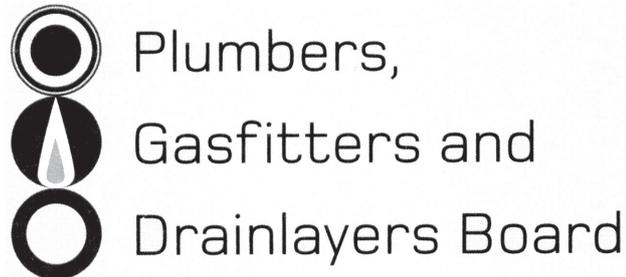


Affix label with Candidate Code
Number here.
If no label, enter candidate
Number if known

.....

No. 9198



REGISTRATION EXAMINATION, JUNE 2016

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 22–25 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 2016 were provided with the following documents:

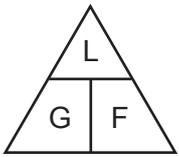
- New Zealand Building Code Clause E1 – Surface Water
- AS/NZS 3500 Part 2: Sanitary plumbing and drainage

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

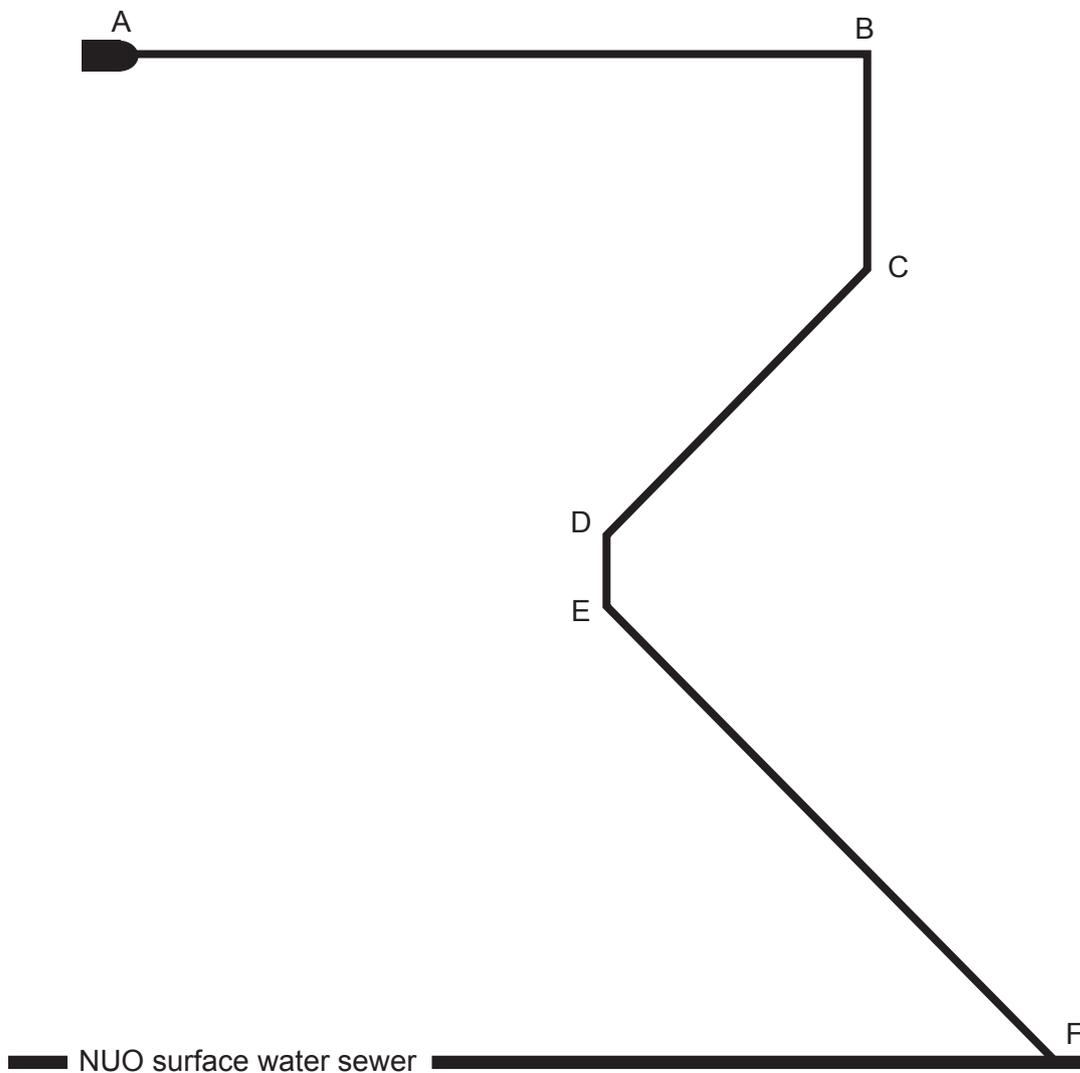
The diagram below shows the layout of a surface water drain from the discharge point at the location marked A to the Network Utility Operator (NUO) sewer connection at the location marked F.

