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 2014

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 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

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Candidates that sat this examination in June 2014 were provided with the following documents:

- AS/NZS 3500 Part 2: Sanitary plumbing and drainage
- New Zealand Building Code Clause G13 Foul Water
- New Zealand Building Code Clause G14 Industrial Liquid Waste

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 sewage treatment system includes a septic tank with a biofilter, and discharges by gravity to an effluent disposal field.

(a) Sketch and label a diagram to show the main components of the sewage treatment system.

(5 marks)

(b) List, in order, the steps that occur through the treatment process when sewage is disposed of using this type of sewage treatment system.

(5 marks)

Total 10 marks

QUESTION 2

The plan opposite shows a building and contour lines on a site. The foul water drainage pipework connecting the dwelling to the network utility operator's (NUO) sewer is also shown.

The pipework has been laid at a gradient of 1:60, and the distances between the points are as shown in the table below.

Length of pipe sections	
Pipe section	Distance
A – B	1.4 metres
B – C	6.0 metres
C – D	6.5 metres
D – E	3.1 metres
D – F	4.2 metres

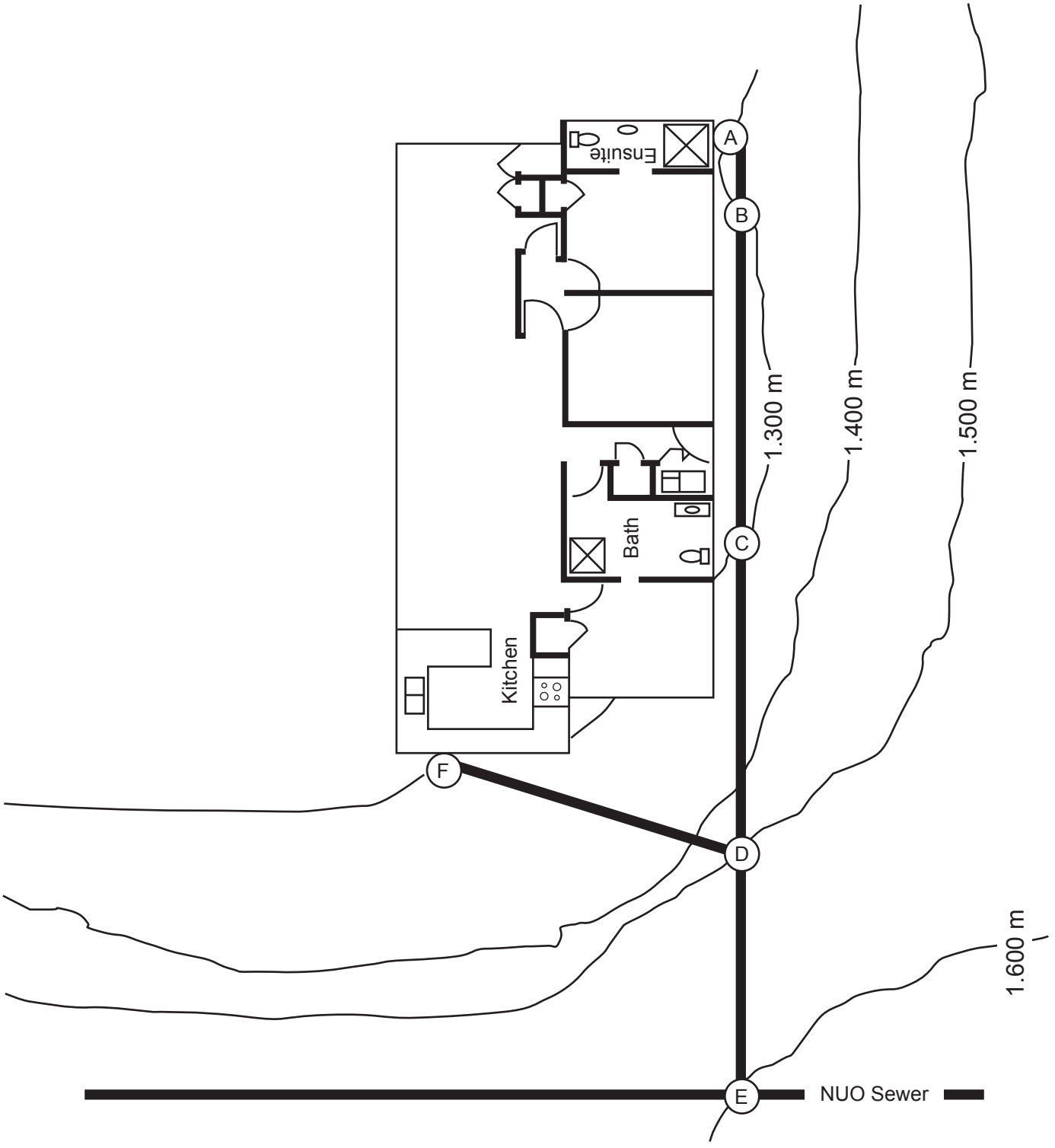
The invert for the NUO connection marked E is 1.25 m below ground level.

