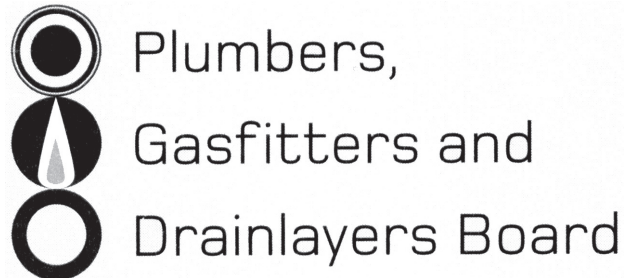


Affix label with Candidate Code  
Number here.  
If no label, enter candidate  
Number if known

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No. 9198



## REGISTRATION EXAMINATION, NOVEMBER 2020

# 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.

This exam booklet consists of 2 sections

Section A – Question 1 to 11

Section B – Question 1 to 10

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 27–29 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 30 pages in the correct order.

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

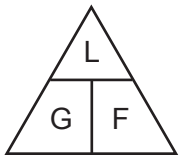
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## USEFUL FORMULAE

Circumference of circle =  $2 \times \pi \times R$  or Circumference of circle =  $\pi \times D$

Area of circle =  $\pi \times R^2$  or Area of circle =  $0.7854 \times D^2$

Volume of cylinder =  $\pi \times R^2 \times H$  or Volume of cylinder =  $0.7854 \times D^2 \times H$



length = L

gradient = 1:G

fall = F

# SECTION A

## QUESTION 1

(a) Give SIX examples of drainlaying work that would be classed as particular hazardous work.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_

(3 marks)

(b) Explain why a low pressure air test is used when testing large diameter drains.

\_\_\_\_\_

(1 mark)

(c) List FIVE harmful contaminants that are likely to be encountered in excavations.

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

(5 marks)

(d) Give FOUR items of safety equipment in addition to personal protection equipment that may be required when working in a drainage excavation.

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

(4 marks)

**Total 13 marks**

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## QUESTION 2

- (a) New Zealand Building Code clause B2 Durability states specific minimum lengths of time that products are required to last.

There are three different categories of products, determined by how difficult a product is to access.

Complete the following table by giving the specific time each listed product is required to last and an example of a situation for each category.

Category	Minimum time	Situation
Easy to access and replace		
Moderately difficult to access and replace		
Difficult to access and replace		

(6 marks)

- (b) Before performing consented work, material listed in the job specifications is changed.

State TWO parties who must be notified of the change.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

**Total 8 marks**

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### QUESTION 3

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

Name THREE suitable options that could be used to adequately dispose of the surface water from the property, and for each describe a situation in which that option would be the most appropriate.

Name \_\_\_\_\_

Situation \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(3 marks)

Name \_\_\_\_\_

Situation \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(3 marks)

Name \_\_\_\_\_

Situation \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(3 marks)

**Total 9 marks**

**QUESTION 4**

- (a) The plan opposite (not to scale) shows a building and contour lines on a site. The surface water drain connecting the dwelling to the network utility operator’s (NUO) system is also shown.

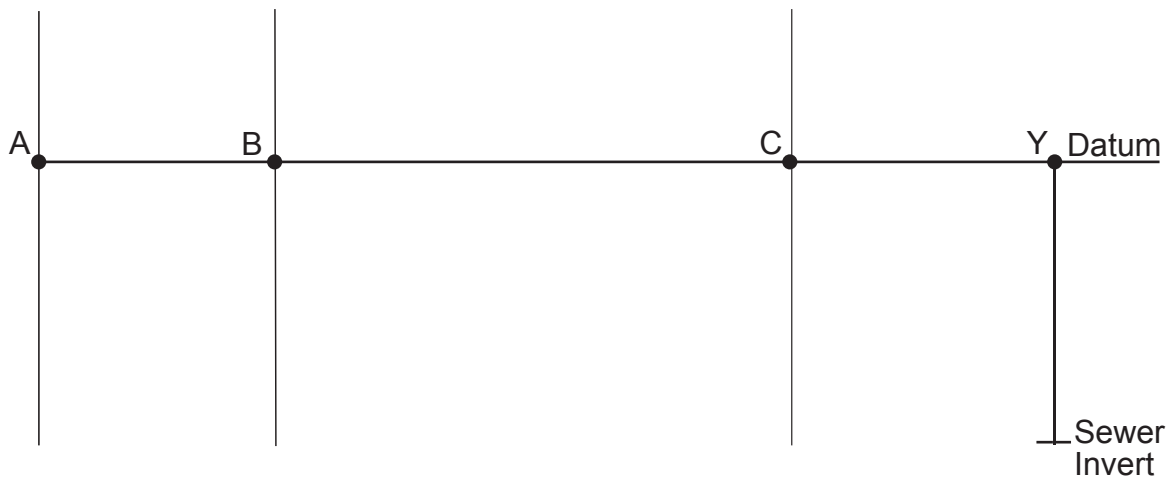
The invert for the NUO’s connection at Y is 0.9 metres below ground level.

