

Affix label with Candidate Code  
Number here.  
If no label, enter candidate  
Number if known

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No. 9197



Plumbers,  
Gasfitters and  
Drainlayers Board

## REGISTRATION EXAMINATION, JUNE 2011 **LICENSED DRAINLAYER**

QUESTION AND ANSWER BOOKLET

Time allowed **THREE** hours

### **INSTRUCTIONS**

Check that the Candidate Code Number on your admission slip is the same as the number on the label at the top of this page.

Do not start writing until you are told to do so by the Supervisor.

Total marks for this examination: 100.

The pass mark for this examination is 60 marks.

Write your answers and draw your sketches in this booklet. If you need more paper, use pages 20–21 at the back of this booklet. Clearly write the question number(s) if any of these pages are used.

All working in calculations must be shown.

### **Candidates are permitted to use the following in this examination:**

Drawing instruments, approved calculators, document(s) provided.

Publications, Acts, Regulations, Codes of Practice, or Standards other than the ones provided are NOT permitted in the examination room.

Check that this booklet has all of 21 pages in the correct order and that none of these pages is blank.

**YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION**

Candidates that sat this examination in June 2011 were provided with the following documents:

- AS/NZS 3500 Part 2: Sanitary plumbing and drainage
- New Zealand Building Code clause E1 Surface Water
- New Zealand Building Code clause G13 Foul Water

# SECTION A

## QUESTION 1

(a) State the purpose of a soak pit.

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(1 mark)

(b) State the purpose of using filter cloth in the construction of a soak pit.

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(1 mark)

(c) A site has been selected for the location of a soak pit.

The required volume for the soak pit is 12 m<sup>3</sup>.

A machine capable of boring a hole 1.5 metres in diameter has been selected to complete the excavation.

Calculate the depth of the soak pit. Make no allowances for liners etc.

Formula:

$$\text{Depth} = \frac{V}{D \times D \times 0.7854}$$

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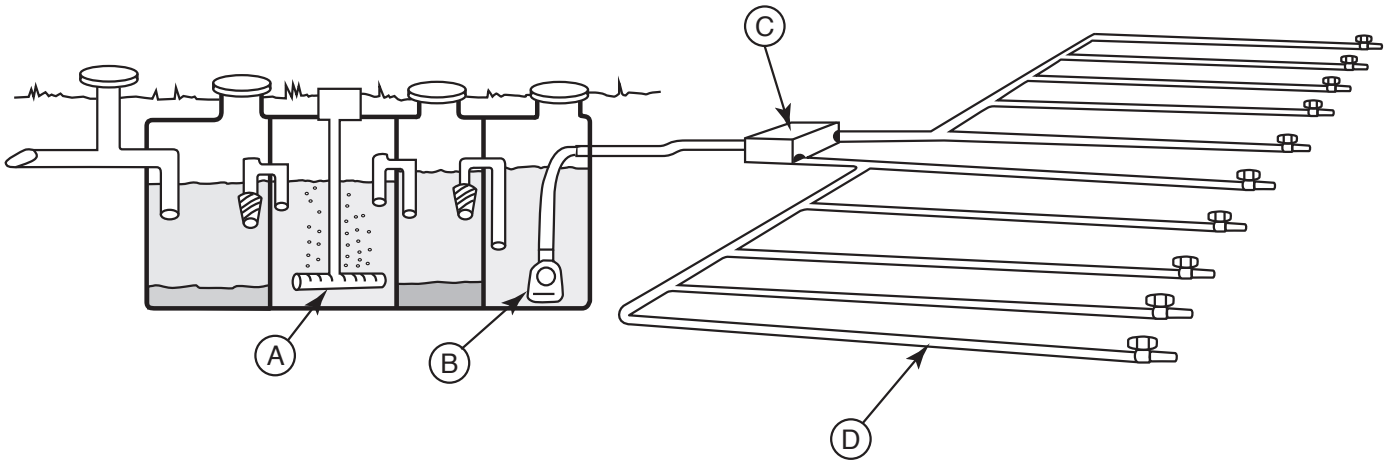
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(2 marks)

**Total 4 marks**

## QUESTION 2

The following diagram shows a domestic sewage treatment system.



Name, describe the function and give an advantage of each section labelled A – D.

A Name: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

Advantage: \_\_\_\_\_

\_\_\_\_\_

B Name: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

Advantage: \_\_\_\_\_

\_\_\_\_\_

**QUESTION 2 (cont'd)**

C Name: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Advantage: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

D Name: \_\_\_\_\_

Function: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Advantage: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Total 12 marks**

### QUESTION 3

Give the definitions of the following terms in relation to stormwater.