Complete the table below to show how many millimetres below ground level to the invert of the drain at the points indicated.

Depth of invert of drain	
Point	Depth
A	
B	
C	
D	
F	

Total 10 marks

QUESTION 2 (cont'd)



QUESTION 3

(a) A system for the disposal of industrial liquid waste is to be designed.

The waste is not hazardous, but is not permitted to be discharged directly to a sewer.

Give the TWO acceptable options for disposal of the liquid waste.

1 _____

2 _____

(2 marks)

(b) Name TWO clauses of the New Zealand building code with which systems designed for collecting hazardous industrial liquid waste must comply.

1 _____

2 _____

(2 marks)

(c) Give the TWO specific requirements that a pump used to pump hazardous liquid waste must meet.

1 _____

2 _____

(2 marks)

(d) Name the type of trap that must be included in the foul water drainage design if the industrial liquid waste is flammable.

_____

(1 mark)

Total 7 marks

QUESTION 4

A drainlayer has changed his contact address details.

(a) (i) State the length of time within which the drainlayer must notify the Plumbers, Gasfitters and Drainlayers Board of the change of address.

_____

(1 mark)

(ii) State the penalty that may be imposed if the requirement in (i) is not met.

_____

(1 mark)

(b) A certifying drainlayer has employed a trainee who now holds a limited certificate.

State the minimum period of time must the trainee work in the presence of the certifying drainlayer.

_____

(1 mark)

(c) (i) Explain the purpose of approved codes of practice.

_____

(1 mark)

(ii) State why following the recommendations of codes of practice is beneficial if an incident were to occur.

_____

(1 mark)

