No. 9198

**Plumbers, Gasfitters and Drainlayers Board**

# REGISTRATION EXAMINATION, NOVEMBER 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 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 November 2013 were provided with the following documents:
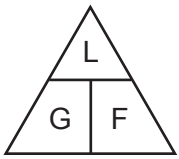
- New Zealand Building Code Clause E1 Surface Water

- Guide for Safety with Underground Services

- Health and Safety in Employment Act

# USEFUL FORMULAE

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

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

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

length = L
gradient = 1:G
fall = F

# SECTION A

**QUESTION 1**

(a)  Define secondary flow as it applies to drainlaying.

_____

_____

(1 mark)

(b)  List the FOUR items of information that are required to determine if a secondary flow
path exists.

1  _____

2  _____

3  _____

4  _____

(4 marks)

**Total 5 marks**

## QUESTION 2

The plan below shows the proposed layout for 150 mm diameter surface water pipework under a flat sealed area. The plan is not drawn to scale.

The invert depth at the surface water connection point X is 1.5 metres.

The pipework is to comply with the minimum requirements of New Zealand Building Code Clause E1/AS1 Surface Water.



Plan not to scale
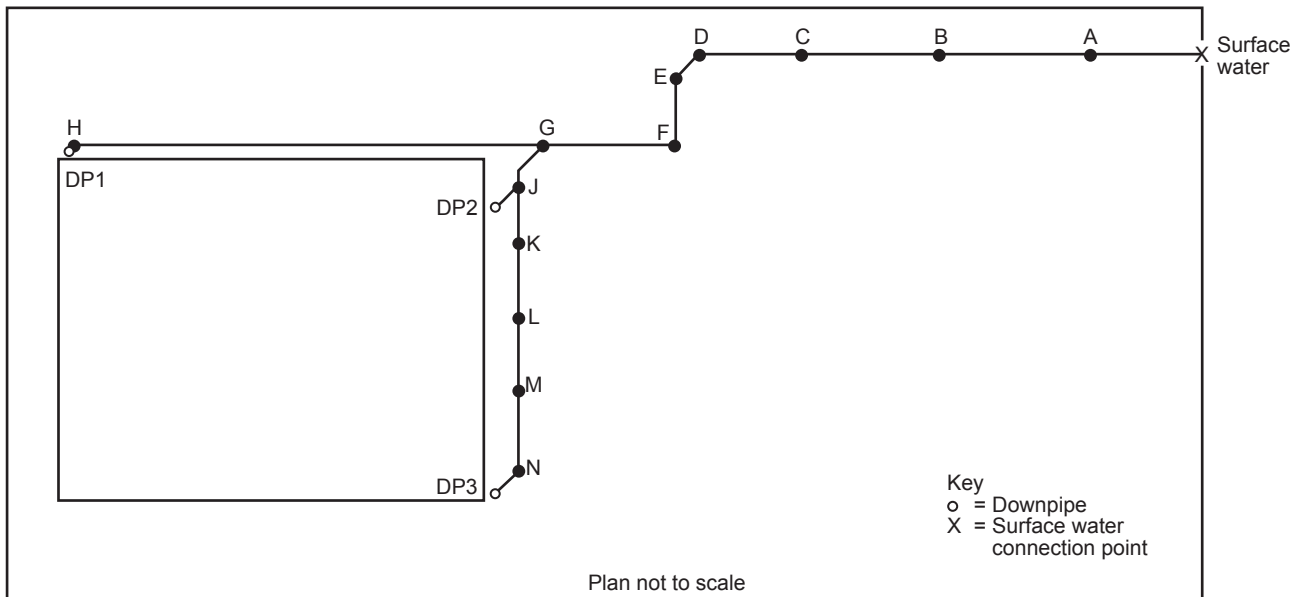
| Section | Distance (m) | Gradient |
|---------|--------------|----------|
| X – A | 25 | 1:200 |
| A – B | 25 | 1:200 |
| B – C | 25 | 1:200 |
| C – D | 15 | 1:200 |
| D - E | 10 | 1:120 |
| E – F | 12 | 1:120 |
| F – G | 15 | 1:120 |
| G – H | 30 | 1:200 |
| H – DP1 | 1 | 1:200 |

| Section | Distance (m) | Gradient |
|---------|--------------|----------|
| G – J | 4 | 1:200 |
| J – DP2 | 2 | 1:200 |
| J – K | 10 | 1:200 |
| K – L | 20 | 1:120 |
| L – M | 20 | 1:120 |
| M – N | 10 | 1:120 |
| N – DP3 | 3 | 1:200 |