The gradient of the drain is 1:50 and the distances between the points are as shown in the table below.

Length of pipe sections		
Pipe section	Distance	Fall
A - B	5 m	
B - C	13 m	
C - Y	6 m	

On the chart below show the following information.

- (i) The ground levels.
- (ii) The depth of the drain invert below the datum.



(8 marks)

- (b) Complete the following table to give the depth of the drain invert below the ground at each point.

A	B	C	Y

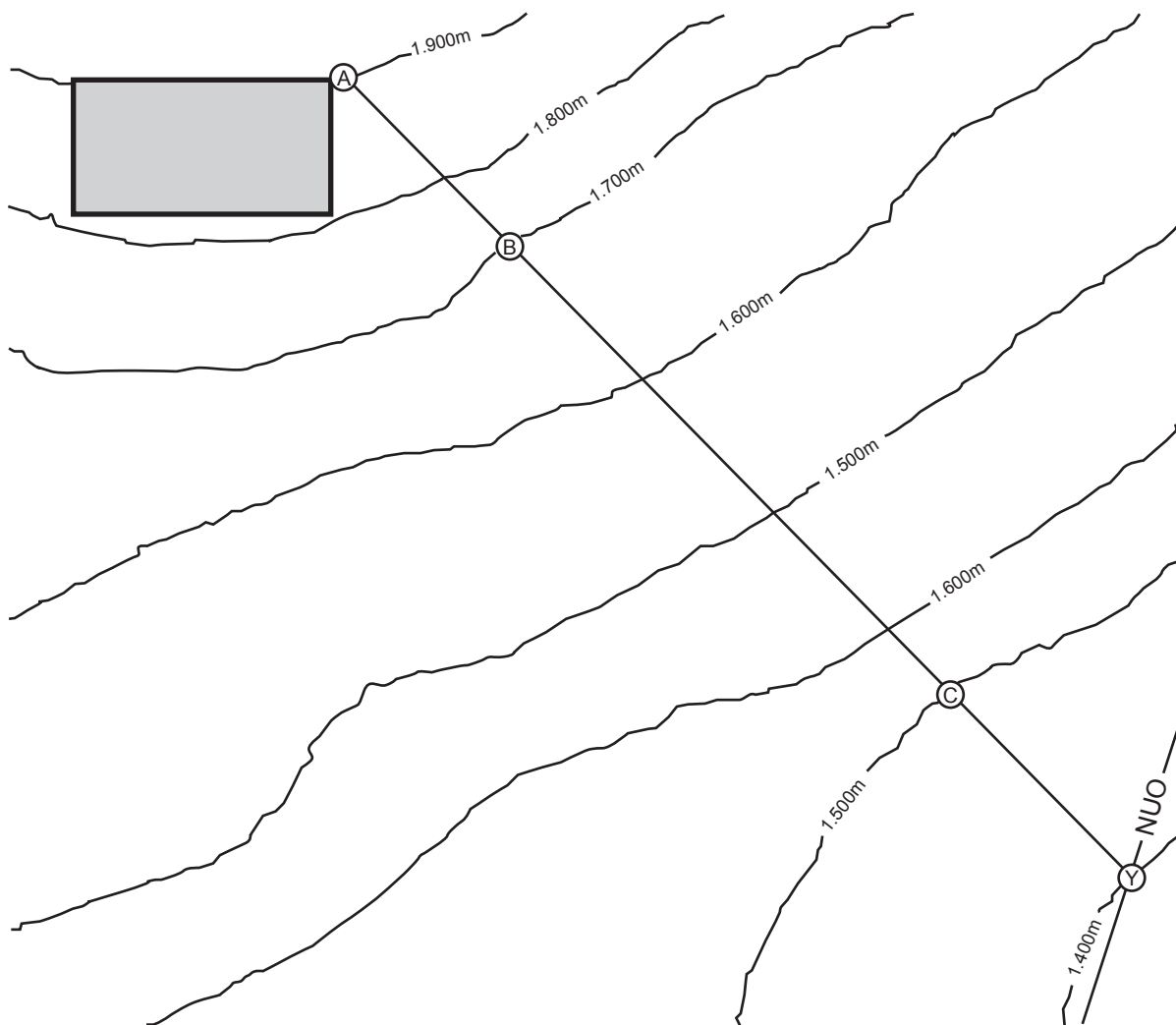
(4 marks)