Total 5 marks

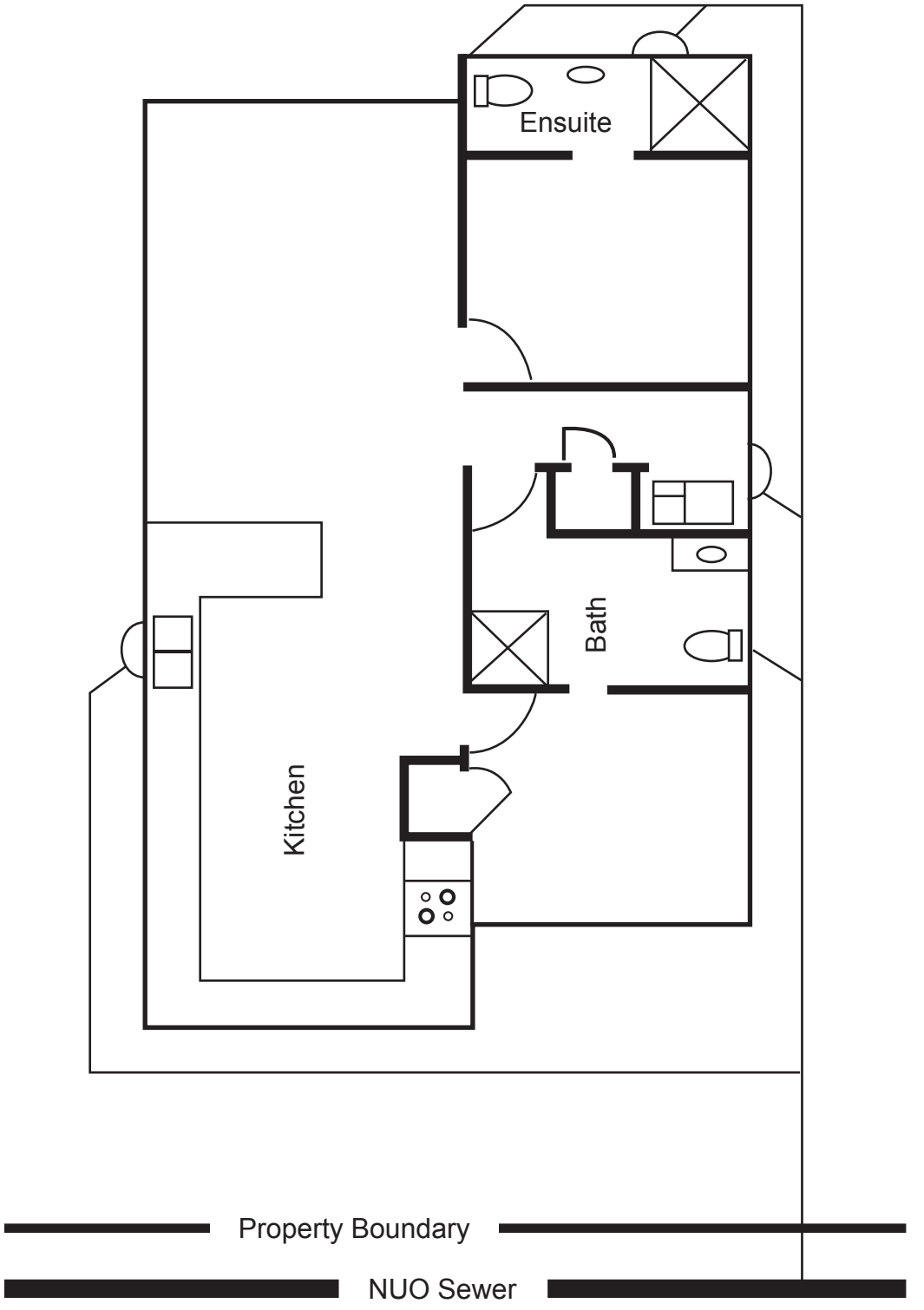
QUESTION 5

The plan below shows part of the foul water drainage system for a dwelling installed to comply with the minimum requirements of New Zealand Building Code clause G13/AS2 Foul Water.

The plan has been drawn to a scale of 1:50

(a) Complete the plan to show the vent pipework and the locations of inspection openings for the system.

(2 marks)



QUESTION 5 (cont'd)

(b) Complete the table below to show the quantity of the listed items that are required to complete the installation.

Allow for an extra 20% of pipe for wastage.

Items	Quantities
Inspection junctions	
Inspection bends	
Plain junctions	
Plain bends	
Length of pipe (m) including wastage allowance	

(3 marks)

Total 5 marks

QUESTION 6

(a) Sketch and label a diagram of a Type 1 surface water sump. Include relevant measurements on your diagram.

(7 marks)

(b) Give TWO differences between a Type 1 surface water sump and a Type 2 surface water sump.

(2 marks)

Total 9 marks

QUESTION 7

Surcharge from a surface water drain has entered a building during normal rainfall.

Give THREE checks that should be carried out before taking remedial action.

1 _____

2 _____

3 _____

Total 2 marks

QUESTION 8

(a) Name the test used to determine the suitability of an area to be used for the installation of a soak pit.

_____

(1 mark)

(b) Describe how the test in (a) is performed.

_____

_____

_____

(3 marks)