(a) Rodding point

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(b) Sump

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(c) Trap

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(d) Culvert

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**Total 4 marks**

### QUESTION 4

State the purpose of each of the following.

(a) Stormwater detention tank

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(1 mark)

(b) Stormwater retention tank

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(1 mark)

**Total 2 marks**

**QUESTION 5**

(a) State THREE acceptable methods for soundness testing a stormwater drain before backfilling.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_

(3 marks)

(b) Give TWO reasons why a foul water drain must be proven water tight before being backfilled.

- 1 \_\_\_\_\_  
\_\_\_\_\_
- 2 \_\_\_\_\_  
\_\_\_\_\_

(1 mark)

(c) A trench has been excavated 35 m long and 650 mm wide, with an average depth of 900 mm. Calculate the volume of material that has been excavated. Give your answer in cubic metres.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2 marks)

**Total 6 marks**

### QUESTION 6

The diagram below shows a plan view indicating changes of direction for a drain.



The drain at point A is 300 mm below the datum.

The drain has been laid at a gradient of 1:60 (1.65%)

Complete the following table to show the fall between each change of direction and the depth below datum for the excavation at points B, C, D and E. (A has been completed for you.)

Point	Fall	Depth
A	0 mm	300 mm
B		
C		
D		
E		

Total 8 marks



**QUESTION 7**

A foul water drain is to be installed at an existing petrol station.

(a) State TWO hazards that may be specific to an excavated trench on this type of site.

- 1 \_\_\_\_\_  
\_\_\_\_\_
- 2 \_\_\_\_\_  
\_\_\_\_\_

(2 marks)

(b) Give FOUR safety precautions that should be taken when excavating this type of site.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

(4 marks)

(c) Give the THREE restrictions that apply where drains cross over existing underground services.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_

(3 marks)

**Total 9 marks**

## QUESTION 8

The drawing on the page opposite shows a plan view of a proposed commercial premises.

The foul water connection is marked X.

The stormwater connection is marked O.

- (a) On the plan view, draw a plan for the layout of the foul water drains
- (b) On the plan view, show the stormwater drains and include the following information:

The minimum allowable size for the branch drain serving downpipe 'A'.

The minimum allowable size for the branch drain serving the Type 2 water sump.

The minimum allowable size for the main drain from the boundary to the storm water outfall.