**QUESTION 4 (cont'd)**

- (c) State the grade of the drain between C and Y if the invert of the drain at point C was changed to 500 mm below ground level.

(3 marks)



**Total 15 marks**

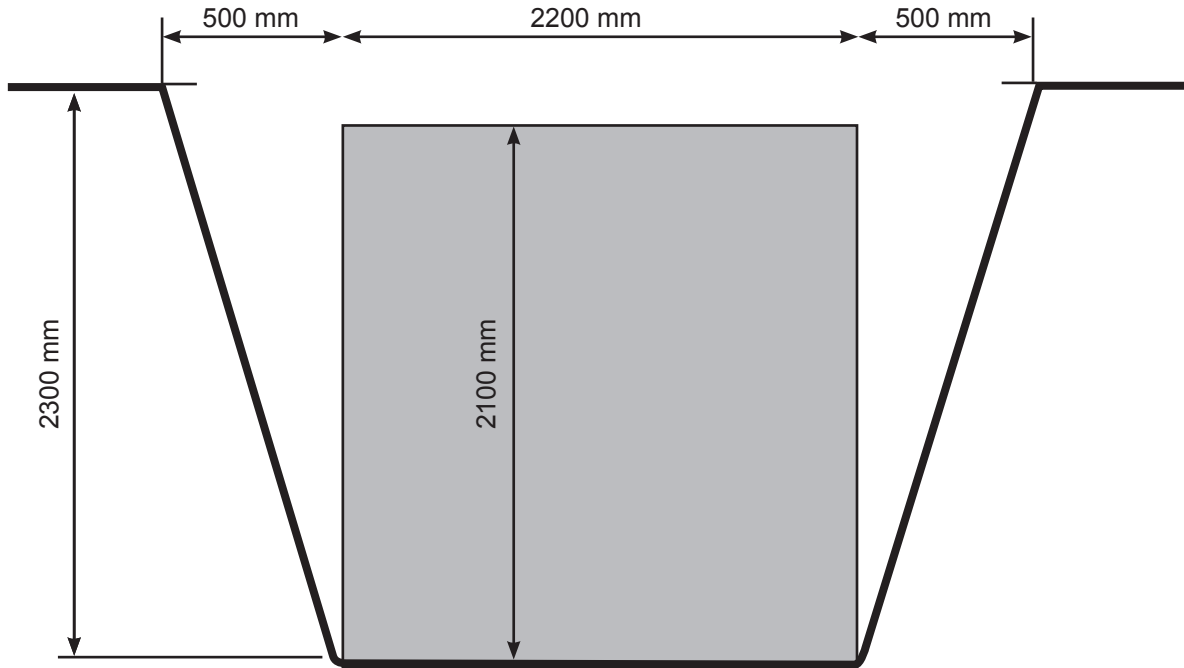
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### QUESTION 5

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

The box culvert measures 2200 mm × 2100 mm.

The trench and culvert are both 3 m 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

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## QUESTION 6

A surface water drain is to be water tested using the method prescribed in the New Zealand Building Code Verification Method E1/VM1 Surface Water.

(a) State the required length of time for the test.

\_\_\_\_\_

(1 mark)

(b) The drain is 300 mm in diameter and 57 metres long.

Calculate in litres the maximum amount of acceptable water loss during the test.

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

(3 marks)

(c) Give TWO other acceptable methods that may be used to test the drain.

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

(1 mark)

(d) Give the additional requirements that must be met when testing a drain that has been constructed from ceramic or concrete pipe.

\_\_\_\_\_

(1 mark)

**Total 6 marks**

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**QUESTION 7**

- (a) Give a situation in which an above-ground evapotranspiration effluent disposal system would be required to be installed.