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

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

Complete the diagram to show the required locations for the inspection or rodding points required.

The completed drawing is to comply with the minimum requirements of New Zealand Building Code clause E1/AS1.



Total 7 marks

QUESTION 2

Work is to be completed on a foul water drain access chamber.

- (a) Give FIVE safety or environmental factors that should be checked before starting work in an access chamber.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks)

- (b) The work has been identified as notifiable.

- (i) Name the agency that must be notified before work commences.

(1 mark)

- (ii) State the amount of notice (time) that must be given to the agency before notifiable work is carried out.

(1 mark)

QUESTION 2 (cont'd)

(c) Complete the table below by indicating which of the following situations are notifiable work and which are not.

| | Notifiable work Yes/No |
|--|---------------------------|
| Working in a trench that is 1.8 metres deep and 1.5 metres wide | |
| Replacing worn asbestos sewer pipe work | |
| Working in a trench 1.6 metres deep where the excavated face has been cut back to a 60° angle. | |
| Using explosives to break up rock | |

(2 marks)

Total 9 marks

QUESTION 3

(a) Name FOUR service providers that should be contacted to confirm that there are no underground services located in the area of a proposed excavation.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(2 marks)

(b) Give THREE instances when an excavation must be examined by an employer or an employer's representative.

- 1 _____
- 2 _____
- 3 _____

(3 marks)

(c) State the minimum trench width when installing a foul water drain with a diameter of 110 mm.

(1 mark)

Total 6 marks

QUESTION 4

Answer the following in accordance with AS/NZS 3500.

(a) Give the meaning of the term rising main.

(1 mark)

(b) A rising main is being used to convey foul water.

Give the test criteria that must be met when proving the main is free from leaks.

(2 marks)

(c) State TWO permitted locations to which a foul water rising main is allowed to discharge.

1 _____

2 _____

(2 marks)

Total 5 marks

QUESTION 5

(a) Give the meaning of the term sullage tank.

(1 mark)

(b) Give a situation in which a sullage tank would be required

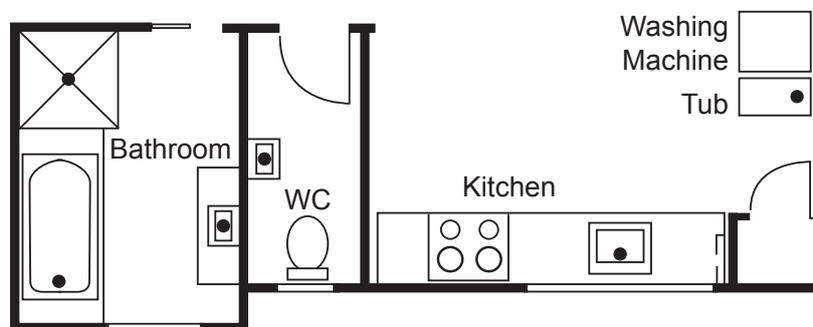
(1 mark)

(c) The plan below shows the layout of sanitary fixtures in a dwelling.

(i) Complete the plan to show the foul water drains including a sullage tank and a septic tank.

