

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

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No. 9198



Plumbers,  
Gasfitters and  
Drainlayers Board

## REGISTRATION EXAMINATION, JUNE 2013

# CERTIFYING 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 23–25 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 25 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 2013 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

The surface water drain from a property is lower than the local territorial authority's (TA) main drain connection point.

- (a) Name a suitable option that could be used to adequately dispose of the surface water from the property.

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(1 mark)

- (b) Draw and label a diagram showing the key requirements that must be met for the option named in (a).

(5 marks)

**Total 6 marks**

## QUESTION 2

A three bedroom house is being built. The soil fixtures only will discharge to a septic tank and trench effluent field system.

The house will have an occupancy of four people.

Recommended capacities for septic tanks				
Type of Wastewater	Persons		Bedrooms	
	1 to 5	6 to 10	1 to 3	4 to 6
All-waste	3000	4500	3000	4500
Greywater only	1800	2700	1800	2700
Blackwater only	1500	2500	1500	2500

(a) Using the table above, determine the required capacity for the septic tank.

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(1 mark)

**QUESTION 2 (cont'd)**

- (b) The house is supplied with water from the network utility operator mains supply, and has water reduction fixtures installed throughout.

The Design Loading Rate (DLR) for the soil in the area is 34 mm/day.

The effluent trenches will be 500 mm wide.

Expected Daily Flow Rate (EDF) in Litres/Person/Day		
Source	On-site Roof Water Tank Supply	Mains or Borehole Water Supply
Households with standard facilities (including automatic washing machine)	140	180
Households with full water reduction fixtures	115	145
Households with extra wastewater producing facilities (waste disposal units, dishwashers, bidets etc)	170	220
Blackwater only	1500	2500

Calculate how many metres of trench are required for the effluent field.

Formula:

$$\text{Length} = \frac{\text{EDF}}{\text{DLR} \times \text{width}}$$

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(2 marks)

**Total 3 marks**

**QUESTION 3**

Answer the following in relation to AS/NZS 1547 On-site domestic wastewater management.

(a) Give TWO circumstances under which effluent is required to be disinfected.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(b) Give TWO methods that may be used to disinfect effluent.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

(c) Name FOUR factors that impact on the effectiveness of a disinfection system.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

(4 marks)

**Total 8 marks**

#### QUESTION 4

Name FOUR different design options for the effluent field of an on-site domestic wastewater management system.

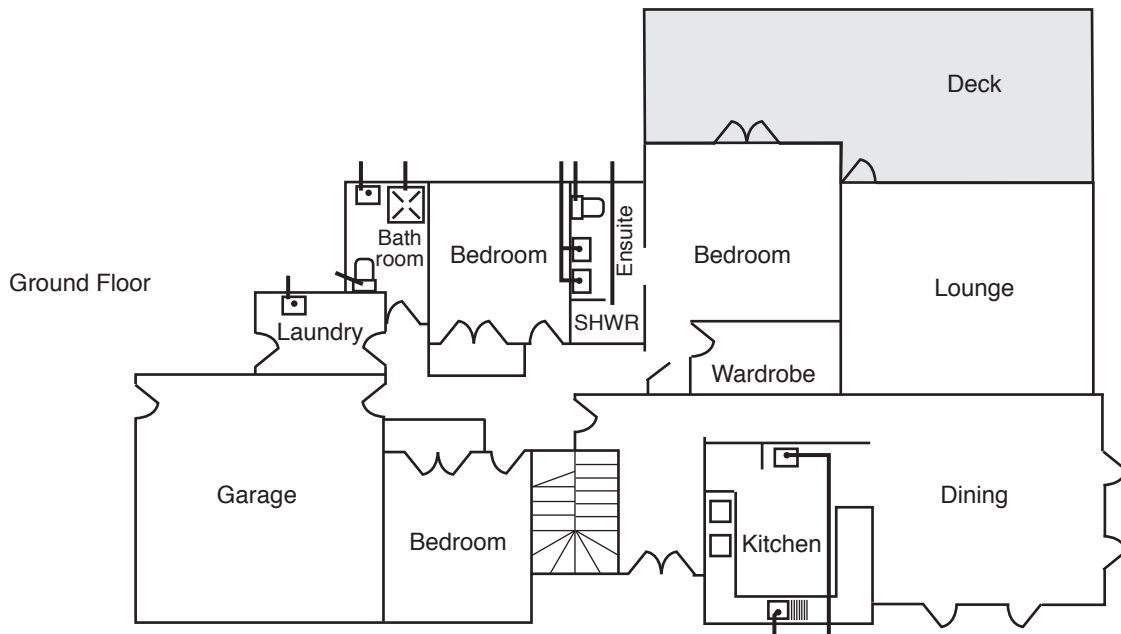
- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

