	09:00	S-CULVERT	0.19	0.4	0.48	0.469	179.6
	10:00	S-CULVERT	0.2	0.4	0.50	0.5	191.4
	11:00	S-CULVERT	0.215	0.4	0.54	0.574	219.8
	12:00	S-CULVERT	0.225	0.4	0.56	0.6125	234.5
	13:00	S-CULVERT	0.22	0.4	0.55	0.587	224.7
	14:00	S-CULVERT	0.21	0.4	0.53	0.556	212.9
	15:00	S-CULVERT	0.18	0.4	0.45	0.416	159.3
	16:00	S-CULVERT	0.16	0.4	0.40	0.3375	129.2
	17:00	S-CULVERT	0.17	0.4	0.43	0.387	148.2
	18:00	S-CULVERT	0.2	0.4	0.50	0.5	191.4
	19:00	S-CULVERT	0.18	0.4	0.45	0.416	159.3
	20:00	S-CULVERT	0.2	0.4	0.50	0.5	191.4
	21:00	S-CULVERT	0.22	0.4	0.55	0.587	224.7
	22:00	S-CULVERT	0.195	0.4	0.49	0.487	186.5
	23:00	S-CULVERT	0.11	0.4	0.28		0
	00:00	S-CULVERT	0.1	0.4	0.25	0.135	51.7
	01:00	S-CULVERT	0.1	0.4	0.25	0.135	51.7
	02:00	S-CULVERT	0.09	0.4	0.23		0
	03:00	S-CULVERT	blocked	0.4	#VALUE!	#VALUE!	#VALUE!
	04:00	S-CULVERT	blocked	0.4	#VALUE!	#VALUE!	#VALUE!
	05:00	S-CULVERT	blocked	0.4	#VALUE!	#VALUE!	#VALUE!
	06:00	S-CULVERT	blocked	0.4	#VALUE!	#VALUE!	#VALUE!

LOCATION	DIAMETER, IN M	ROUGHNESS	SLOPE	RADIUS	AREA	QF
F1	0.45	0.013	0.026	0.1125	0.159	459.720
F3	0.4	0.013	0.0429	0.1	0.126	431.349
J5	0.5	0.013	0.002857	0.125	0.196	201.828
S-SEWER	0.4	0.013	0.0338	0.1	0.126	382.876

Date of measurement	Time of measurement	Location	Depth of flow y in m	Diameter, D in m	y/D	Q/Q_F	sewage flow Q, m^3/s
2004/10/06	06:00	S-CULVERT	BLOCKED	0.4	#VALUE!	#VALUE!	#VALUE!
	07:00	S-CULVERT	BLOCKED	0.4	#VALUE!	#VALUE!	#VALUE!
	08:00	S-CULVERT	SURCHARGED	0.4	#VALUE!	#VALUE!	#VALUE!
	09:00	S-CULVERT	0.28	0.4	0.70	0.8125	311.1
	10:00	S-CULVERT	0.26	0.4	0.65	0.756	289.5
	11:00	S-CULVERT	0.24	0.4	0.60	0.67	256.5
	12:00	S-CULVERT	0.245	0.4	0.61	0.696	266.5
	13:00	S-CULVERT	0.25	0.4	0.63	0.726	278.0
	14:00	S-CULVERT	0.24	0.4	0.60	0.67	256.5
	15:00	S-CULVERT	0.235	0.4	0.59	0.658	251.9
	16:00	S-CULVERT	0.215	0.4	0.54	0.574	219.8
	17:00	S-CULVERT	0.21	0.4	0.53	0.556	212.9
	18:00	S-CULVERT	0.22	0.4	0.55	0.587	224.7
	19:00	S-CULVERT	0.24	0.4	0.60	0.67	256.5
	20:00	S-CULVERT	0.25	0.4	0.63	0.726	278.0
	21:00	S-CULVERT	0.27	0.4	0.68	0.812	310.9
	22:00	S-CULVERT	0.25	0.4	0.63	0.726	278.0
	23:00	S-CULVERT	0.215	0.4	0.54	0.574	219.8
	00:00	S-CULVERT	0.2	0.4	0.50	0.5	191.4
	01:00	S-CULVERT	0.2	0.4	0.50	0.5	191.4
	02:00	S-CULVERT	0.1	0.4	0.25	0.135	51.7
	03:00	S-CULVERT	0.1	0.4	0.25	0.135	51.7
	04:00	S-CULVERT	0.08	0.4	0.20	0.069	26.4
	05:00	S-CULVERT	BLOCKED	0.4	#VALUE!	#VALUE!	#VALUE!

	06:00	S-CULVERT	BLOCKED	0.4	#VALUE!	#VALUE!	#VALUE!