Show the locations of any required inspection points and vents on your drawing.

The installation is to comply with the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage.



(10 marks)

QUESTION 5 (cont'd)

- (ii) Six people are to live in the dwelling. The dwelling has a bore water supply and standard facilities.

The Design Loading Rate (DLR) for the soil in the area is 35 mm/day.

The effluent trenches will be 900 mm wide.

| Recommended capacities for septic tanks (in litres) | | | | |
|---|---------|---------|----------|--------|
| 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 |

| Waste water Flow allowance 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 |

Using the tables above, determine the required capacity for the septic tank.

(1 mark)

- (iii) Calculate the length of trenching required for the effluent field to dispose of the waste produced by the six dwelling occupants.

(2 marks)

Total 15 marks

QUESTION 6

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, and is to be economical.

- (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 a Type 2 water sump
 - the minimum allowable size for the main drain from the boundary to the surface water outfall.

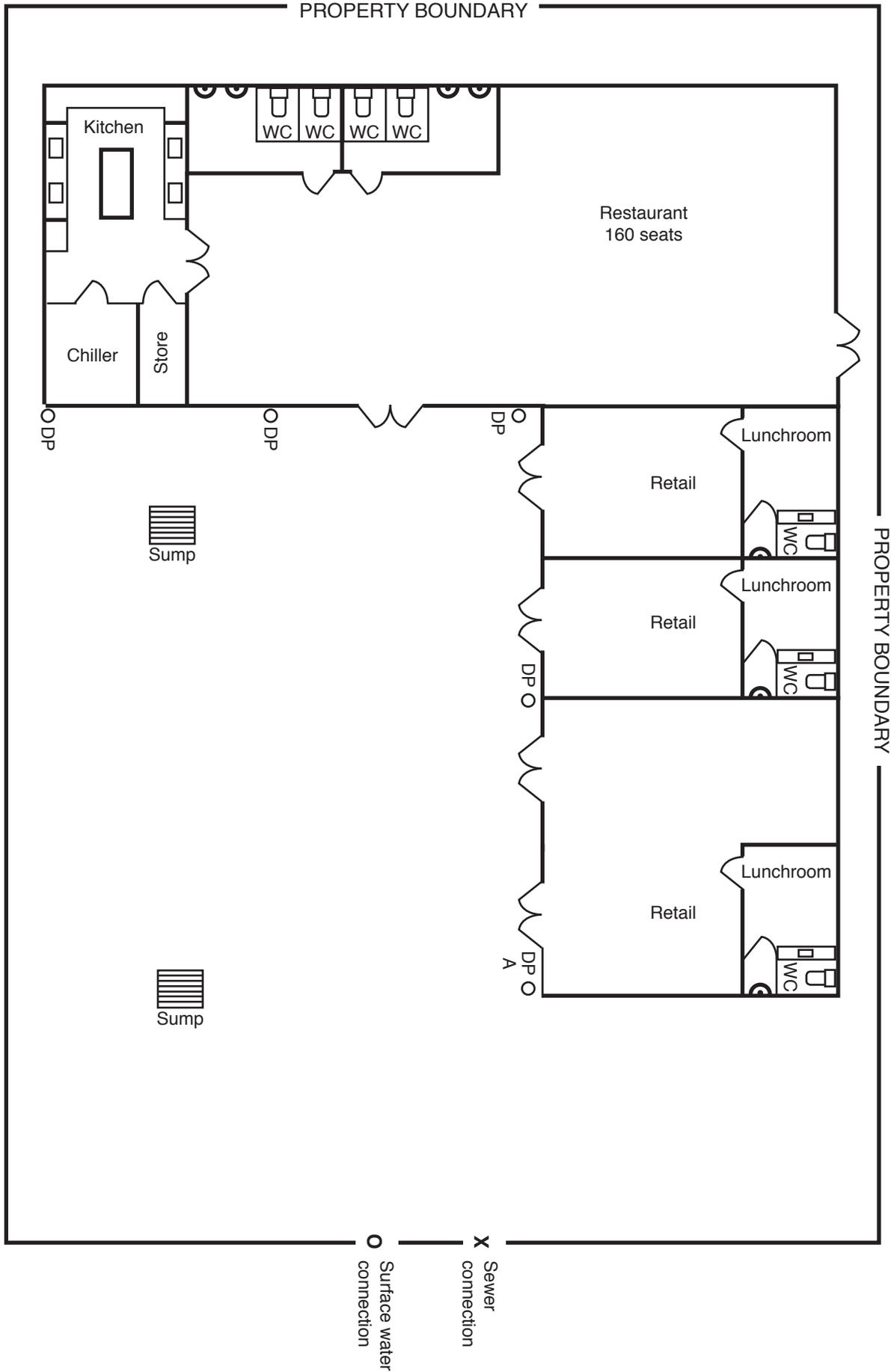
(13 marks)

