Grate Drainage Performance Certificate ID: 200 Series Click Drain

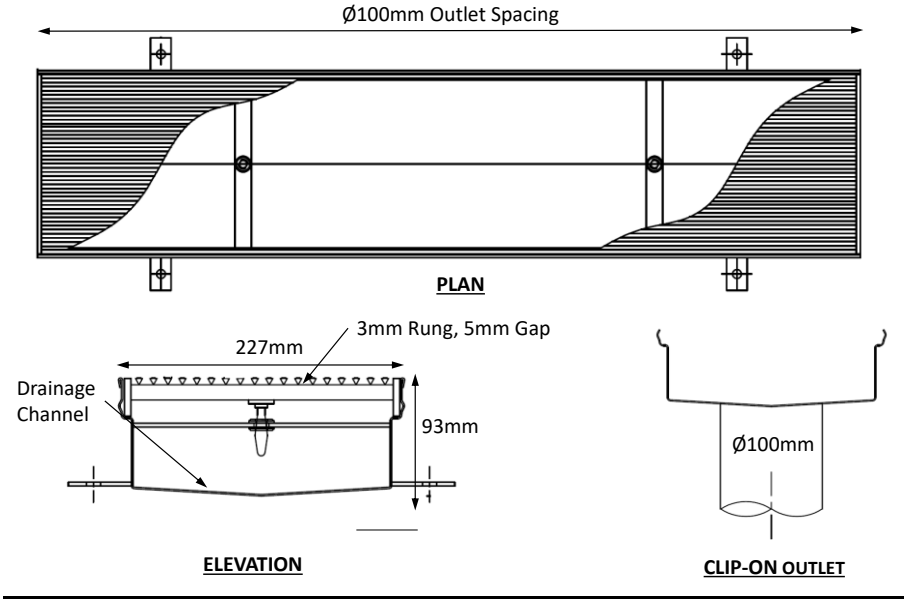
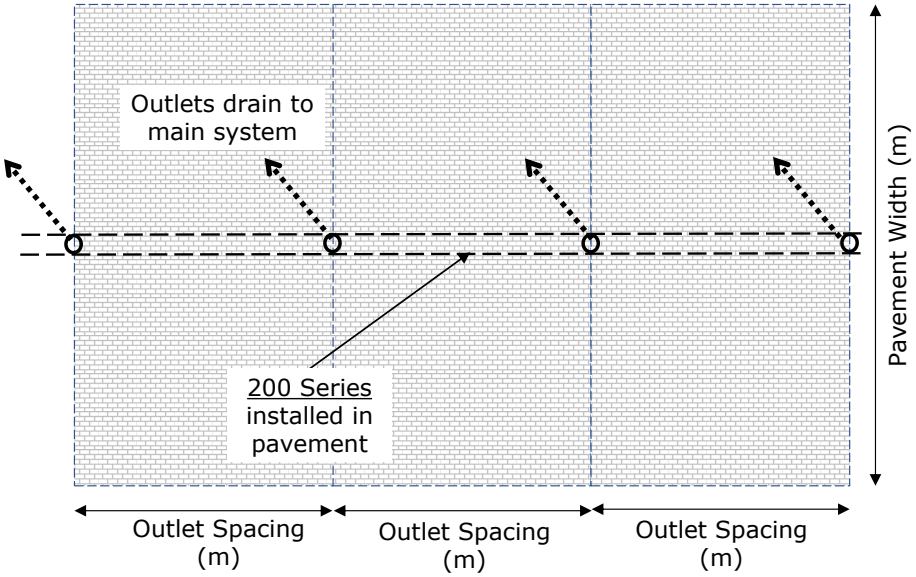
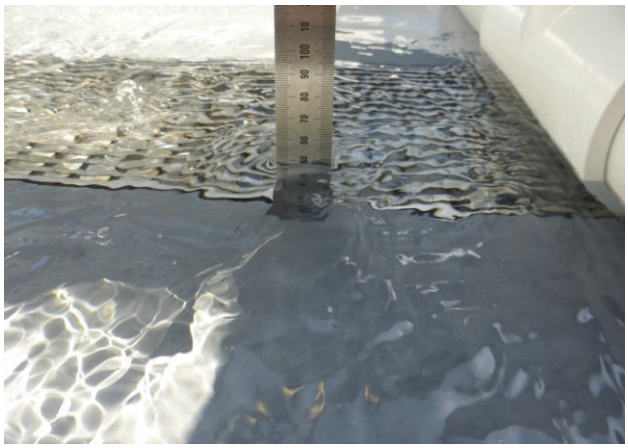
Test Results	ID: 200 Series CD
Description	Paige Stainless 200 Series Click Drain
Drain Type	200mm wide grate – flush mounted to pavement
Model	Paige Stainless - 200 Series CD
Test Date	9/10/2020
Grate Drawing	
Typical Installation	
Test Grate Configuration	A one metre length of the *200 Series CD* was installed flush with test rig base. The maximum drainage capacity of the grate opening, the Ø200mm drainage outlet, and the conveyance capacity of the channel were tested for different water ponding levels (H).