\_\_\_\_\_

(1 mark)

- (b) Draw and label a cross-sectional view showing the construction of an above-ground evapotranspiration effluent disposal system.

(5 marks)

- (c) Give THREE recommendations that should be given to the end-user to prolong the life of an above-ground evapotranspiration effluent disposal system.

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

(3 marks)

- (d) Name THREE design options other than above-ground evapotranspiration for the effluent field of an on-site domestic wastewater management system.

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

(3 marks)

**Total 12 marks**

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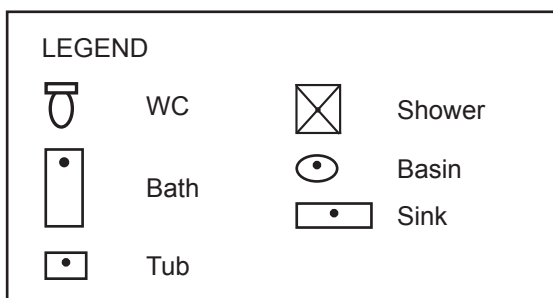
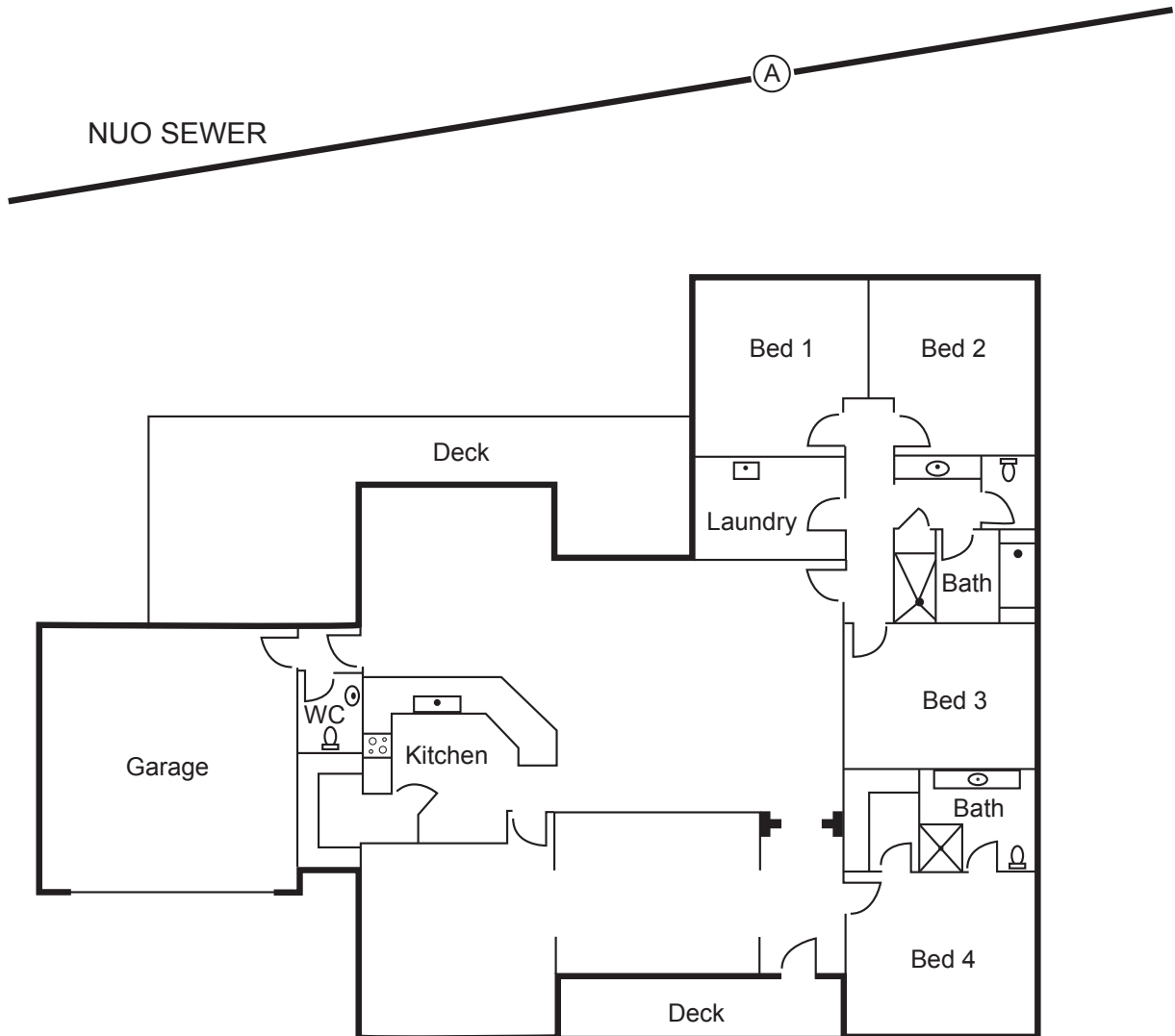