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

(1 mark)

Total 14 marks

QUESTION 6 (cont'd)



QUESTION 7

The site plan opposite shows the location of a 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 37 mm/h.

The downpipes are to discharge into a soak pit. Each soak pit will have a diameter of 900 mm and will be able to accommodate 5 m³ of rainwater.

- (a) The 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.

(3 marks)

- (b) Calculate the number of soak pits required to accommodate the expected rain water, and show on the site plan the most economical locations for the soak pits that will be accepted by the local territorial authority.

(8 marks)

Total 11 marks

QUESTION 8

- (a) State the minimum allowable gradient for an 80 mm foul water drain that is installed to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

(1 mark)

- (b) The minimum amount of fall required by AS/NZS 3500 Part 2 Sanitary plumbing and drainage is not available for a foul water drain, and so the drain is to be installed at a reduced gradient.

State THREE factors that must be taken into account when designing the drainage system.

1 _____

2 _____

3 _____

(3 marks)

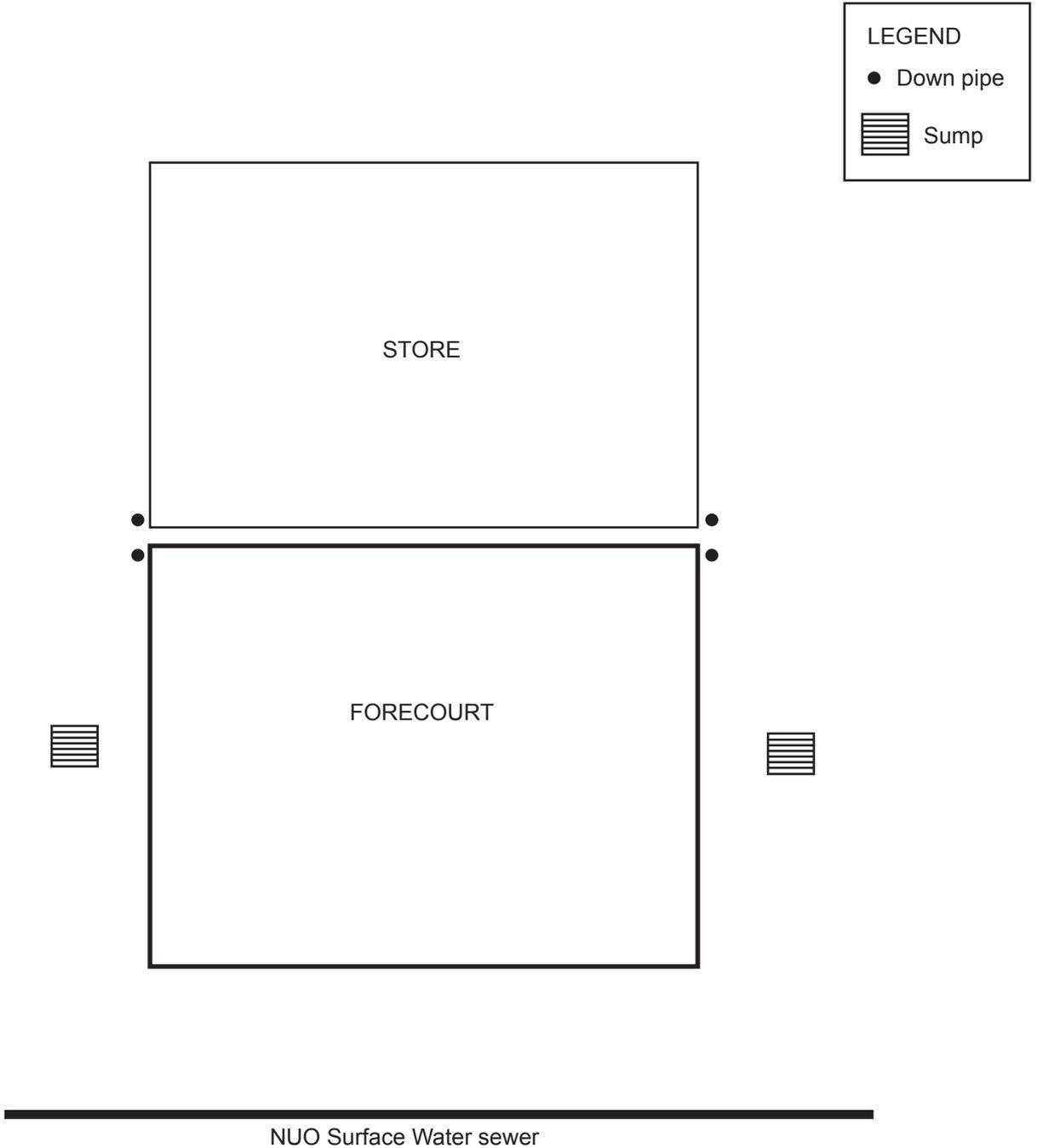
Total 4 marks

QUESTION 9

The diagram below shows a petrol station store and forecourt.

Complete the diagram to show the required surface water drains to convey rain water to the network utility operator's surface water sewer.

Label all components.

