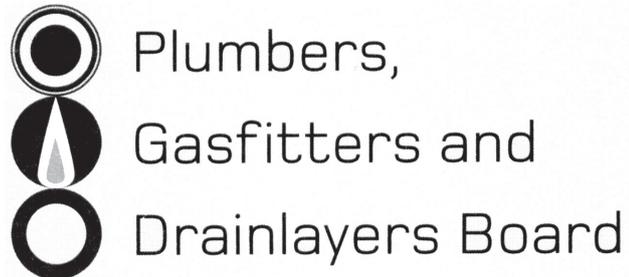


No. 9198



REGISTRATION EXAMINATION, NOVEMBER 2015
CERTIFYING DRAINLAYER

ANSWER SCHEDULE

ANSWER 1

- (a) A pipe to convey
Foul water
Surface water
Industrial liquid waste (1 mark)
- (b) A drain that serves more than one property (more than one Certificate of Title) (1 mark)
- (c) Contact all the property owners using that section of drain. (1 mark)

Total 3 marks

ANSWER 2

- (a) The angle of a slope where the material in the face will remain stable under all anticipated conditions of work and weather. (1 mark)
- (b) Any THREE (1 mark each)
The soil type.
Ground moisture content.
Weather conditions.
Ground vibrations in the area (traffic etc). (3 marks)
- (c) Any THREE (1 mark each)
Harmful gases from the soil or machinery.
Contact with dangerous underground services – gas pipe/electricity cables.
Exposure to falling objects from above the excavation.
Falling into the excavation. (3 marks)
- (d) Any FOUR (1 mark each)
Keep spoil and machinery away from the edge of the trench.
Use shoring/trench shield etc.
Use a ladder to access and exit the trench.
Put up barricades around the perimeter of the trench to prevent objects and people falling into the trench.
Monitor the air quality in the trench.
Check the soil moisture levels regularly – too dry or too wet can cause trench collapse.
Dewatering.
Safe slope. (4 marks)

- (e) Any TWO (1 mark each)
 Work in any pit, shaft, trench, or other excavation in which any person is required to work in a space more than 1.5 metres deep and having a depth greater than the horizontal width at the top.
 Work in any drive, excavation, or heading in which any person is required to work with a ground cover overhead.
 Work in any excavation in which any face has a vertical height of more than 5 metres and an average slope steeper than a ratio of 1 horizontal to 2 vertical.
 When explosives are used or stored.
- (2 marks)
- (f) When the employee provides his/her own suitable PPE gear. (1 mark)
- (g) Any FOUR (1 mark each)
 How to adjust guards.
 PPE to be worn.
 Method of isolation – turning on and off.
 Pre-use inspections.
 Procedure to be followed in emergency.
 Operating procedure instructions.
- (4 marks)

Total 18 marks

ANSWER 3

- (a) Any TWO (2 marks each)
 Air diffusers or jet aerators – pumping air via a spreader into the aeration chamber.
 An aspirated propeller – a rotating shaft that causes a vacuum to pull air down to the base of the tank.
 Rotating Biological Contactor – rotating the biofilter where the bacteria live so that it raises out of the liquid and bacteria can access oxygen above the fluid level.
 Spray booms – spraying effluent over contact media/bed.
- (6 marks)
- (b) Any THREE (1 mark each)
 The effluent produced by an aerated system is of a higher quality.
 Less likelihood of waterways and soil being contaminated with untreated or partially treated sewage.
 More flexibility in disposal field construction.
 Less dependent on good quality, well-draining soil.
 Less foul odour.
- (3 marks)
- (c) Any FOUR (1 mark each)
 Requires electricity to introduce oxygen and to pump the treated effluent to the disposal field.
 Has mechanical parts that will require maintenance.
 Has less tolerance to overloading or underloading than a septic system.
 Aerated systems are not recommended for holiday homes that are only used for short periods at a time. This will effectively starve the aerobic bacteria and it will take some weeks for the colonies to grow to a size where they can digest and treat the sudden increase in discharged waste.
 May release more nitrates into the soil and ground water than a septic system.
- (4 marks)