**QUESTION 2 (cont'd)**

(a) Using the information in the tables on page 2, circle the type of access required for each of the points listed.

| Point | Access Type Required | | |
|:-----:|:----:|:----:|:----:|
| X | None | Rodding point | Chamber |
| A | None | Rodding point | Chamber |
| B | None | Rodding point | Chamber |
| C | None | Rodding point | Chamber |
| D | None | Rodding point | Chamber |
| E | None | Rodding point | Chamber |
| F | None | Rodding point | Chamber |
| G | None | Rodding point | Chamber |
| H | None | Rodding point | Chamber |
| J | None | Rodding point | Chamber |
| K | None | Rodding point | Chamber |
| L | None | Rodding point | Chamber |
| M | None | Rodding point | Chamber |
| N | None | Rodding point | Chamber |

(7 marks)

(b) Name the point shown on the plan at which an access chamber must be installed.

_____

(1 mark)

**Total 8 marks**

**QUESTION 3**

(a) Explain why the surface water run-off co-efficient is affected by the gradient of a site.

_____

_____

(2 marks)

(b) Calculate the corrected run-off coefficient for a sealed driveway that has a slope of 15%.

_____

_____

(1 mark)

**Total 3 marks**

**QUESTION 4**

(a)  The New Zealand Building Code Clause E1/VM1 Surface Water gives an acceptable method for the construction of a chamber soak pit, in which a layer of rocks must be included on the base of the soak pit.

State the purpose of this layer of rocks.

_____

_____

(1 mark)

(b)  Give FOUR requirements that must be met in the construction of a sump designed to collect surface water.

1  _____

2  _____

3  _____

4  _____

(2 marks)

**Total 3 marks**

**QUESTION 5**

50 metres (including the test riser) of 250 mm diameter surface water pipe have been installed. The pipe is to be water tested for leaks.