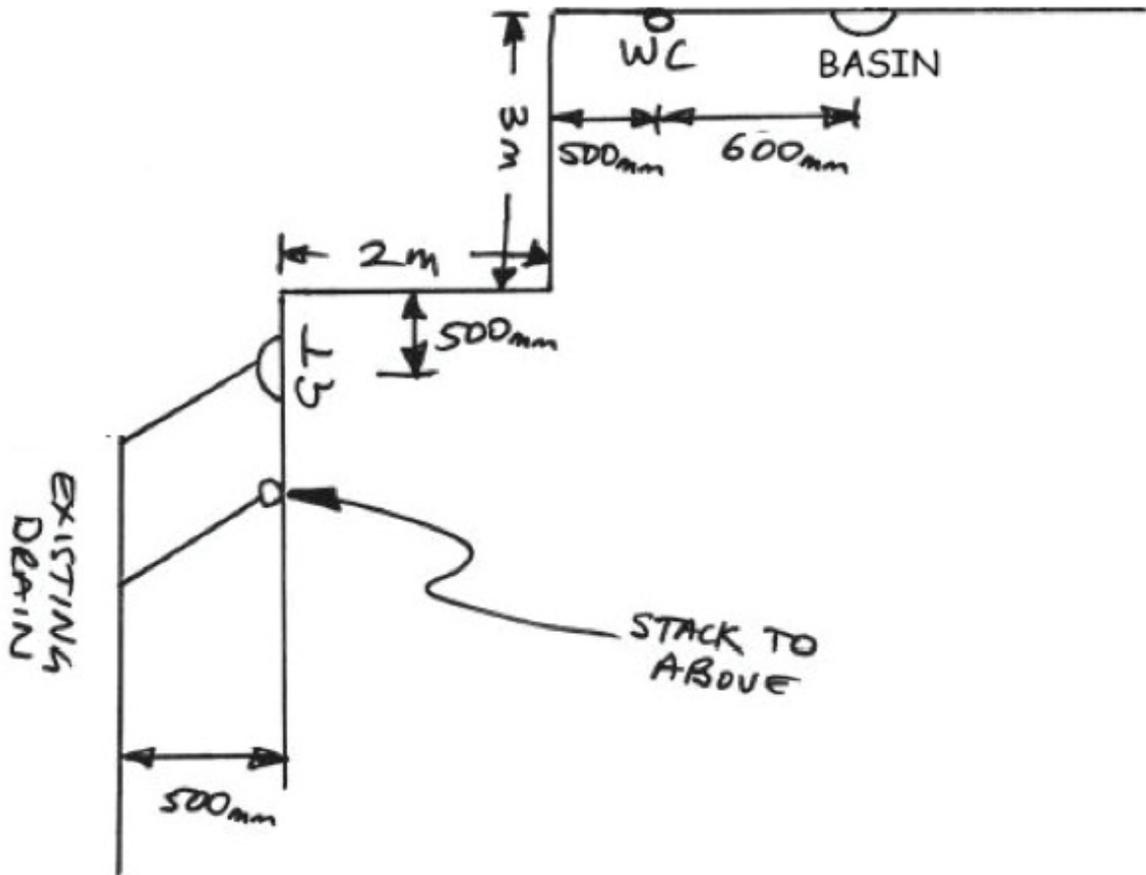


Total 3 marks

QUESTION 10

A home owner has provided the sketch below showing part of the existing foul water drain and the proposed location of a new WC pan and basin in a dwelling. The dwelling has a concrete pad foundation.

On the opposite page, draw a diagram to a scale of 1:50 showing the additional foul water drainage pipework required for the property to obtain a certificate of compliance.