(4 marks)

**Total 4 marks**

## QUESTION 5

The diagram below shows the floor plan of a new dwelling with the layout of the sanitary fixtures and discharge pipes.



The diagram opposite is a site plan showing the location of the dwelling in relation to the property boundaries and the network utility operator (NUO) sewer connection point (marked X). The plan has been drawn to a scale of 1:100

- Complete the site plan provided opposite to show suitable foul water pipework to convey waste to the NUO sewer connection point. All drainage is to be outside the building foundations. The system is to comply with the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.
- On the site plan, show the location of any necessary inspection openings.

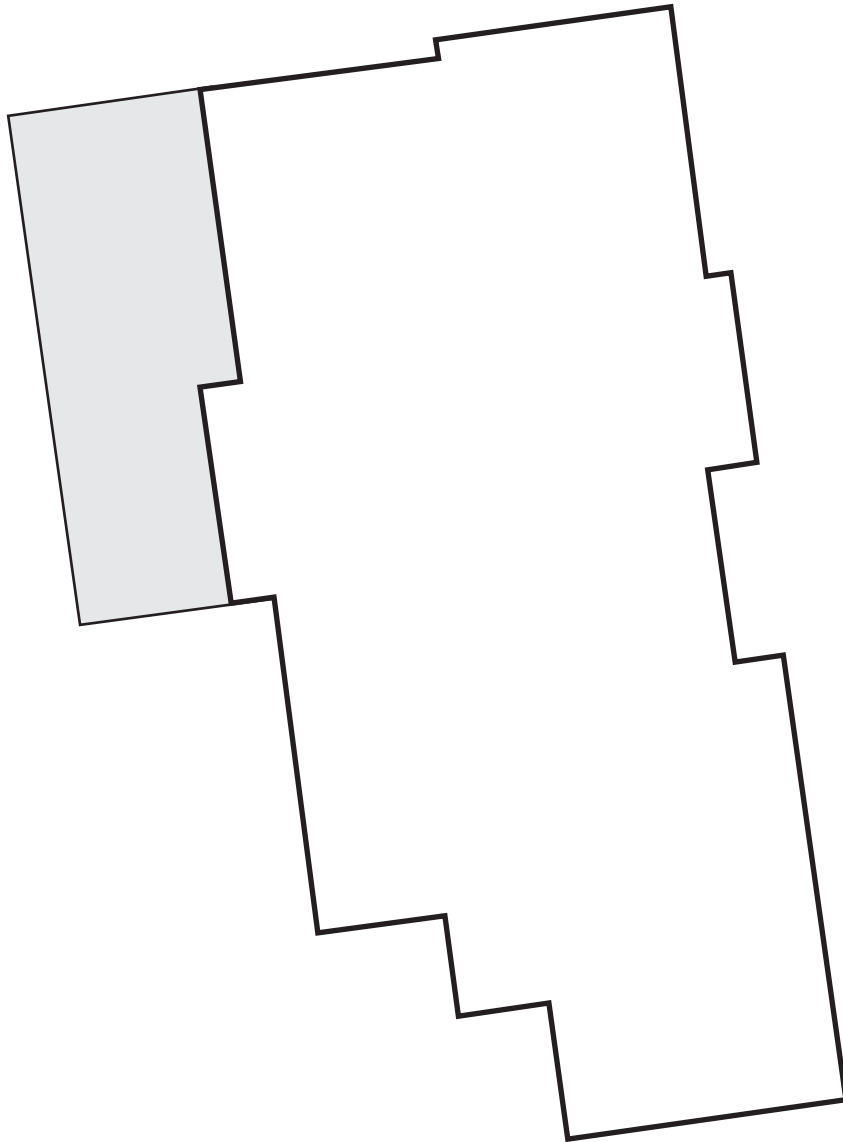
**Total 10 marks**





QUESTION 5 (cont'd)

(X)



## QUESTION 6

The site plan opposite shows the location of a flat roof warehouse in relation to the property boundaries, and the position of the required downpipes. The plan has been drawn to a scale of 1:200