Calculate in litres the maximum amount of water the pipe is permitted to lose before it fails the water tightness test described in New Zealand Building Code E1/AS1 Surface Water.
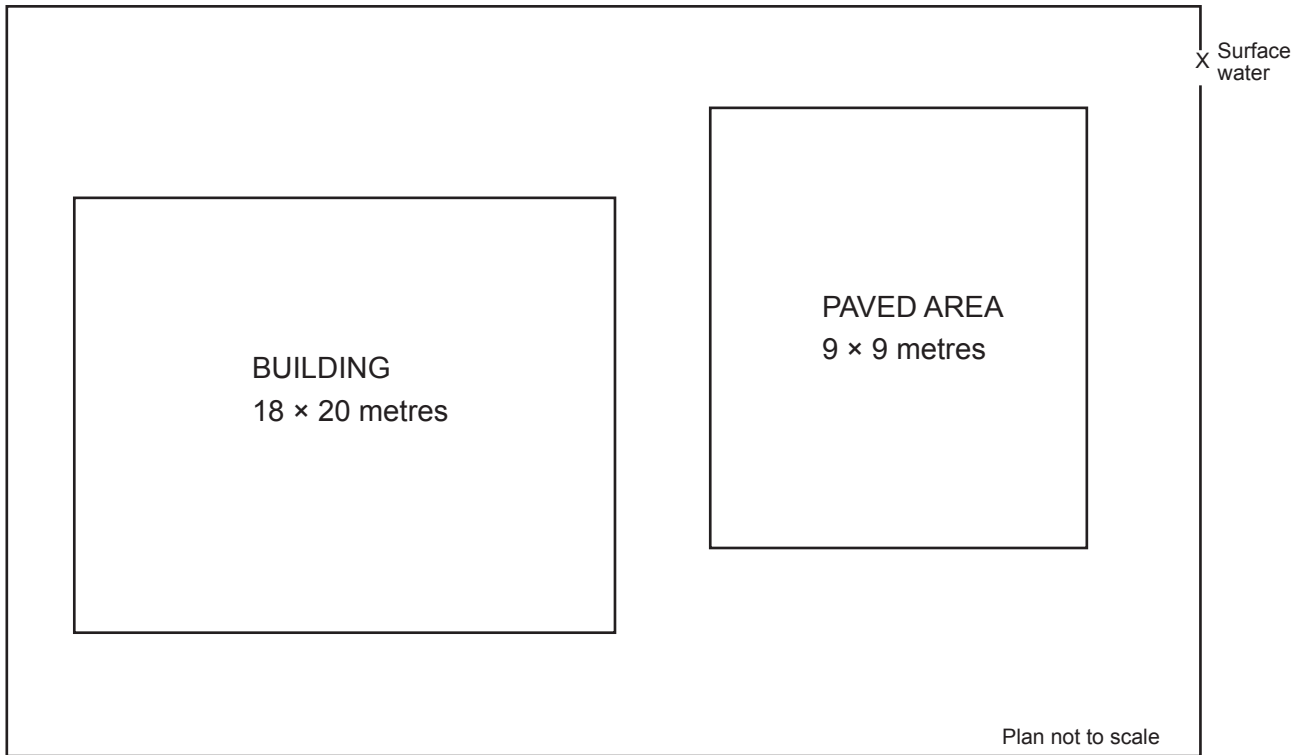
_____

_____

**Total 3 marks**

## QUESTION 6

The plan below shows the layout for a site in Timaru. The plan is not drawn to scale.



X Surface water

BUILDING
18 × 20 metres

PAVED AREA
9 × 9 metres

Plan not to scale

The surface water pipework will be laid at a gradient of 1:80

Using the information required and Figure 3 from New Zealand Building Code Clause E1/AS1 Surface Water, determine the acceptable diameter for the surface water pipework at the outfall marked X. Show all working.

_____

_____

_____

_____

_____

_____

**Total 4 marks**

**QUESTION 7**

The diagram below shows the foul water drainage plan for an existing concrete floor dwelling.

The dwelling is undergoing renovations. A plan showing the proposed layout for the sanitary fixtures, walls and a deck has been supplied on the page opposite.

On the diagram on the opposite page, show the foul water pipework system to carry the waste to the network utility operator's connection point (X) that will be compatible with the current system. Identify clearly the parts of the existing drainage system that will be retained. Include in your revised plan the required locations for inspection openings.

Legend
MV: Main vent
GT: Gully trap

New raised deck
(450 mm above ground)