Total 4 marks

QUESTION 9

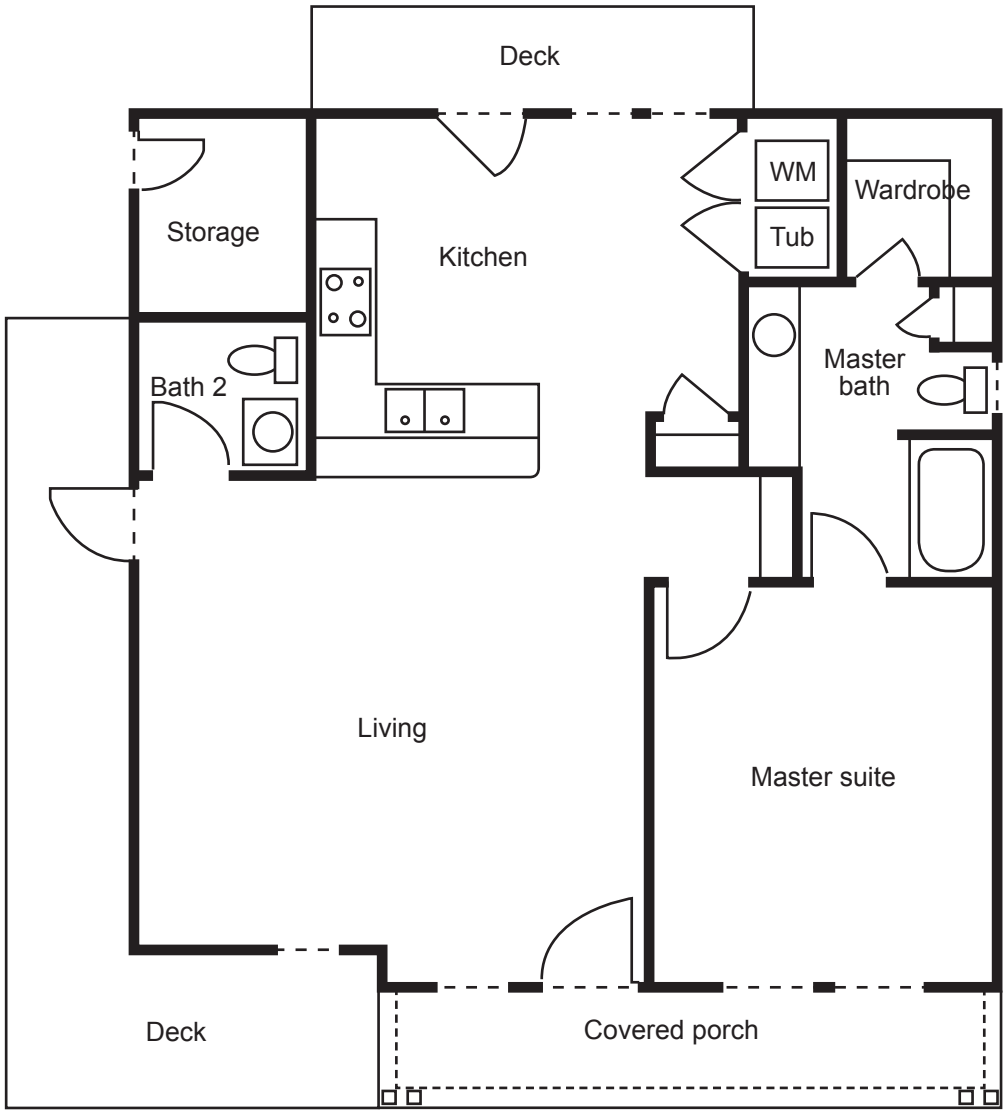
The plan below shows the layout of sanitary fixtures for a new dwelling and a connection point to the Network Utility Operators (NUO) sewer connection point (X). The plan has been drawn to a scale of 1:100

(a) Complete the diagram to show the foul water drains required to convey the waste to the NUO connection point. The system is to comply with the minimum requirements of New Zealand Building Code Clause G13/AS2 Foul Water.

(b) Label the diagram to indicate the location of any necessary inspection openings.