Each downpipe serves an equal area of roof.

The rainfall intensity for a 1 in 10 year storm is 40 mm/h.

The rain water is to be disposed of via a soak pit system. Each soak pit will have a diameter of 900 mm and will be able to accommodate 8 m<sup>3</sup> of rainwater.

- (a) The local territorial authority has stated that soak pits must not be installed within 3 metres of a building or within 1.5 metres from the property boundary.

Complete the site plan to show the prohibited locations for any soak pits.

(5 marks)

- (b) Calculate the number of soak pits required to accommodate the expected rainwater and indicate on the site plan the most economical location for the soak pits that will be accepted by the local territorial authority.

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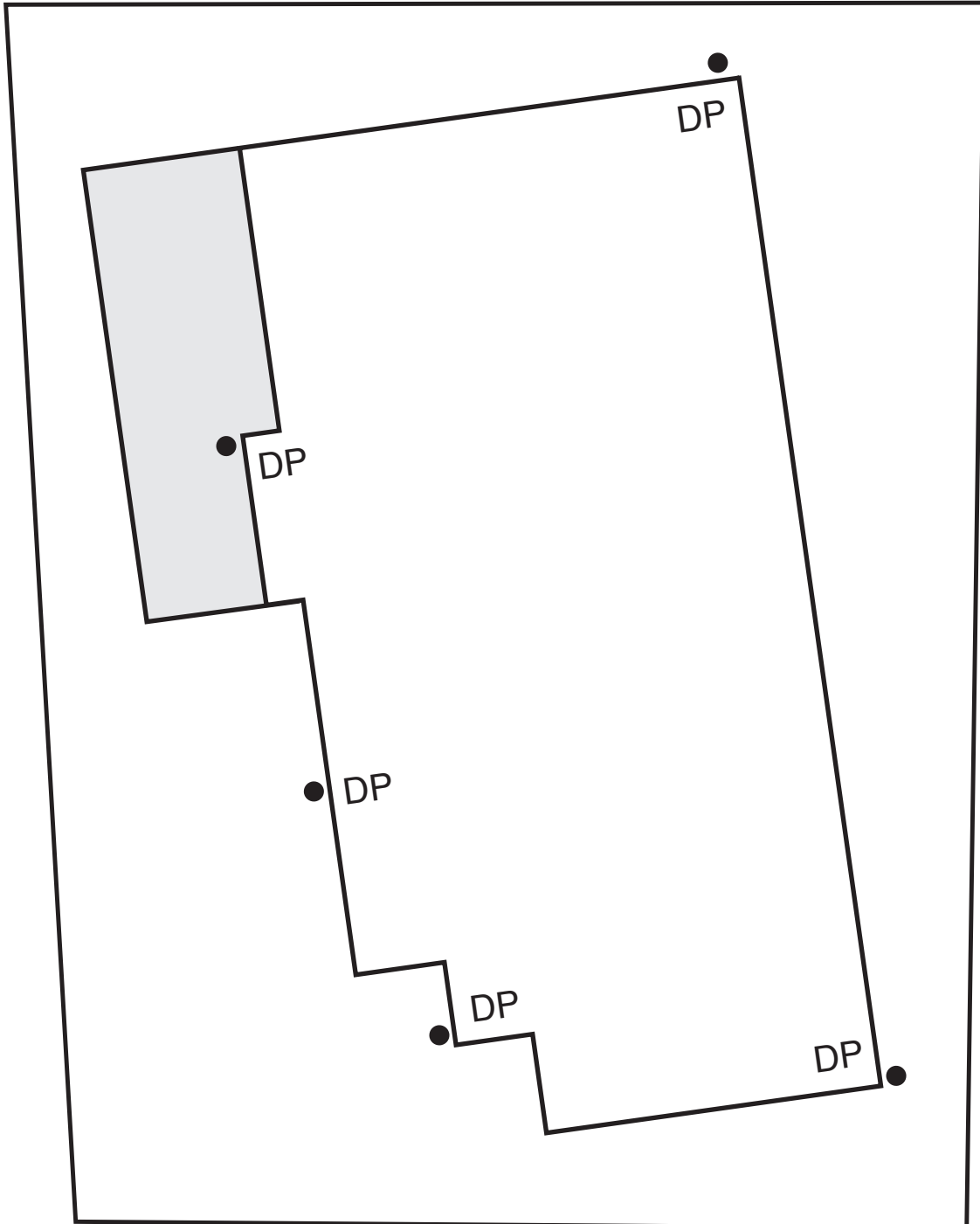
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(6 marks)