X

NUO Sewer
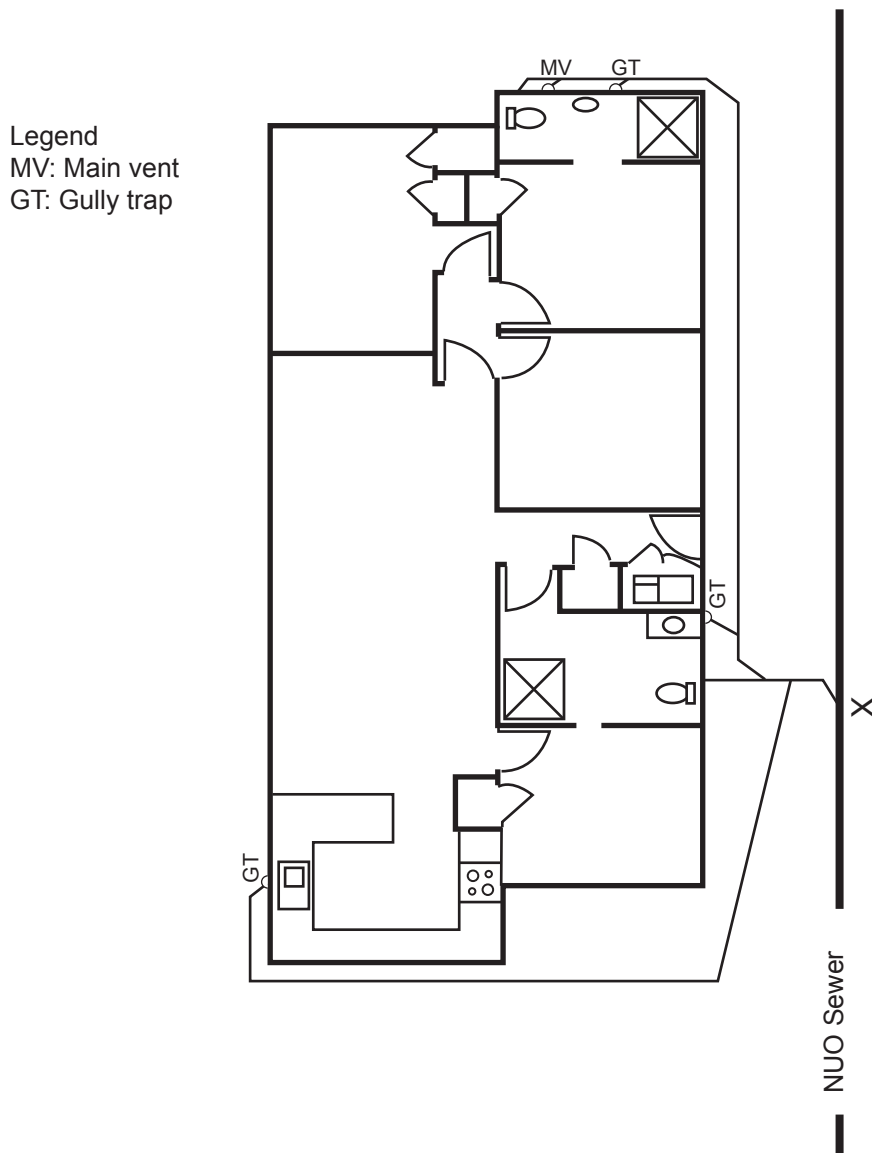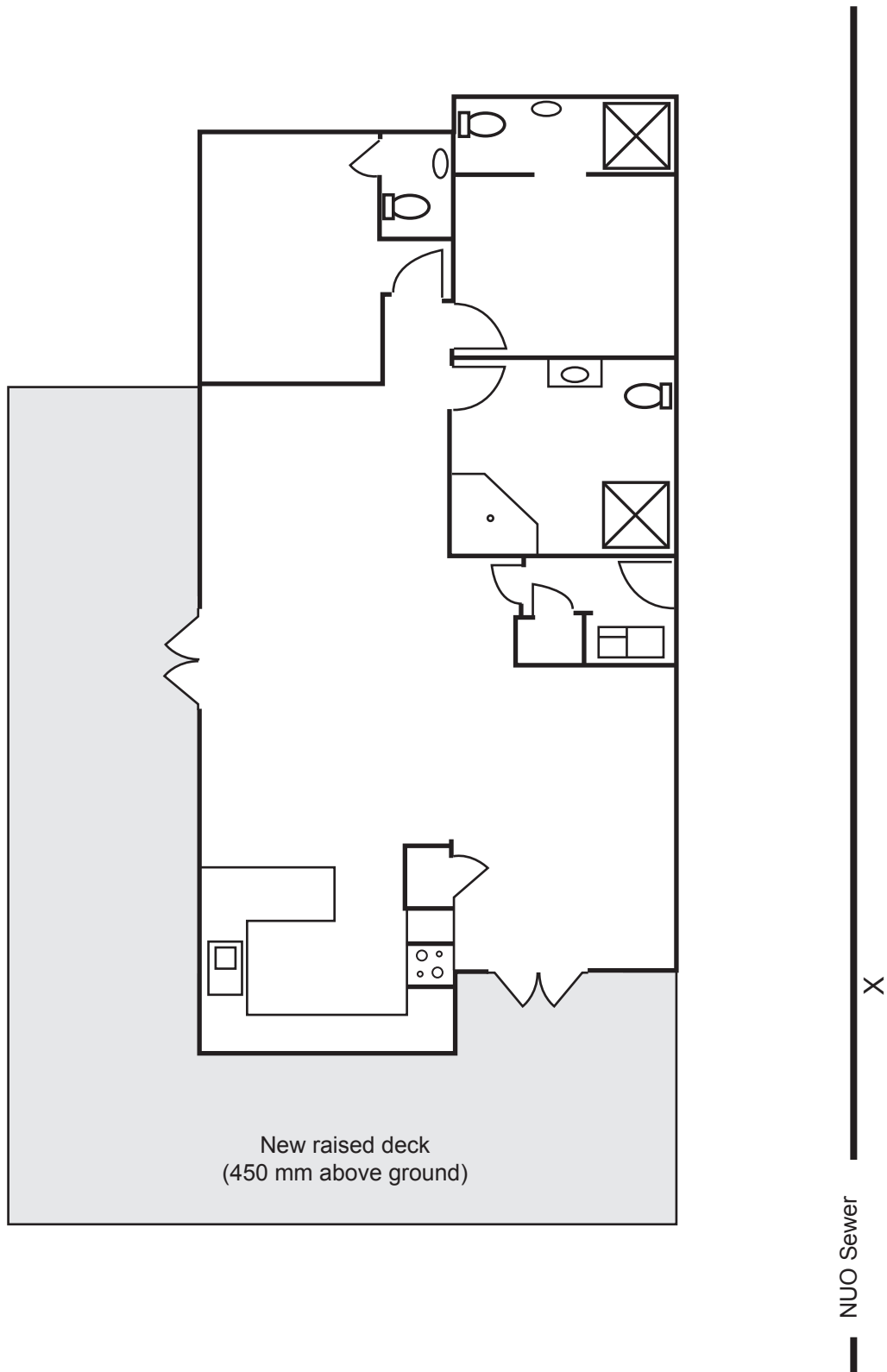
**Total 10 marks**