Total 13 marks

ANSWER 4

Any FOUR (½ mark each)

Constructed

- 1 with *adequate* capacity for the volume of *foul water* and the frequency of disposal
- 2 with *adequate* vehicle access for collection if required
- 3 to avoid the likelihood of contamination of any potable water supplies
- 4 to avoid the likelihood of contamination of soils, ground water, and waterways except as permitted under the Resource Management Act

Total 2 marks

ANSWER 5

(a)

Length of pipe sections		
Pipe section	Distance	Fall in mm
A – B	5.6 metres	93
B – C	7.5 metres	127
C – D	9.0 metres	150
B – F	6.9 metres	115
C – E	1.6 metres	27

(b)

Depth of invert of drain	
Point	Depth
A	1150
B	1107
C	1030
D	930
E	1053
F	1042

Total 10 marks

ANSWER 6

- (a) (i) Drawing to show:
access point before drain enters under building and access point after drain exits under building.
drain re-laid straight.
gully trap and junction moved to external of building. (3 marks)
- (ii) PVC (1 mark)
- (b) 25 mm (1 mark)

Total 5 marks

ANSWER 7

- (a) The Resource Management Act (RMA). (1 mark)
- (b) Petrol interceptor. (1 mark)
- (c) (i) Waste that cannot be discharged to a network utility operator's sewer system. (1 mark)
- (ii) Waste that must be treated before it can be discharged to a network utility operator's sewer system. (1 mark)
- (iii) Waste that does not require treatment and can be discharged directly to a network utility operator's sewer system. (1 mark)

Total 5 marks

ANSWER 8

Diagram to show:

- minimum of one gully trap (2 marks)
- gully trap(s) not under the deck (2 marks)
- inspection openings at code locations (3 marks)
- vented correctly (2 mark)
- practical and economic layout (1 mark)

Total 10 marks

ANSWER 9

- (a) Any TWO (1 mark each)
- Lay the last section of pipe at as low a gradient as possible.
- Angle the pipe so that the entry into the waterway is less than 45°.
- Increase the diameter of the last section of pipe. (2 marks)
- (b) Any THREE (1 mark each)
- Rip Rap aprons
- Stilling basins
- Drop pools
- Hydraulic jump basins
- Baffled aprons
- Impact energy dissipaters
- Headwall with baffle blocks (3 marks)

Total 5 marks

ANSWER 10

- (a) Office: 227 m²
Factory: 870 m²
Carpark: 359 m² (3 marks)
- (b) A 150 mm.
B 225 mm.
C 150 mm. (3 marks)
- (c) Total modified area = 1456 m²
Main drain diameter = 225 mm (at 1:130) OR engineer's design (1 mark)
- (d) Type 2 sump (2 marks)
- Total 8 marks**

ANSWER 11

Any TWO (1 mark each)

Reduce the pressure

Restrain the plugs

Standing clear of the ends

Total 2 marks

ANSWER 12

- (a) Drawing to show two pumps (2 marks) and any SIX (1 mark each)
- two pumps
 - valve
 - discharge pipe
 - ladder in the pit
 - lid
 - non-return valve
 - flexible joint/union
 - ground base
 - vent
 - inlet junction
 - three float switches
- (8 marks)
- (b) Water level reaches first level probe – duty pump should come on.
Water level reaches second level probe – back up pump should come on – notify need for service.
Water level reaches high level probe – alarm raised – water bypasses to overflow.
- (3 marks)
- Total 11 marks**

SECTION B

1. D 3 months
2. A Every 10 years
3. E 1:350
4. B 30 minutes
5. A 180 m²
6. E Junctions of drains serving a single downpipe, that are less than 2.0 m long
7. A 1.34 m
8. E 0.90
9. E 10 m
10. C The drain must not be collapsed.

Total 10 marks