**Total 11 marks**

QUESTION 6 (cont'd)



## QUESTION 7

Answer the following in relation to the Health and Safety in Employment Act.

- (a) State an employer's general obligations regarding employee participation in workplace health and safety.

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(1 mark)

- (b) Explain when an employee participation system must be developed.

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(2 marks)

- (c) List the THREE parties involved in the setting up and maintenance of an employee participation system.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(2 marks)

- (d) Give TWO examples of the functions of an employee participation system.

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

(2 marks)

- (e) State who assumes the responsibility for organising the election of a health and safety representative.

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(1 mark)

**Total 8 marks**

## QUESTION 8

Give FOUR examples of drainlaying work that is Notifiable Work.

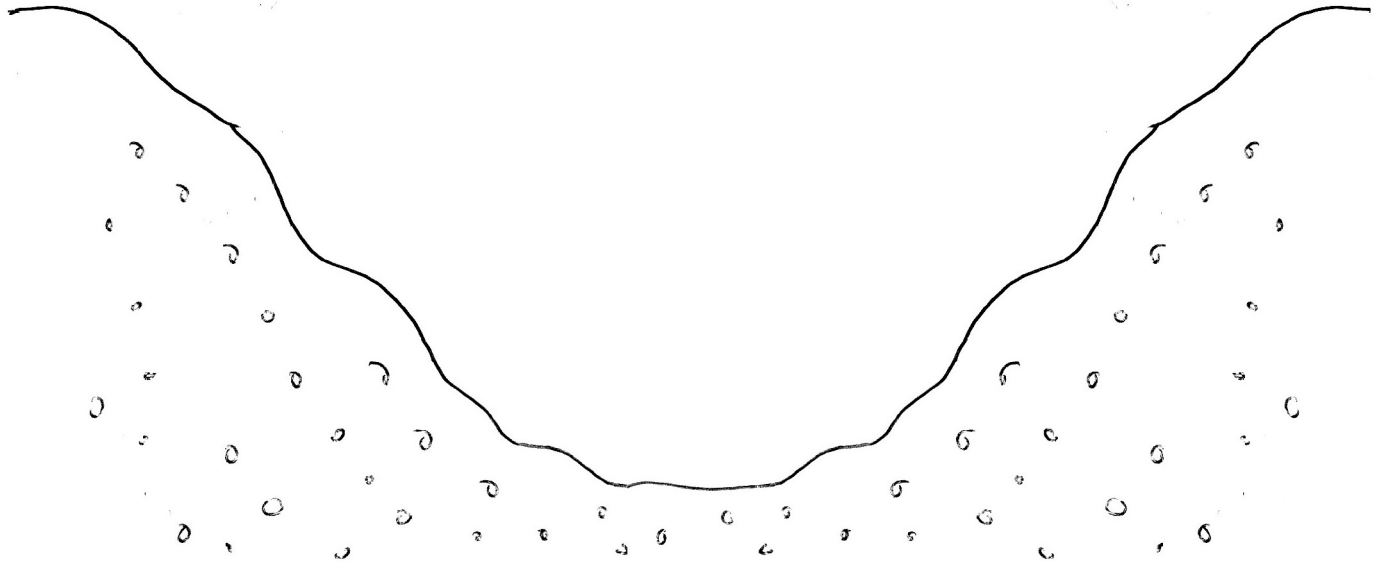
- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