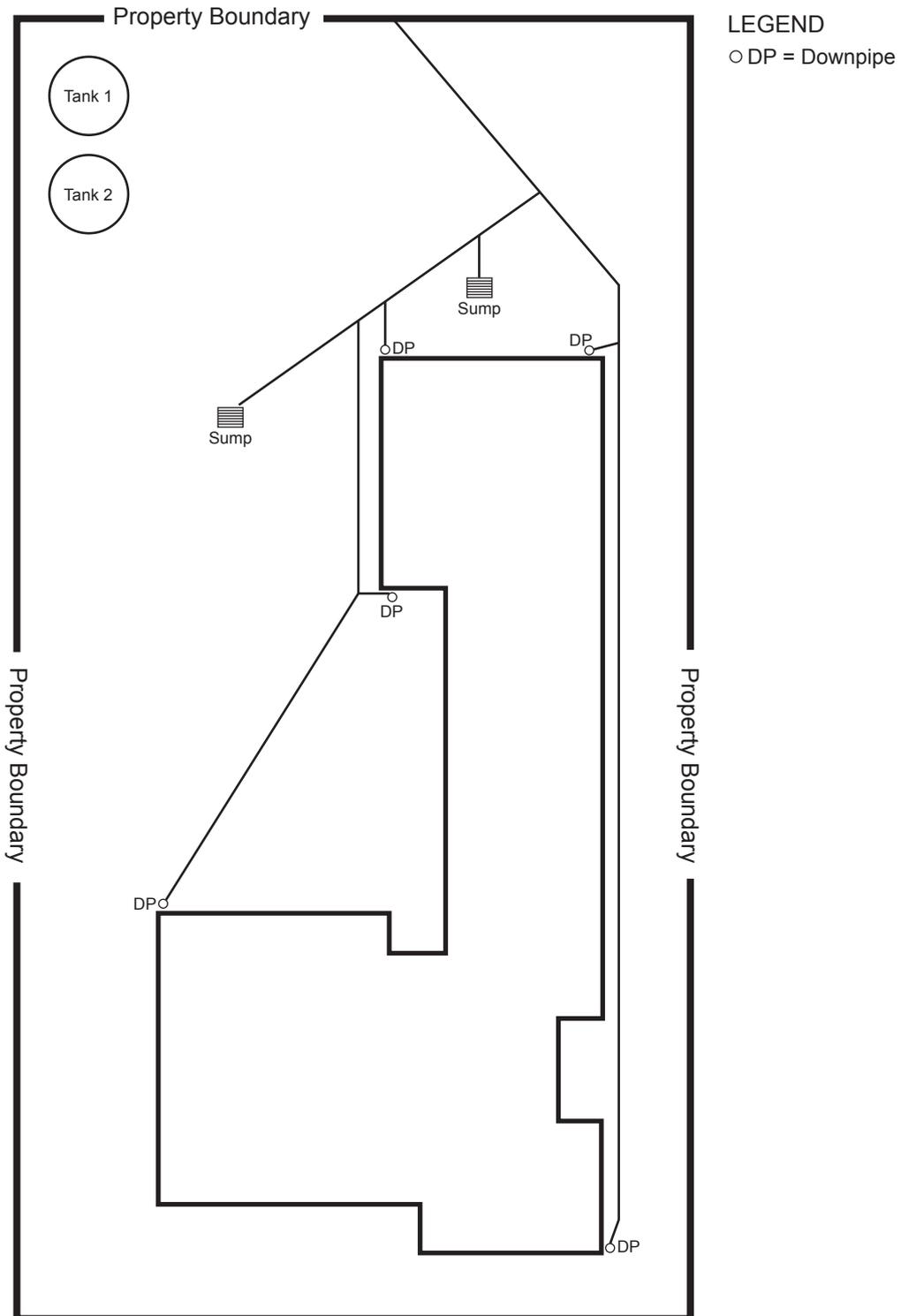
Total 6 marks

QUESTION 11

The drawing below shows the plan view of a dwelling and existing surface water drains.

Two water storage tanks have been installed at the locations shown to store surface water from the property.

Complete the drawing to show the changes required to the surface water drains.



Total 5 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. Which of the following best describes an Approved Code of Practice?

- A New Zealand Building Code clause.
- B New Zealand Building Code approved alternative solution.
- C Mandatory solution for complying with the Health and Safety in Employment Act.
- D Normative set of rules which must be followed.
- E Statements of preferred work practice or arrangements.

2. Which of the following is NOT an acceptable reason to disturb the scene of an accident that has resulted in serious harm?

- A To recover plant and equipment from the site.
- B To save a life.
- C To prevent suffering of an injured person.
- D To maintain public access to services (e.g. gas and electricity).
- E To prevent serious damage to property.

3. What is meant by the term surcharge loads in relation to shoring a trench?

- A The amount of ground water in the area of the trench.
- B Slippage of soil along bedding planes applying extra forces on the shoring.
- C Extra weight from soil or vehicles near the edge of the trench.
- D The removal of ground water via well-pointing changing the structure of the soil.
- E Building foundations within 1 m of a trench.

4. 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 stormwater from the property to discharge to a curb and channel.
 - E To show the as-laid location of the drainage system on the certificate of title.