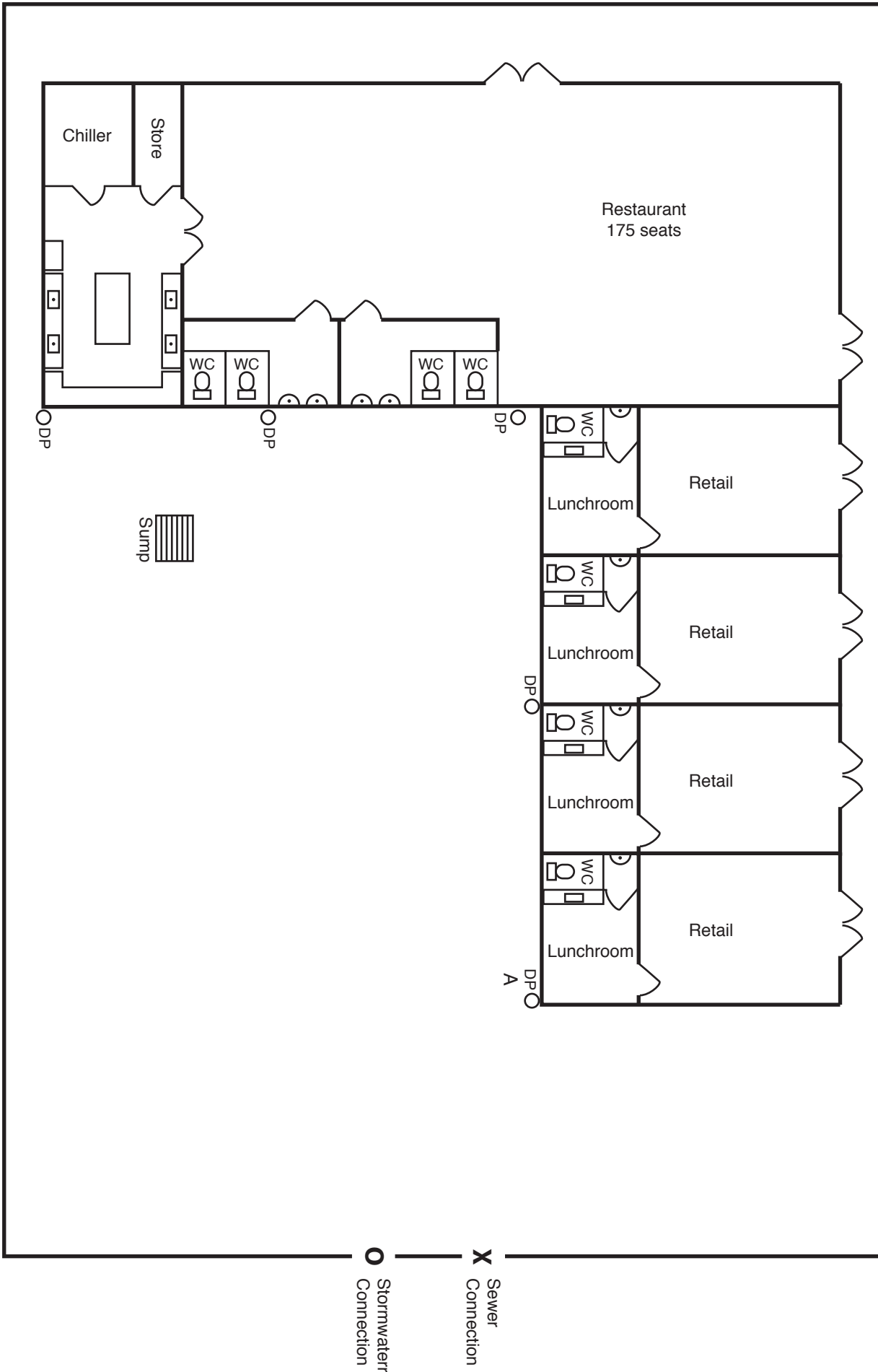
The drawing must show an economical solution that is consistent with sound trade practice and that complies with the New Zealand Building Code clauses E1/AS1 Surface Water and G13/AS2 Foul Water.

- (c) State the size of the grease trap that is required for serving the restaurant.

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**Total 15 marks**

QUESTION 8 (cont'd)



**QUESTION 9**

(a) Give SIX requirements that must be met when a gully trap is being installed.

1 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(3 marks)

(b) Explain why a drain servicing a house must include at least one gully trap.

\_\_\_\_\_  
\_\_\_\_\_

(1 mark)

**Total 4 marks**

**QUESTION 10**

A drain is being installed.

The drain will travel under a proposed concrete pad.

No branches will be entering the drain under the pad.

Give FOUR requirements that must be met when the drain is being installed.

- 1 \_\_\_\_\_  
\_\_\_\_\_
- 2 \_\_\_\_\_  
\_\_\_\_\_
- 3 \_\_\_\_\_  
\_\_\_\_\_
- 4 \_\_\_\_\_  
\_\_\_\_\_

**Total 2 marks**

## QUESTION 11

- (a) A commercial building has been built on a level below the local territorial authority sewer connection.

Sketch a wet well pumping installation that could be used to collect and discharge the waste from the dwelling to the sewer.

(8 marks)

- (b) Explain the difference between a dry well and a wet well pumping installation.

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(2 marks)

**Total 10 marks**

**QUESTION 12**

(a) Describe the situation in which a Jump-up would be required.

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(1 mark)

(b) Give TWO requirements that must be met in the construction of a Jump-up.

1 

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2 

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(2 marks)

(c) Give TWO situations where the installation of a square junction on a drain is permitted.

1 

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2 

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(1 mark)

**Total 4 marks**

## SECTION B

Answer the following multiple-choice questions by writing your answer (A, B, C, D or E) in the box provided after each one of the questions.

Each correct answer in this section of the examination is worth 1 mark.

Note that should your choice of answer be unclear in this section of the examination no marks will be awarded for that question.

1. Which of the following requires two people to find a level?

- A Smart level.
- B Plumb bob.
- C Dumpy/builders level.
- D Spirit level.
- E Laser level.

2. Where should solvent cement be applied when joining uPVC pipe?

- A Inside the socket only.
- B Inside the spigot only.
- C On the outside of the socket and the inside of the spigot.
- D On the outside of the spigot and the inside of the socket.
- E On the outside of the spigot only.