**Total 4 marks**

### QUESTION 9

The starter drawing below shows a trench excavated for the purpose of installing a trench effluent disposal field.

Complete and label the drawing to show a cross-sectional view of the placement of materials used to complete the installation and backfilling of the trench.



Total 4 marks

**QUESTION 10**

(a) Give the definition of grey water.

\_\_\_\_\_

(1 mark)

(b) Give THREE requirements that must be met specific to installing drainage piping from a fixture to a grey water system.

1

\_\_\_\_\_

\_\_\_\_\_

2

\_\_\_\_\_

\_\_\_\_\_

3

\_\_\_\_\_

\_\_\_\_\_

(3 marks)

**Total 4 marks**

## QUESTION 11

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

The foul water sewer connection point is marked X.

The surface water connection point is marked O.

The drainage system is to meet the minimum requirements of New Zealand Building Code clauses E1/AS1 Surface Water and G13/AS2 Foul Water.

- (a) (i) On the plan view, draw a plan for the layout of the foul water drains, including any required inspection openings.
- (ii) On the plan view, draw a plan for the layout of the surface water 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 two Type 2 water sumps
  - the minimum allowable size for the main drain from the boundary to the surface water outfall.

(13 marks)

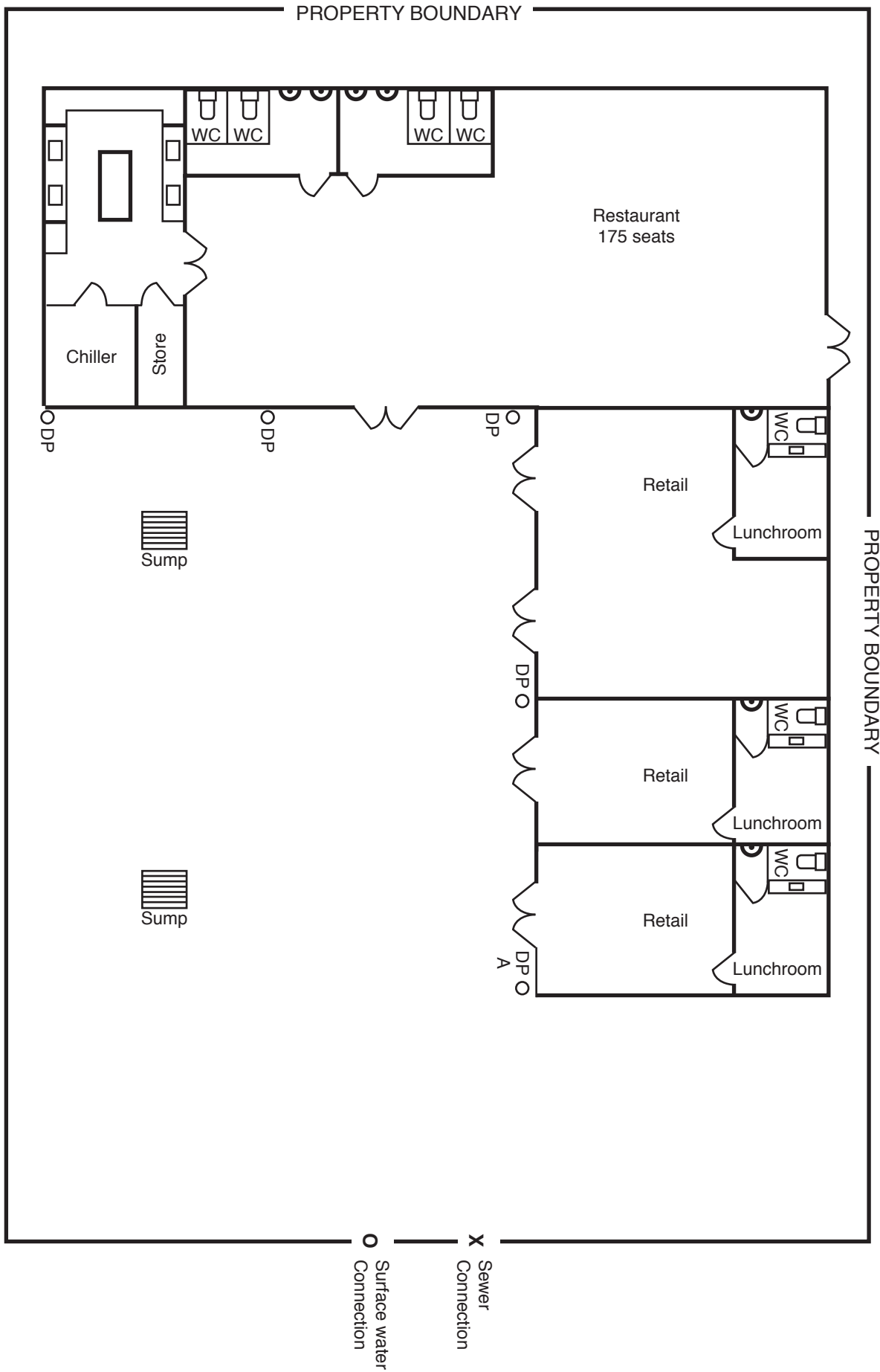
- (b) State the minimum size for the grease trap that is required to receive waste from the premises.
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(1 mark)

**Total 14 marks**



QUESTION 11 (cont'd)

