No. 9198

Plumbers, Gasfitters and Drainlayers Board

REGISTRATION EXAMINATION, JUNE 2012
CERTIFYING DRAINLAYER

ANSWER SCHEDULE

ANSWER 1

(a)   They may be used as <u>evidence</u> of <u>good practice in court</u>.   (2 marks)

(b)   (i)   The works must be examined, using the correct type of detecting equipment.   (1 mark)

       (ii)   Tests must be carried out in advance of work starting and
              As a continuing exercise throughout the period of work.   (2 marks)

(c)   Trench excavations
       Where the <u>horizontal width</u> at ground level is <u>less than the vertical depth</u> of the deeper side.

       Open excavations
       <u>Wider than trenches</u> and <u>include foundations, building sites</u> and the like.   (2 marks)

(d)   The pumping would be causing a <u>loss of fines</u> and <u>reducing the load-bearing capacity</u> of the soil.
                                                                                                          (1 mark)

(e)   Before work starts each day.
       After rain.
       After any occurrence that could affect the stability of an excavated face.   (3 marks)

(f)   1   Ensure that <u>protective equipment</u> is provided, accessible and used.
       2   <u>Monitor employees' exposure</u> to the hazard.
       3   Seek the <u>consent of employees</u> to monitor their health.
       4   With their informed consent, <u>monitor employees' health</u>.   (4 marks)

(g)   1   Save life or prevent suffering.
       2   Maintain public access for essential services, e.g. electricity, gas.
       3   Prevent serious damage or loss of property.   (3 marks)
                                                                                              Total 18 marks

ANSWER 2

(a)   The average rainfall intensity in a 5-10 minute period of a storm than that has a chance of
       happening once every ten years, or a 10% chance of happening in any one year.
                                                                                                    (2 marks)

(b)   To size rainwater or surface water handling systems.   (1 mark)
                                                                                              Total 3 marks

ANSWER 3

(a)

Calculation	Answer
Catchment area of roof in m^2	208 (½ mark)
Catchment area of driveway in m^2	18 (½ mark)
Run-off coefficient for roof	0.80 (½ mark)
Run-off coefficient for driveway	0.85 (½ mark)
Expected water run-off from roof in m^3/h (= area of catchment in m^2 × run-off coefficient × rainfall intensity in m/h)	5.79 (1 mark)
Expected water run-off from drive way in m^3/hr (= area of catchment in m^2 × run-off coefficient × rainfall intensity in m/h)	0.532 (1 mark)
Total volume of water conveyed from catchment areas to soak pit in m^3.	6.322 (½ mark)
Area of the base of the soak pit in m^2 (= 0.7854 × D × D)	10.178 (1 mark)
Absorption ability of soak pit in m^3/h (= area of base of soak pit in m^2 × average level drop from percolation test in m)	4.58 (1 mark)
Storage volume of soak pit required (= volume of water conveyed to soak pit – volume of absorption)	1.742 (½ mark)
Total volume required for soak pit allowing for rocks (= $\frac{V}{38}$ × 100)	4.58 (1 mark)
Required depth of soak pit (= volume of soak pit in m^3 ÷ area of base in m^2)	0.45 (1 mark)

(9 marks)

(b)   Any TWO (1 mark each)
Territorial Authority – including regional or city council
NIWA – HIRDS
AS3500 Part 3 – Stormwater
NZBC E1/AS1

(2 marks)

Total 11 marks

ANSWER 4

Fall per meter = 25 mm   (1 mark)

Fall over diameter of chamber = 26.25   (1 mark)

Formula from E1

$H_L = Kv^2/2g$ (½ mark)

$H_L = (0.2 \times 24 \times 24) \div (2 \times 9.8)$ (½ mark)

$H_L = 115.2 \div 19.6$ (½ mark)

$H_L = 5.87$ (½ mark)

Total Fall = 26.25 + 5.87   (1 mark)

Total Fall = 32.12 mm   (½ for answer, ½ for unit)

Total 6 marks

ANSWER 5

(a)   A main through which water or sewage is pumped at pressure.   (1 mark)

(b)   Rising mains shall be free of leaks when subject to a pressure test at a pressure of not less than <u>twice the shut-off head of the pump</u> connected to the rising main, for a period of <u>not less than 10 minutes</u>.