X

NUO Sewer



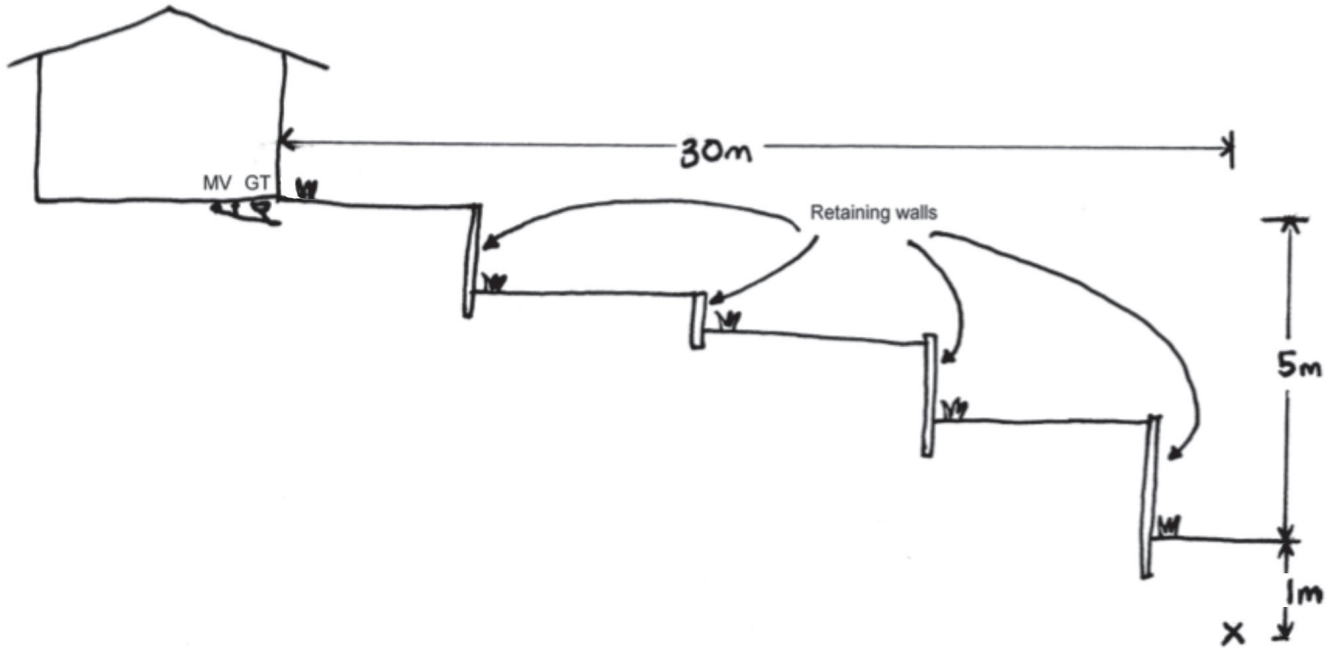
Total 10 marks

QUESTION 10

The diagram below shows a dwelling built at the top of a steep section. The section has had retaining walls installed.

Sketch a design showing the foul water drain connecting the gully trap (GT) outlet to the Network Utility Operator's connection point (X). Also show any inspection and support requirements.

The completed installation is to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.