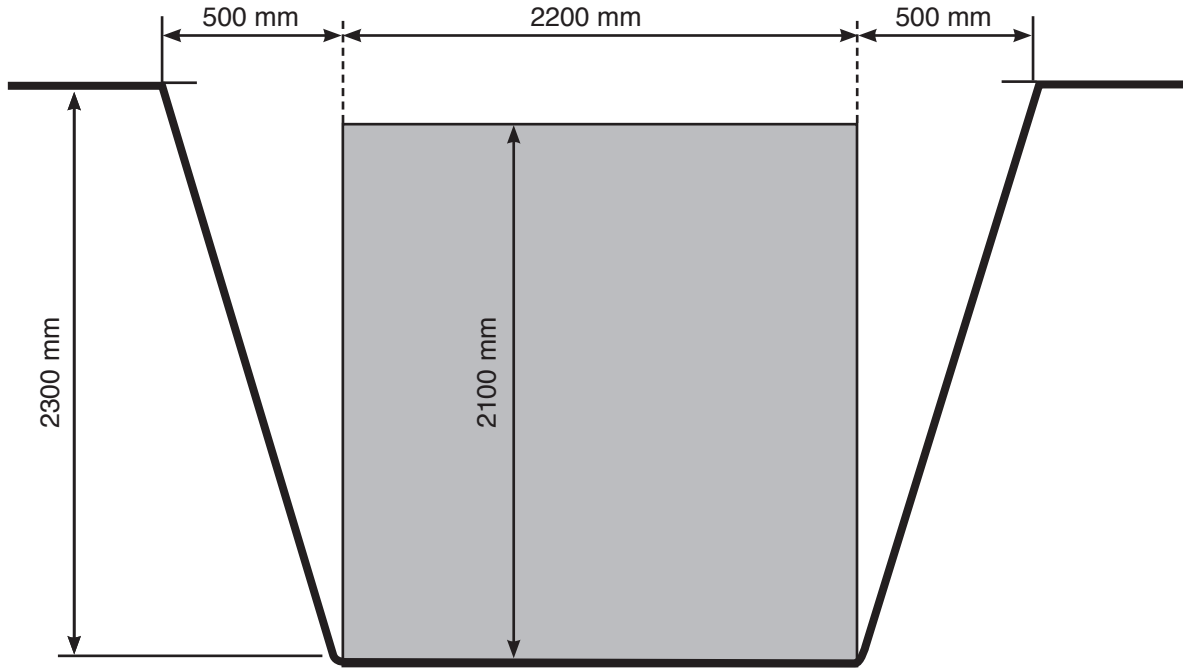


**QUESTION 12**

The diagram below shows an end view of a box culvert installed in a trench.

The box culvert measures 2200 mm X 2100 mm.

The trench and culvert are both 3 metres long.



Calculate the volume of backfill material that will be required to fill the trench allowing for 20% compaction.

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**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 no marks will be awarded for that question.

1. Who has a duty to ensure the health and safety of all people on a work site?

- A The principal contractor.
- B The health and safety representative.
- C The owner of the property.
- D The worker.
- E The Ministry of Business, Innovation and Employment.

2. Approved Codes of Practice give details of how work could be carried out.

Why is following these recommendations beneficial?

- A The approved Code of Practice ensures the work will comply with the Building Act.
- B If the work is carried out according to the Code of Practice a notifiable work form does not have to be completed.
- C If an accident occurred, the Code of Practice is used as an example of good work practice and if not followed could indicate negligence.
- D The Department of Labour can issue an infringement notice or fine if work is not completed according to the Code of Practice.
- E Approved Codes of Practice must be followed to prevent accidents occurring.

3. Under what condition may greywater be considered trade waste?

- A When the grey water is discharged from a commercial premises.
- B When the greywater has been treated.
- C When the greywater has been stored for longer than 24 hours.
- D When the greywater contains human waste.
- E When the greywater is being discharged to a network utility operator's sewer system.

4. A pipe has been laid at a gradient of 1:40 (2.50%).

How much will the pipe fall over a 7 metre run?

A 1.75 m.

B 175 mm.

C 280 mm.

D 2.8 m.

E 70 mm.

5. A pipe falls 900 mm over a 45 metre run.

What gradient has it been laid at?

A 1:50 (2.00%).

B 1:45 (2.25%).

B 1:40 (2.50%).

C 1:30 (3.35%).

D 1:20 (5.00%).

6. A pipe is laid at a gradient of 1:80 (1.25%) and has a fall of 120 mm.

How long is the pipe?

A 1.50 m.

B 150 mm.

C 6.66 m.

D 960 mm.

E 9.60 m.

7. Which of the following organisations should provide the most accurate rainfall intensity data for a location?

A National Institute of Water & Atmospheric Research (NIWA).

B The Met Service.

C The territorial authority for the location.

D The Department of Conservation.

E The Ministry for the Environment.

8. The fixtures discharging into an overflow relief gully have been removed.

What actions should be taken regarding the drain?