**QUESTION 8**

(a)  A dwelling has an on-site effluent disposal system.

Give FOUR changes that could be made within the dwelling to reduce the amount of effluent produced and therefore reduce the area required for the disposal of effluent.

1  _____

2  _____

3  _____

4  _____

(4 marks)

(b)  A dosing system is required to deliver effluent to the disposal field. Due to the location, there is no power supply available to run a pump dosing system.

Give TWO systems that can be used in this situation.

1  _____

2  _____

(2 marks)

(c)  A section of land is being considered as a location for an effluent disposal system.

Give SIX site assessment factors, excluding soil assessment, that will determine its suitability.

1  _____

2  _____

3  _____

4  _____

5  _____

6  _____

(6 marks)

**QUESTION 8 (cont'd)**

(d)   A house drain connected to an on-site sewage disposal system is overflowing at the gully dish.

Give FOUR different causes of this.

1   _____

2   _____

3   _____

4   _____

(2 marks) ☐

**Total 14 marks** ☐

## QUESTION 9

(a) Give the 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)

**Total 9 marks**

**QUESTION 10**

The Health and Safety in Employment Act states that, when an employee agrees, his/her health can be monitored.

(a)  For the employee to give informed consent for his/her health to be monitored, certain criteria must be met.

Give TWO of these criteria.

1  _____

_____

2  _____

_____

(2 marks)

(b)  Give TWO reasons for monitoring an employee's health.

1  _____

_____

2  _____

_____

(2 marks)

(c)  If an employee needs to have his/her health monitored, he/she should be given specific information.

Give FOUR of the pieces of information he/she needs to be given.

1  _____

2  _____

3  _____

4  _____

(4 marks)

**Total 8 marks**

**QUESTION 11**

Describe what is meant by each of the following terms as they relate to drainlaying.