5. Which of the following is true for a drain to be suitable for relining?
- A The drain must have no bends.
 - B The drain must be at least 150 mm in diameter.
 - C The drain must not be collapsed.
 - D The drain must be made from earthenware pipe.
 - E The drain must be fully uncovered.

6. Which of the following cannot be disposed of at a clean fill landfill site?
- A Soil.
 - B Concrete.
 - C Earthenware pipe.
 - D Cesspit/stormwater sump cleanings.
 - E Gravel.

7. A new drain is to be connected to the network utility operator's sewer. As the trench is being excavated, a line of purple paint is discovered on the ground.

What service is likely to be buried below the purple line?

- A Electrical.
- B Gas.
- C Surface water.
- D Water.
- E Telecommunications.

8. A house is connected to a septic tank. A foul water sewer is being extended up the street past this house.

At what distance of the house from the sewer does connecting the house to the sewer become compulsory?

- A 20 m.
- B 30 m.
- C 40 m.
- D 50 m.
- E 60 m.

9. 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.

10. 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.

11. 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 6.0 m.

12. Why is there a maximum allowable distance between a gully dish and a 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.

13. 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 70 mm.
- B 175 mm.
- C 280 mm.
- D 1.75 m.
- E 2.8 m.

14. 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%).

C 1:40 (2.50%).

D 1:30 (3.35%).

E 1:20 (5.00%).

15. 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 150 mm

B 960 mm.

C 1.50 m.

D 6.66 m.

E 9.60 m.

Total 15 marks

For Examiner's use only

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