Table 1 - 200 Series CD Max. Inflowrate (L/s) per lineal metre for outlet spacings

Head (mm)	Outlet Spacing (m)																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	4.00	2.00	1.33	1.00	0.80	0.67	0.57	0.50	0.44	0.40	0.36	0.33	0.31	0.29	0.27	0.25	0.24	0.22	0.21	0.20
5	6.80	3.40	2.27	1.70	1.36	1.13	0.97	0.85	0.76	0.68	0.62	0.57	0.52	0.49	0.45	0.43	0.40	0.38	0.36	0.34
10	8.00	4.00	2.67	2.00	1.60	1.33	1.14	1.00	0.89	0.80	0.73	0.67	0.62	0.57	0.53	0.50	0.47	0.44	0.42	0.40
20	8.35	4.18	2.78	2.09	1.67	1.39	1.19	1.04	0.93	0.84	0.76	0.70	0.64	0.60	0.56	0.52	0.49	0.46	0.44	0.42
30	8.70	4.35	2.90	2.18	1.74	1.45	1.24	1.09	0.97	0.87	0.79	0.73	0.67	0.62	0.58	0.54	0.51	0.48	0.46	0.44
40	8.90	4.45	2.97	2.23	1.78	1.48	1.27	1.11	0.99	0.89	0.81	0.74	0.68	0.64	0.59	0.56	0.52	0.49	0.47	0.45
50	9.15	4.58	3.05	2.29	1.83	1.53	1.31	1.14	1.02	0.92	0.83	0.76	0.70	0.65	0.61	0.57	0.54	0.51	0.48	0.46
75	9.70	4.85	3.23	2.43	1.94	1.62	1.39	1.21	1.08	0.97	0.88	0.81	0.75	0.69	0.65	0.61	0.57	0.54	0.51	0.49
100	10.55	5.28	3.52	2.64	2.11	1.76	1.51	1.32	1.17	1.06	0.96	0.88	0.81	0.75	0.70	0.66	0.62	0.59	0.56	0.53
125	11.45	5.73	3.82	2.86	2.29	1.91	1.64	1.43	1.27	1.15	1.04	0.95	0.88	0.82	0.76	0.72	0.67	0.64	0.60	0.57
150	12.30	6.15	4.10	3.08	2.46	2.05	1.76	1.54	1.37	1.23	1.12	1.03	0.95	0.88	0.82	0.77	0.72	0.68	0.65	0.62



9.15 L/s @ 50 mm Head

8.0 L/s @ 10 mm Head

Observation Comments:

- The *200 Series CD* opening was hydraulically effective and no backing up of flow was observed.
- The drainage capacity of the *200 Series CD* is governed by the outflow capacity of the Ø100mm outlet rather than the conveyance capacity of the drainage channel, or the inflow capacity of the grate. At 80% blockage, the grate inflow rate was greater than the outflow capacity of the Ø100mm outlet. Typical grate blockage by debris is therfore unlikely to affect the governing hydraulic capacity of the Ø100mm drainage outlet.
- As the drainage channel was completely full during all tests on the 1m long *200 Series CD*, no further conveyance capacity is possible. This means that the maximum inflow rates observed for the 1m long *200 Series CD* must be appropriately reduced for outlet spacings greater than 1m.
- See example calculations on following page for more explanation.