3. Which of the following is allowable for galvanised steel drain pipe that is being installed in compliance with AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

- A The pipe can be used for conveying grey water.
- B The pipe can be cement lined.
- C The pipe can be bent.
- D The pipe can be used for conveying discharge from soil fixtures.
- E The pipe can be installed in inaccessible locations.



4. What is the ratio in cement and sand should be mixed to create cement mortar, as stated in AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

A 1:5

B 1:4

C 1:3

D 1:2

E 1:1

5. What is the maximum amount of time mixed cement mortar can be left before use as stated in AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

A 15 minutes.

B 20 minutes.

C 30 minutes.

D 45 minutes.

E 60 minutes.

6. A drain is being connected to the base of a two story discharge stack.

A branch to a gully trap is also being connected to the drain downstream from the stack.

What is the minimum allowable distance between the two connections?

A 0.500 m.

B 1.000 m.

C 1.500 m.

D 2.000 m.

E 2.500 m.

7. Which of the following tools cannot be used to cut earthenware pipe?

A Cold chisel.

B Hacksaw.

C Chain cutters.

D Wheel cutters.

E Angle grinder.

8. What is a submersible pump?

- A A pump that is designed to be completely covered by the liquid it is pumping.
- B A pump that is used only to convey sewage.
- C A pump that is used when well pointing a site prior to excavation.
- D A pump that is used in a dry well duplex system.
- E A pump that is suitable for conveying stormwater only.

9. What is a dewatering system?

- A A system that separates solid waste from liquid waste during sewerage treatment.
- B A system that removes ground water before excavation.
- C A system that uses recycled waste for irrigation.
- D A system that helps effluent transpire through the soil.
- E A system that dilutes liquid effluent to maintain a safe level of bacteria.

10. What is the maximum allowable distance between a gully dish and a grease trap?

- A 1.500 m.
- B 2.000 m.
- C 2.500 m.
- D 3.000 m.
- E 3.500 m.

11. What is the minimum allowable capacity of a grease trap?

- A 50 litres.
- B 100 litres.
- C 125 litres.
- D 150 litres.
- E 200 litres.

12. A trench is to be excavated.

The trench is deeper than 1.5 m and its depth is greater than its width at the top.

Which of the following organisations must be notified before starting the excavation?

- A The Plumbers Gasfitters and Drainlayers Board.
- B The local territorial authority or regional council.
- C The Department of Labour.
- D The Council of Trade Unions.
- E The Department of Building and Housing.

13. A drain is serving a vertical discharge stack on a three level building.

A gully dish is required to be connected to the drain downstream of the discharge stack connection.

How close to the discharge stack connection is the junction for the gully trap permitted to be?

- A 0.500 m.
- B 1.000 m.
- C 1.500 m.
- D 2.000 m.
- E 2.500 m.

14. Which clause of the New Zealand Building Code covers the design and construction of soak pits?

- A B2 Durability.
- B E1 Surface Water.
- C E2 External Moisture.
- D G12 Water Supplies.
- E G13 Foul Water.

15. What is the maximum depth an access chamber can be before rungs must be installed?

A 0.800 m.

B 1.000 m.

C 1.200 m.

D 1.500 m.

E 1.800 m.

16. What is the purpose of using flexible joints on a drainage pipe?

A To provide an easy point for the drain to be disconnected.

B To allow branches for future connections to be added.

C To allow for settling of soil around the drain.

D To adjust the angle of a drain during installation.

E To connect two different drainage pipe materials.

17. An existing building is being removed from a site.

Where should the drain that served the building be sealed once the building is disconnected?

A Where the drain enters the sewer system.

B At ground level.

C No less than 1 metre downstream of the first branch from the building.

D At the point where the drain is 600 mm below ground level.

E At each branch from the drain to the building.

18. What is the maximum discharge unit loading for a 150 mm drain laid at a 1:60 gradient?

A 1040

B 1310

C 1790

D 2200

E 2920

19. At what length does a branch drain require a vent when it is being installed so that it is compliant with New Zealand Building Code Clause G13/AS2 Foul Water?
- A 2.500 m.
  - B 5.000 m.
  - C 7.500 m.
  - D 10.000 m.
  - E 15.000 m.
- 

20. A trench is to be dug in line with the footings of a building.  
The trench is expected to be open for 36 hours.  
The trench will be 1.5 metres deeper than the footings.  
How far away from the base of the footings must the trench be?
- A 0.500 m.
  - B 1.000 m.
  - C 1.500 m.
  - D 2.000 m.
  - E 2.500 m.
- 

**Total 20 marks**

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
Section B		
Total		