### QUESTION 8

The plan below shows the layout of sanitary fixtures for a new dwelling and a connection point (marked A) to the network utility operator's (NUO) sewer. The plan has been drawn at a scale of 1:200.

Complete the diagram to show the foul water drainage system required to convey waste to the NUO's sewer connection point.

The completed system is to comply with the minimum requirements of New Zealand Building Code Acceptable Solution G13/AS2 Foul Water.



Total 7 marks



## QUESTION 9

The drawing on the page opposite shows a plan view of a proposed commercial premises. The surface water connection point is marked O.

Downpipe A services an area of 80 m<sup>2</sup>. The design rainfall intensity for this site is 100 mm/hr.

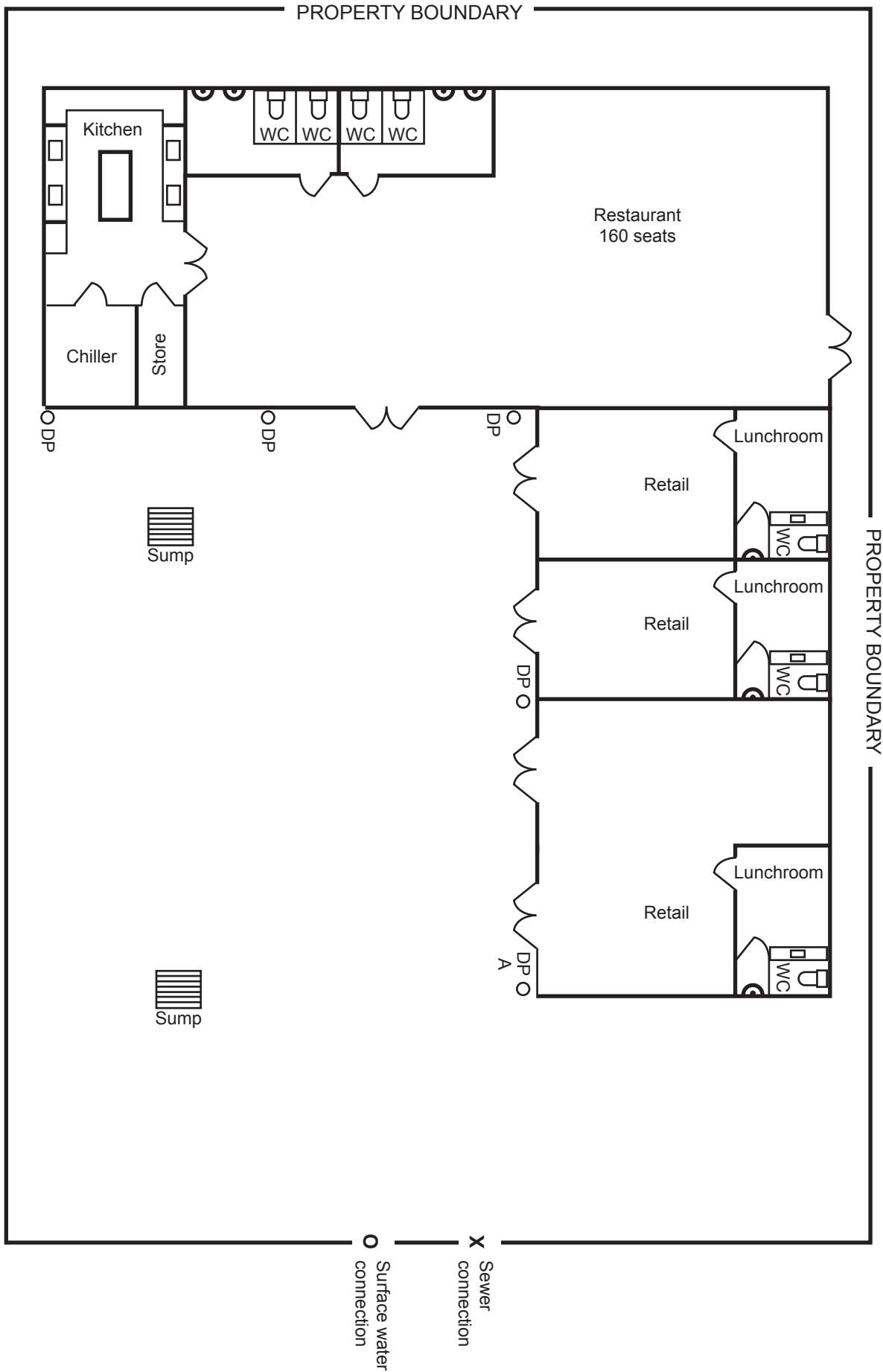
The drainage system is to meet the minimum requirements of New Zealand Building Code Acceptable Solution E1/AS1 Surface Water.