I hereby certify that the test results presented on this outlet performance certificate are true and correct and were obtained using recognised AHSCA Gutter Outlet Testing procedures.

Dr Terry Lucke, Chief Researcher:

Date: 9th October 2020

Mark Alexander, AHSCA Foundation Chairman:

Date: 9th October 2020

Example Calculations for 200 Series Click Drain Spacing

Example 1

Design the pit spacing for the 200 Series CD to satisfactorily drain the 8m wide pavement shown below during a 1 in 10-year, 20 min storm in Brisbane ($^{10}I_{20min}$ = 124 mm/h). The maximum allowable ponding level at the slot drain is 50mm.

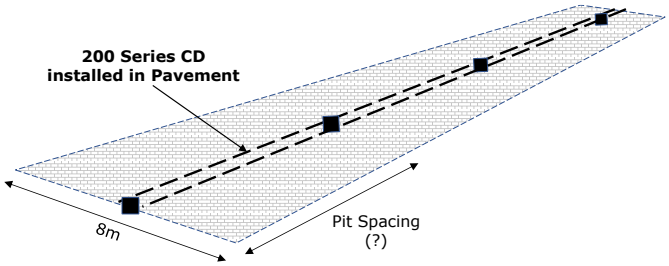


Table 2

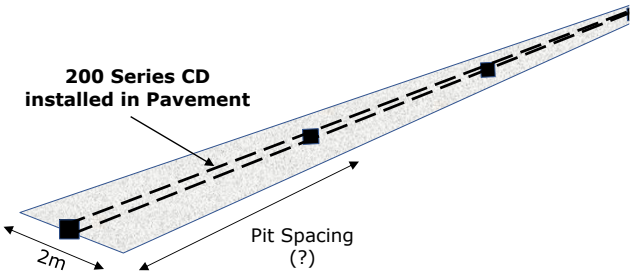
Intensity (mm/h)	runoff (L/s) per m^2
50	0.014
75	0.021
100	0.028
125	0.035
150	0.042
175	0.049
200	0.056
225	0.063
250	0.069
275	0.076
300	0.083
325	0.090
350	0.097
375	0.104
400	0.111
425	0.118
450	0.125
475	0.132
500	0.139

Solution:

- Use Table 2 to find runoff per m^2 (Q_1) for prescribed rainfall event: I = 125mm/h, Q_1 = 0.035L/s/m^2
- Calculate maximum runoff per linear metre (Q_2) of pavement (8m wide): Q_2 = 0.035 x 8 = 0.28L/s/m
- Select a desired outlet spacing: start with, say, 5m…
- Calculate total runoff (Q_{Tot}) for selected outlet spacing: Q_{Tot} = 5 x 0.28 = 1.4L/s
- Use Table 1 to find maximum flowrate for 50mm head and 5m spacing: Q_{max} = 1.83L/s
- Is $Q_{Tot} \leq Q_{max}$? If yes, then design OK, otherwise try another spacing.
- In this case, 1.4 < 1.83, 5m pit spacing design OK!

Example 2

Design the pit spacing for the 200 Series CD to satisfactorily drain the 2m wide footpath shown below during a 1 in 2-year, 15 min storm in Melbourne ($^{2}I_{15min}$ = 41 mm/h). The maximum allowable ponding level at the slot drain is 30mm.



Solution:

- Use Table 2 to find runoff per m^2 (Q_1) for rainfall event: I = 41mm/h (use 50mm/h), Q_1 = 0.014L/s/m^2
- Calculate maximum runoff per linear metre (Q_2) of pavement (2m wide): Q_2 = 0.014 x 2 = 0.028L/s/m
- Select a desired outlet spacing: start with, say, 18m…
- Calculate total runoff (Q_{Tot}) for selected outlet spacing: Q_{Tot} = 18 x 0.028 = 0.504L/s
- Use Table 1 to find maximum flowrate for 30mm head and 18m pit spacing: Q_{max} = 0.48L/s
- In this case, 0.504L/s is not less than 0.48L/s, so we have to change spacing.
- From Table 1, 30mm head with 17m pit spacing = 0.51L/s.
- Therefore, use 17m pit spacing for this design.