- A The gully dish should be removed and a cap installed on the riser.
- B A flushing device or hose tap should be installed to manually keep the gully trap charged.
- C The gully dish and trap should be removed and the branch drain capped
- D The branch drain and junction receiving the waste from the gully dish should be removed and replaced with a straight section of pipe.
- E A down pipe should be diverted to the gully dish to charge the gully trap automatically when it rains.

9. A wet well dual pumping system has been installed to convey waste from a building.

What should occur when the low level sensor is activated?

- A The main pump should start to empty the well.
- B The main pump should stop.
- C A warning system should activate to inform that maintenance is required.
- D The standby pump should start.
- E The building water supply solenoid valve should shut.

10. What is the minimum time for a water test of a surface water drain installed to comply with New Zealand Building Code Clause E1/VM1 Surface Water?

- A 10 minutes.
- B 15 minutes.
- C 20 minutes.
- D 25 minutes.
- E 30 minutes.

11. How far below the overflow level of the lowest fixture connected to a drain should the top of a gully dish be installed?
- A 20 mm.
  - B 50 mm.
  - C 100 mm.
  - D 150 mm.
  - E 200 mm.
- 

12. At which location(s) must inspection points be provided on a grease trap installation?
- A On the outlet of the grease trap.
  - B On the inlet to the grease trap.
  - C On both at the inlet and outlet of the grease trap.
  - D In the lid of the first chamber of the grease trap.
  - E In the lid of the second chamber of the grease trap.
- 

13. What determines the cascade level of grease trap?
- A The height difference between the inlet and the baffle.
  - B The height difference between the baffle and the outlet.
  - C The height difference between the discharging fixture outlet and the grease trap inlet.
  - D The height difference between the inlet and the outlet.
  - E The height difference between the grease trap outlet and the main drain.
- 

14. What is the maximum allowable distance between a grease trap and the gully dish discharging waste to the grease trap?
- A 1.5 m.
  - B 2.0 m.
  - C 2.5 m.
  - D 3.0 m.
  - E 10.0 m.
-

15. Why is there a maximum allowable distance between a gully dish and the grease trap it is discharging into?
- A To stop the waste cooling and fats solidifying on the internal wall of the pipe.
  - B To prevent vermin from entering the grease trap.
  - C So that the pipe does not require venting.
  - D So that the pipe can easily be cleaned without specialised equipment.
  - E So that an inspection point is not required on the inlet of the grease trap.

16. When reading a site plan that includes contour lines, what do contour lines being close together signify?
- A The ground level is becoming higher.
  - B The ground level is becoming lower.
  - C The slope is steep.
  - D The slope is gentle.
  - E The ground is level.

17. Which of the following examples of drainlaying work requires a building consent?
- A A short extension of the surface water drain to reach a new downpipe.
  - B Installing a new gully trap on an existing drain to receive discharge from a redirected waste pipe.
  - C Installing a new access or rodding point for unblocking drains.
  - D Removing a branch drain that is no longer used.
  - E Re-routing an existing drain around a tree due to damage by tree roots.

18. Which of the following drainlaying is exempt building work?

- A Drainlaying work that does not require a building consent from the local territorial authority.
- B Drainlaying work that discharges into an on-site disposal system.
- C Drainlaying work that does not require testing by a certifying drainlayer.
- D Drainlaying work that is not required to comply with the New Zealand Building Code.
- E Drainlaying work that was installed before the local territorial authority began keeping records.

19. Which of the following is the definition of a rising main?

- A A main through which water or sewage is pumped at pressure.
- B A main drain that has a jump up of greater than 3.0 metres.
- C A stormwater drain that includes a bubble up chamber.
- D A system that includes a foul water drain and a soil stack over 5 storeys high.
- E A drain that has been installed before heavy rain which has caused the drain to float in the trench.

20. A drain is to pass beneath a building with a concrete slab.

What is the minimum depth of cover allowable between the top of the pipe and the bottom of the slab to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage?

- A 25 mm.
- B 50 mm.
- C 75 mm.
- D 100 mm.
- E 150 mm.

**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		