(a)    Prohibited trade waste

_____

_____

(1 mark)

(b)    Conditionally acceptable trade waste

_____

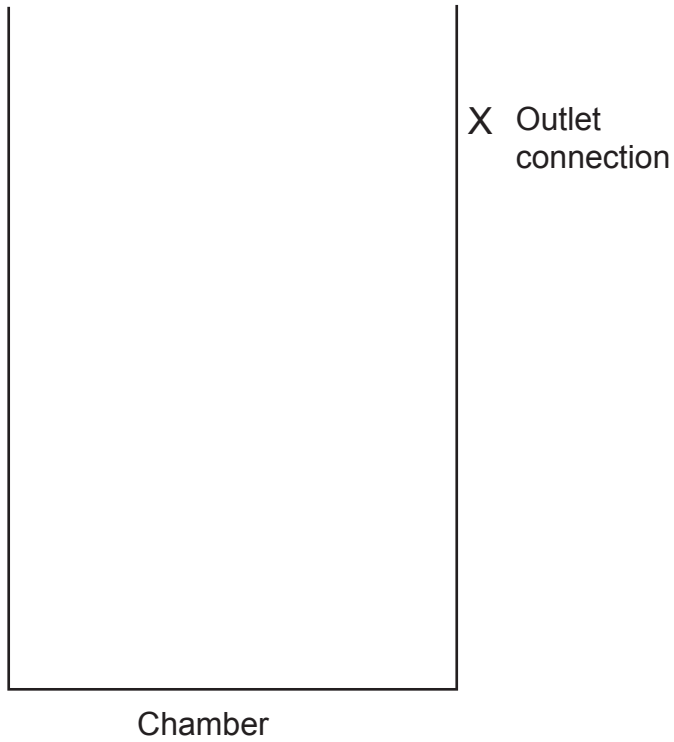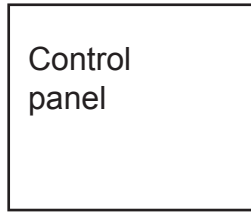_____

(1 mark)

(c)    Acceptable trade waste

_____

_____

(1 mark)

**Total 3 marks**

**QUESTION 12**

Complete the starter drawing to show the installation of a duplex pumping system, and label the required parts.

Control
panel

X Outlet
connection

Chamber

**Total 8 marks**

**QUESTION 13**

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 1:80, and the distances between the points are as shown in the table below.