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 drains serving the sumps.

**Total 6 marks**

QUESTION 9 (cont'd)



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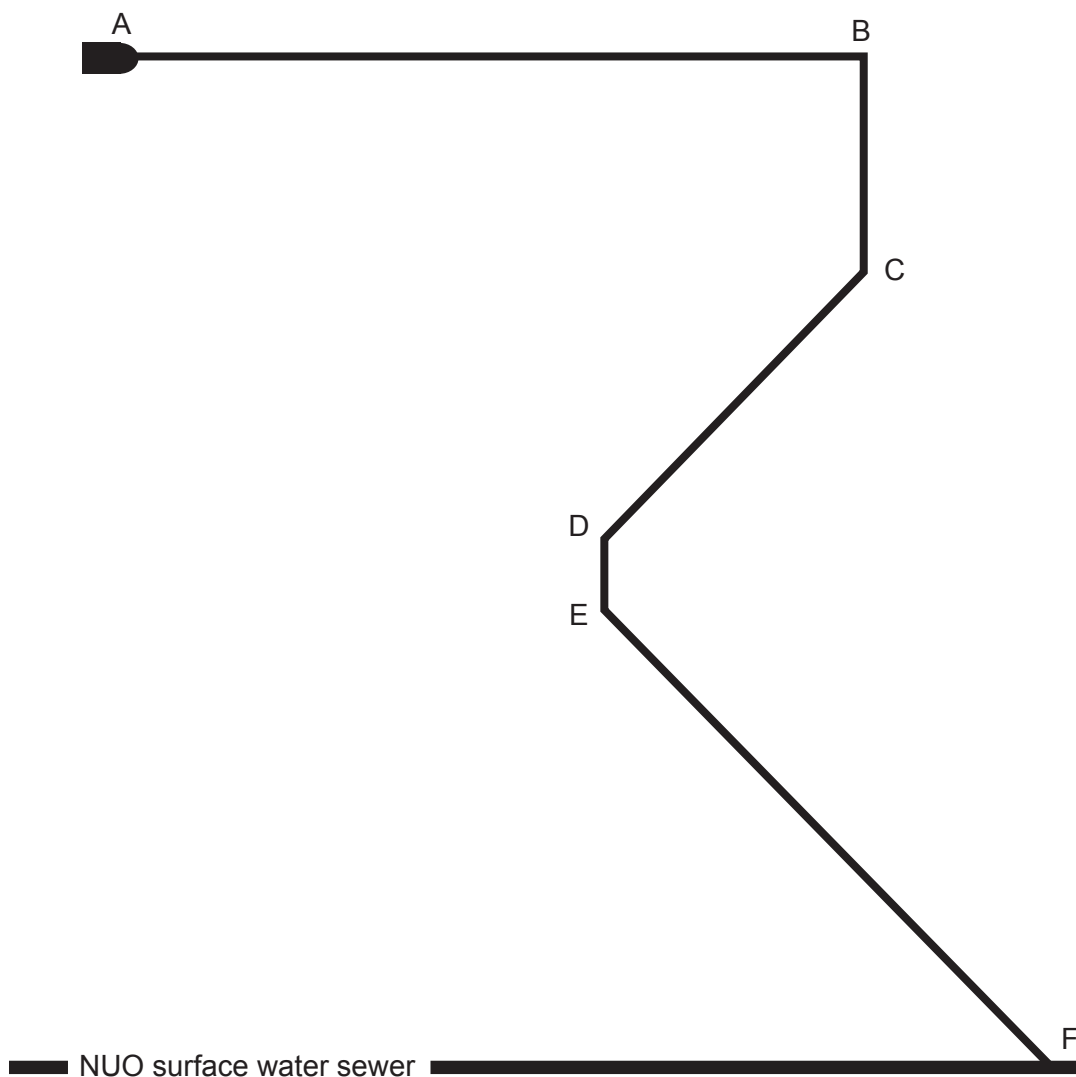
**QUESTION 10**