Total 10 marks

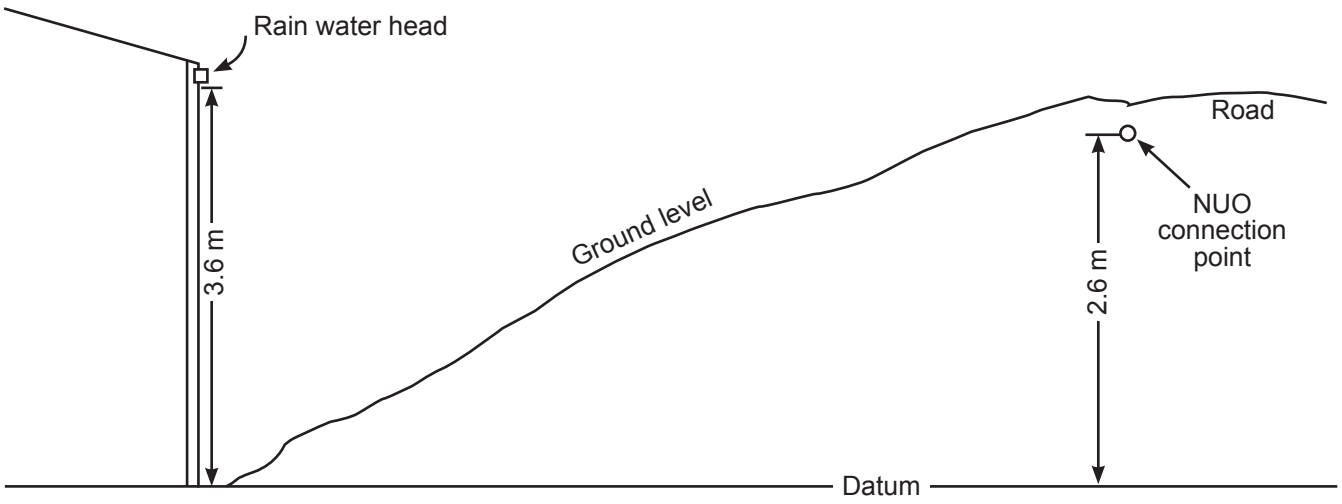
QUESTION 11

The diagram below shows a side elevation of a section which includes a storage shed. There is no electrical power on the site.

The plan also includes a connection to the Network Utility Operator's (NUO) surface water sewer as shown.

Complete the diagram to show the completed surface water drainage system for the site.

Label your drawing to show all necessary requirements for the design to comply with New Zealand Building Code clause E1 Surface Water.



Total 6 marks

QUESTION 12

(a) A building foundation extends 1.2 metres below the finished ground level adjacent to the building.

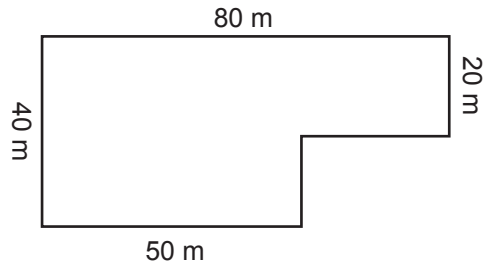
A foul water trench is to be excavated to a depth of 1.9 metres below the finished ground level and will be inspected and backfilled the following day.

Determine the minimum allowable horizontal separation distance between the buildings foundation and the base of the trench in accordance with the New Zealand Building Code clause G13/AS2 Foul Water.

(2 marks)

(b) The diagram below shows a proposed paved area to be laid on a flat section.

The location of the section has an ARI 10 years (AEP 10%) of 35 mm/hr.



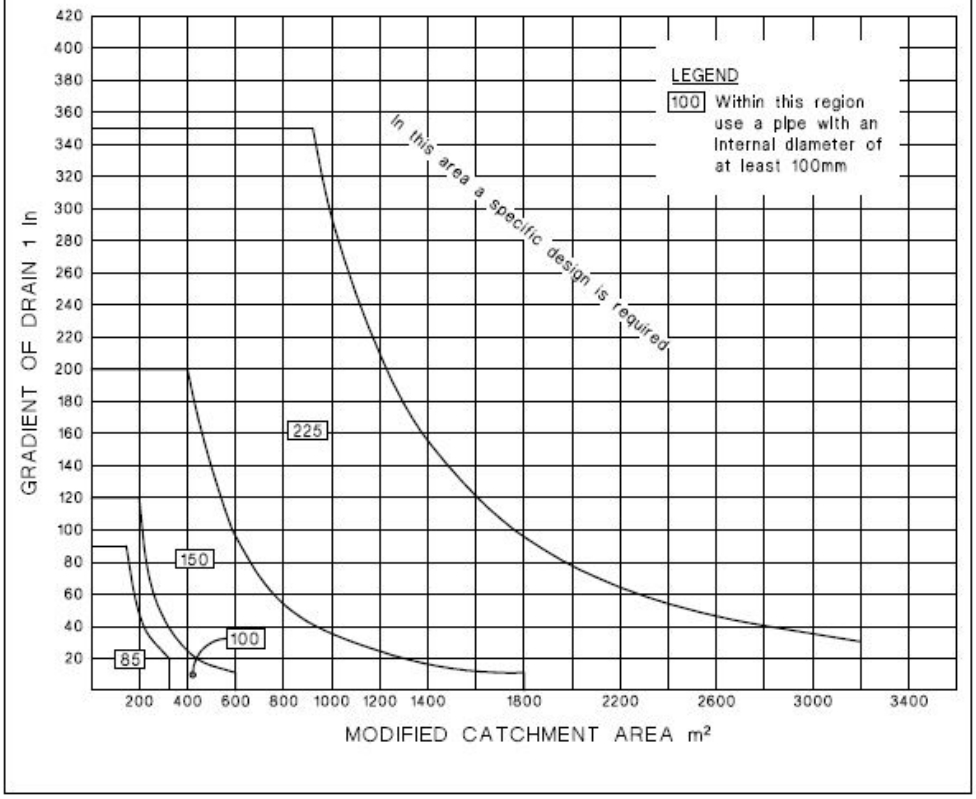
Using the graph on the page opposite, determine the required size and gradient for the surface water drain. Show all working.