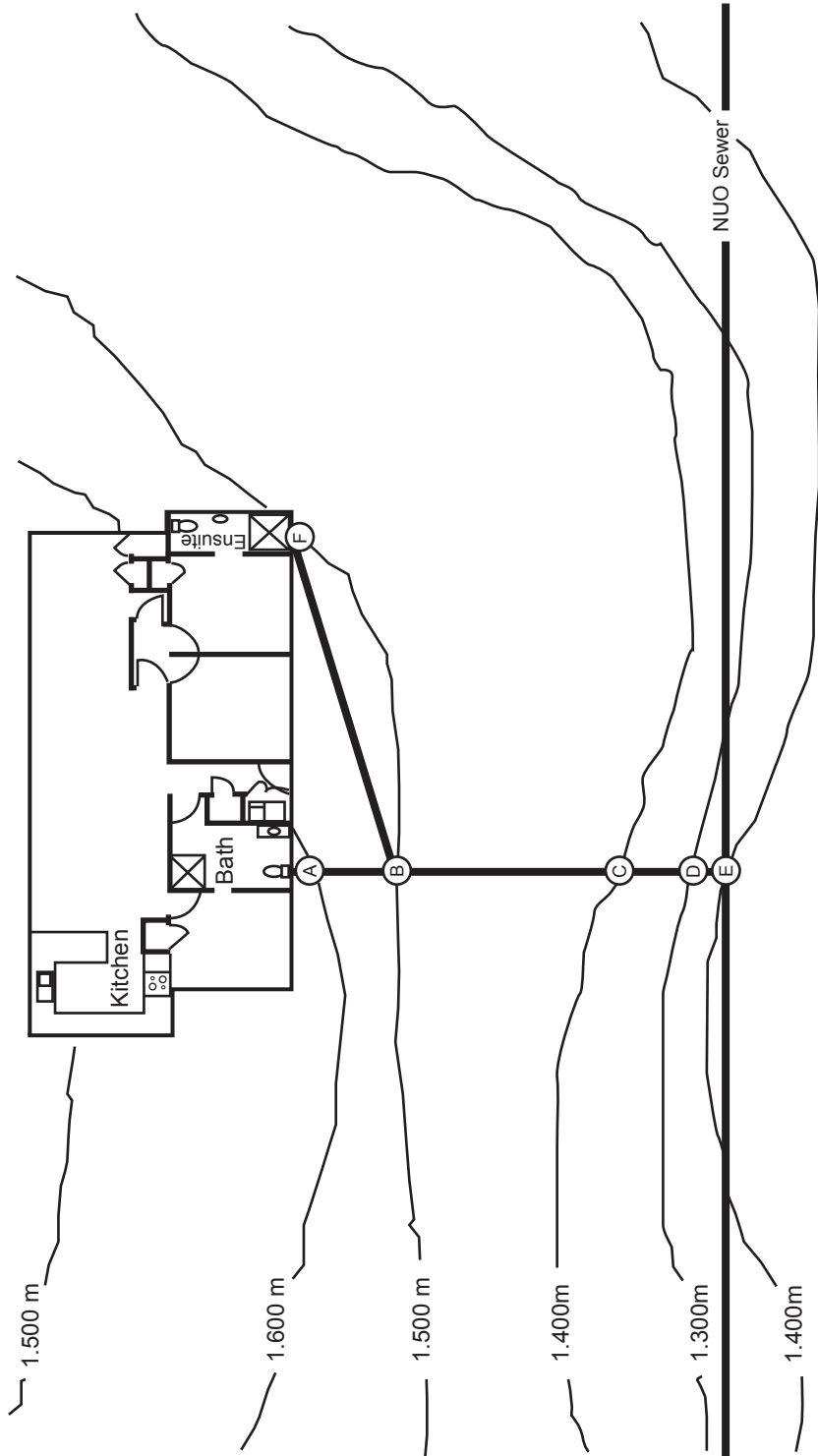| Length of pipe sections | |
|---|---|
| Pipe section | Distance |
| A – B | 2.4 metres |
| B – F | 6.0 metres |
| B – C | 6.5 metres |
| C – D | 1.9 metres |
| D – E | 0.8 metres |

The invert for the NUO's connection at E is 0.9 metres below ground level.

Complete the table below to show the depth below ground level to the invert of the drain at each point listed.

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

**Total 10 marks**

**QUESTION 14**

The starter drawing below shows the base of a power pole installed in the ground.

Complete the drawing to a scale of 1:100 to show the area around the pole that must not be excavated unless written permission from the owner of the pole is obtained.

Ground level

**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.  Drainlayer A has requested the assistance of a licensed drainlayer employed by Drainlayer B.

    Who is responsible for ensuring that the licensed drainlayer is capable of completing the proposed work safely?

    A    Drainlayer A.

    B    Drainlayer B.

    C    The licensed employee drainlayer.

    D    The Department of Labour.

    E    Occupational Safety and Health.

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

    For what length of time must the trainee 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.    Which type of underground service detector is most suitable for locating live electrical cables?

A    Radio frequency detectors.

B    Hum detectors.

C    Transmitter-receiver instruments.

D    Metal detectors.

E    Divining rods.

5.    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    Telecommunications.

D    Water.

E    Surface water.

6.    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.

7    How many litres capacity must a grease trap have when installed on the drain from
     a 90 seat restaurant?

     A    100

     B    180

     C    270

     D    360

     E    450



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

     A    1.0 metres.

     B    1.5 metres.

     C    2.0 metres.

     D    2.5 metres.

     E    3.0 metres.



                                                          **Total 8 marks**

For Examiner's use only

| Question number | Marks | Marks |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| Section B | | |
| Total | | |