The diagram below shows the layout of a surface water drain from a sump to the Network Utility Operator's (NUO) sewer connection.

The changes of direction at points C, D and E are 45°.

The diagram has been drawn to a scale of 1:500

Complete the diagram to show the required locations for the rodding points. The completed system is to comply with the minimum requirements of New Zealand Building Code Acceptable Solution E1/AS1 Surface Water.



Total 6 marks

**INTENTIONALLY BLANK**

**QUESTION 11**

Describe briefly TWO methods of laying drains in unstable ground.

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

**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.

Should your choice of answer be unclear no mark will be awarded.

1. What is the purpose of an aerated chamber on a septic tank system?

- A. To convey the effluent evenly over the disposal field.
- B. To mix the tank contents thoroughly.
- C. To supply oxygen to the bacteria within the tank.
- D. To prevent grease from travelling through the system.
- E. To make sure all sludge is retained within the system.

2. 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.

3. A certifying drainlayer has employed a labourer who has just uplifted an exemption to perform restricted drainlaying. For what length of time must the labourer work in the presence of the certifying drainlayer?

- A. 6 months.
- B. 12 months.
- C. 24 months.
- D. 36 months.
- E. Until such time as the trainee achieves registration.



4. A uPVC drain is to be installed to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage. What is the minimum depth of cover that must be provided in an area that is subject to vehicular traffic.

- A. 350 mm.
- B. 400 mm.
- C. 450 mm.
- D. 500 mm.
- E. 550 mm.

5. 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 Particular Hazardous Work Notification 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 Ministry of Business, Innovation and Employment can issue an infringement notice or a fine if work is not completed according to the Code of Practice.
- E. Approved Codes of Practice must be followed to prevent accidents occurring.

6. What is the purpose of a drainage easement on a Certificate of Title?

- A. To allow a drain to be laid within a neighbouring property.
- B. To prevent flooding caused by surface water from a neighbouring property.
- C. To allow two neighbouring properties to share a drainage system.
- D. To permit the storm-water from the property to discharge to a curb and channel.
- E. To show the as-built location of the drainage system on the certificate of title.

7. The location of an underground electrical cable has been marked on a paved surface. A hand held power tool is used to break up the paved surface. To avoid damage to the electrical cable, the tool should not be used within what distance of the marked location?
- A. 200 mm.
  - B. 300 mm.
  - C. 400 mm.
  - D. 500 mm.
  - E. 600 mm.

8. What is the corrected run-off coefficient for a sealed driveway that has a slope of 15%?
- A. 0.70
  - B. 0.75
  - C. 0.80
  - D. 0.85
  - E. 0.90

9. In the event that the minimum depth of cover required for a drain subject to light vehicular traffic and installed to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage cannot be achieved, which of the following is the minimum requirements to protect the drain from damage?
- A. Cover the pipe with 50 mm of overlay followed by 50 mm of concrete paving.
  - B. Cover the pipe with 25 mm of overlay followed by 75 mm of reinforced concrete.
  - C. Cover the pipe with 50 mm of overlay followed by 75 mm of concrete paving.
  - D. Cover the pipe with 25 mm of overlay followed by 100 mm of concrete paving.
  - E. Cover the pipe with 50 mm of overlay followed by 100 mm of reinforced concrete.

10. Which of the following best describes a retention tank?

- A. A tank designed to hold surface-water until it can be discharged into the network utility operator's system.
- B. A tank designed to hold surface-water for reuse as a water supply on the property.
- C. A tank designed to store any trade waste requiring treatment before disposal.
- D. A tank designed to aerate foul water before discharging to an effluent disposal field.
- E. A tank designed to contain any overflow from a sewage treatment process when any above expected peak flow occurs.

**Total 10 marks**







For Examiner's use only

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