(2 marks)

(c)   A stormwater or inlet pit.
       Directly to a stormwater drain.
       Curb and channel.   (2 marks)

Total 5 marks

ANSWER 6

Figure 6: Bubble-up Chamber
Paragraph 3.4.2
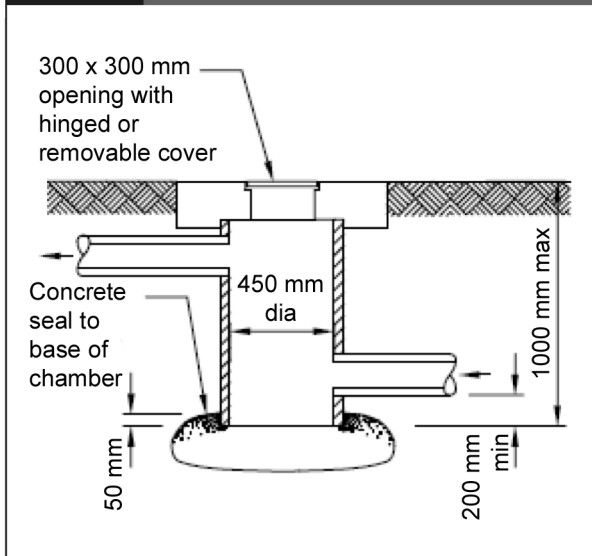
Drawing should show a bubble up chamber as above and include the following information:

Chamber to be 450 mm diameter.
Chamber to be no deeper than 1 meter.
A concrete seal at the base of the chamber extending up outer wall by 50 mm.
A 300 x 300 mm opening with cover at top of chamber.
Inlet at least 200 mm from base of chamber.
Outlet connected to TA drain.
Connection to downpipes must be sealed.
Ground level at downpipe must be at least 150 mm higher that the level of the top of the chamber.

(½ mark each)
Total 4 marks

ANSWER 7

40 000 ÷ 50 mm/h
800 m² per sump
2 sumps required

Total 2 marks

ANSWER 8

Drawing must have two separate jump ups.
Each vertical section max of two metres.
Horizontal section between jump ups must be at least 300 mm long.
A 100 mm thick concrete footing at the base of each vertical section.
An inspection bend or junction is required at the top of each vertical section.

Total 5 marks

ANSWER 9

(a)   Fittings at correct locations.   (3 marks)

(b)

Item	Quantity
Inspection pipes	4 (½ mark)
Inspection junctions	11 (1 mark)
Plain junctions	8 (1 mark)
Plain bends	17 (1 mark)
Inspection bends	Accept 7 or 8 (½ mark)

(4 marks)
Total 7 marks

ANSWER 10

(a)   4500 litres   (1 mark)

(b) $L = \dfrac{170 \times 6}{30 \times .9}$

  $L = \dfrac{1020}{27}$

  $L = 37.7$ (Accept 37.7 – 37.8)   (2 marks)
Total 3 marks

ANSWER 11

Are there any soil fixtures connected to the drain?
What is the discharge unit loading for the drain?
Will a method to flush the drain need to be included in the system?

Total 3 marks

ANSWER 12

(a)   Correct location of the following
       TV = 2 marks
       ORG = 2 marks
       IO to WC = 2 marks
       No IO on GT = 2 marks
       4 or fewer GT = 2 marks
       SW = 2 marks
       Compliant and economical = 3 marks   (15 marks)

(b)   Length of drain from scale = 29 – 30 metres
       Depth = 0.6 m + 30 m × 20 mm/m = 1.2 m (accept 1180 – 1220)   (3 marks)

Total 18 marks

SECTION B

1	C	Copper.
2	D	100 mm.
3	A	The Resource Management Act 1991.
4	E	3.000 metres.
5	A	Interceptor trap.
6	D	4500 mm.
7	B	NZS 4219.
8	E	1500 mm.
9	D	Clause F3.
10	C	The drain must not be collapsed.
11	D	Cesspit/stormwater sump cleanings.
12	B	When the excavation is very wide and open.
13	C	1.5 m.
14	C	Carbon dioxide and methane.
15	B	750 mm.

Total 15 marks