(4 marks)

Total 6 marks

QUESTION 12 (cont'd)

Figure 3: **Sizing of Surface Water Drains**
Paragraphs 3.2.2 and 3.2.3



QUESTION 13

An open water course through a property is to be piped.

Six hazards have been identified for the site and listed on the hazard register as shown below.

Complete the register by giving a management solution for each hazard and indicating if the solution eliminates, isolates or minimises the hazard.

Hazard Register		
Hazard	Management solution	Eliminates, Isolates, Minimises
Digger in use		
Lifting heavy items		
Noise		
Trench collapse		
Falling from height		
Flowing water		

Total 6 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. Which of the following excavations is classified as notifiable work?

   A A trench which is 1200 mm deep and 1000 mm wide.

   B A trench which is 1200 mm deep and 1500 mm wide.

   C A trench which is 1200 mm deep and 1750 mm wide.

   D A trench which is 1500 mm deep and 1000 mm wide.

   E A trench which is 1500 mm deep and 1750 mm wide.

   ☐

2. Which of the following must receive a completed notifiable work form before such work is started?

   A The local territorial authority.

   B WorkSafe New Zealand.

   C The Plumbers, Gasfitters and Drainlayers Board.

   D The Health and Safety Representative for the site.

   E The Regional Health and Safety inspector.

   ☐

3. How much notice (time) must be given before notifiable work is to be carried out?

   A 24 hours.

   B 48 hours.

   C 72 hours.

   D 5 working days.

   E 10 working days.

   ☐

4. Which of the following accident categories must be recorded AND requires the appropriate agency to be notified?

   A Near misses.

   B Accidents which do not require any first aid or other medical attention.

   C Accidents which require basic first aid only.

   D Accidents resulting in serious harm.

   E All of the above.

   ☐

5. Under which of the following circumstances can an employee choose not to wear the PPE gear supplied?

   A When the ambient temperature is above 32°C.

   B When the total weight of the PPE gear exceeds 16 kg.

   C When the employee provides his/her own suitable PPE gear.

   D When it is agreed the PPE gear makes a task more difficult to complete.

   E When the employee signs a waiver safeguarding the employer from prosecution if an injury should occur.

   ☐

6. The sides of a trench have been cut back to a safe slope.

   What is the minimum distance from the top edge of the trench any vehicles should be permitted to drive?

   A 600 mm.

   B 750 mm.

   C 800 mm.

   D 900 mm.

   E 1000 mm.

   ☐

7. Which of the following is considered grey water?

   A Effluent discharged for an aerated sewage treatment system.

   B Discharge from waste water fixtures.

   C Discharge from soil fixtures.

   D Surface water collected for non-potable use (e.g. watering gardens).

   E Untreated surface water, before treatment and use as potable water supply.

   ☐

8. Which of the following effluent disposal options is NOT suitable for use with a septic tank treatment system?

A Gravity soakage trenches.

B Soak pit system.

C Sand (Wisconsin) mounds.

D Low pressure (dose loading) effluent distribution.

E Drip line irrigation system.

☐

9. Which of the following is needed to calculate the required capacity of a grease trap receiving the discharge from a restaurant?

A The diameter of the main drain receiving discharge from the restaurant.

B The capacity of all sinks and tubs and wash hand basins in the restaurant.

C The size of the restaurant floor space, including the kitchen area in square meters.

D The total number of discharge units of fixtures discharging into the grease trap.

E The number of seats provided for customers in the restaurant.

☐

10. An electrical supply cable has been laid in the ground with mechanical protection and marked with orange marker tape.

How close to the electrical cable is an underground drain permitted to be installed?

A 100 mm.

B 200 mm.

C 300 mm.

D 500 mm.

E 600 mm.

☐

Total 10 marks ☐

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
Section B		
Total		