

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

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No. 9197



Plumbers,
Gasfitters and
Drainlayers Board

REGISTRATION EXAMINATION, NOVEMBER 2007

DRAINLAYING

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, ask the Supervisor for extra sheets. Write your Candidate Code Number and the number 9197 on any extra sheets used, and attach them to this booklet. **NO SEPARATE ANSWER BOOKLET IS TO BE USED.** Write the number of extra sheets used in the box on the last page of this booklet. Write NIL if you have not used any.

All working in calculations must be shown.

Candidates are permitted to use the following in this examination:

Drawing instruments, approved calculators

The following are NOT permitted in the examination room:

Any publications, Acts, Regulations, Codes of Practice, or Standards

Check that this booklet has all of 18 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

QUESTION 1

(a) List FIVE specific requirements that must be met when laying a below-ground sanitary drainage system.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks)

(b) State the main purpose of a silt trap.

(2 marks)

(c) Trade waste is prohibited from entering the sewage system until it has been treated.

List THREE categories that prohibited trade waste may be classified under.

1 _____
2 _____
3 _____

(3 marks)

Total 10 marks

QUESTION 2

- (a) One of the purposes of a sewer gas interceptor trap is to prevent foreign objects from entering a sewer. State another purpose.

(1 mark)

- (b) Describe, in order, the effect on the discharge as it passes through a grease trap.

(3 marks)

- (c) Stormwater drains within and under buildings and main internal drains shall be tested.

- (i) State the maximum head to which a stormwater drain can be tested during a hydrostatic test.

- (ii) State the length of time for which the test should be maintained for any material other than vitrified clay.

- (iii) State what determines that the test has been successful.

(3 marks)

QUESTION 2 (cont'd)

(d) From your knowledge of AS/NZS3500: Part 2 Sanitary plumbing and drainage, state the MINIMUM size of the following drain vents.

(i) The upstream vent on any main drain.

(ii) The upstream vent on any branch drain.

(iii) The section of drain acting as a vent.

(3 marks)

Total 10 marks

QUESTION 3

When timber shoring is used as a means of supporting trench walls, struts, waling, sheeting material and props will be required.

(a) Define each of the following terms.

(i) Strut _____

(ii) Waling _____

(iii) Sheeting _____

(iv) Prop _____

(4 marks)

(b) Draw a diagram to demonstrate the position of the following shoring components as would be used in a trench of type "B" soil depth 3m or less. Label all components.

- Struts
- Walings
- Sheeting
- Props

(2 marks)

Total 6 marks

QUESTION 4

A drainlayer has been asked to inspect a branch drain down a 3 metre deep manhole.

List THREE primary safety precautions the drainlayer should take before entering the manhole.

- 1 _____
- 2 _____
- 3 _____

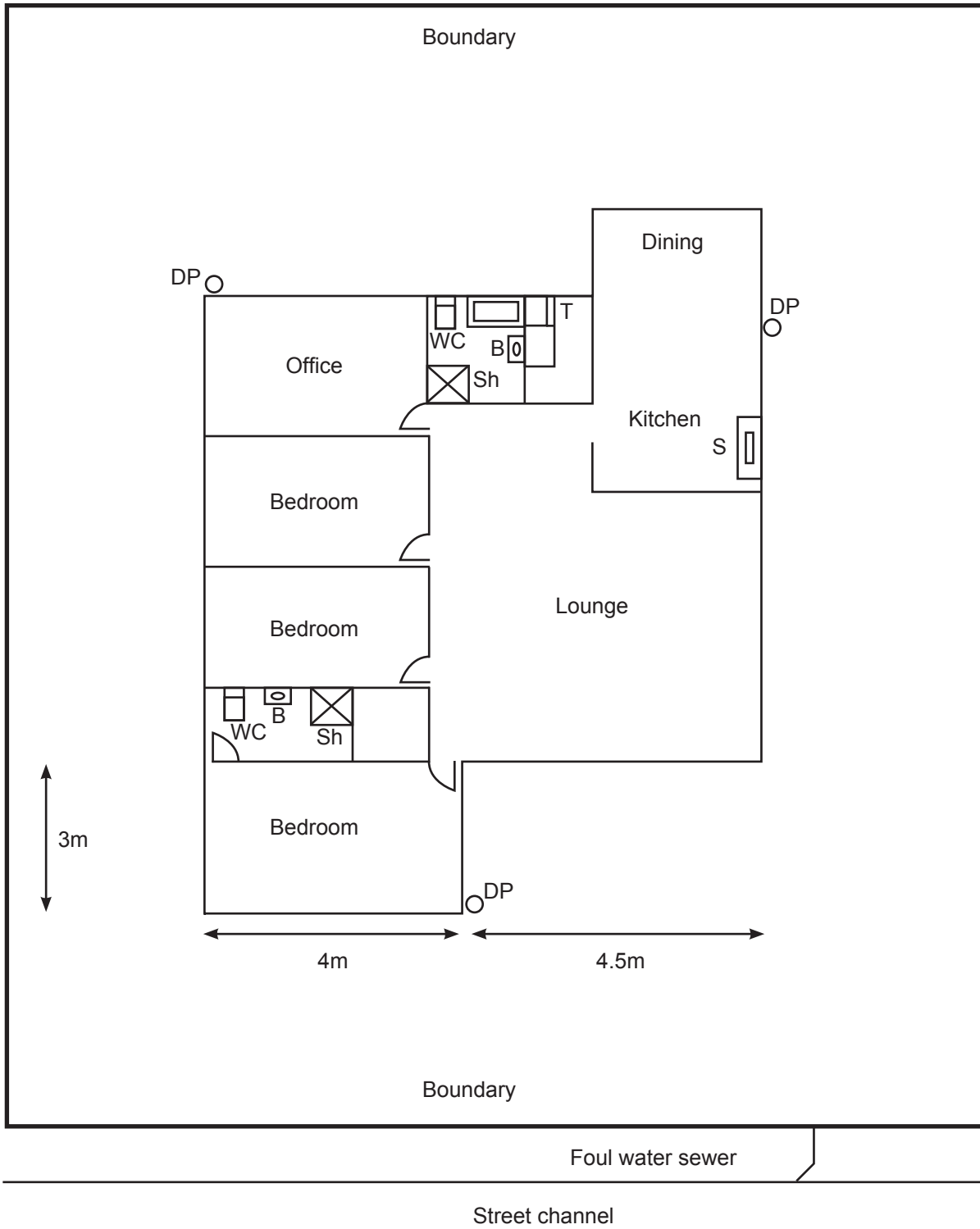
Total 3 marks

QUESTION 5

The diagram below shows a plan of a house site.

Foul water is to connect to the foul water sewer. The storm water system is to discharge to the street channel. Drainage systems are to comply with AS/NZS 3500: Part 2 Sanitary plumbing and drainage.

On the plan, neatly draw and label the house drainage system. Include both foul water and storm water systems, all pipe work, bends, junctions, fittings, inspections and ventilation points.



Total 10 marks



QUESTION 6

(a) An effluent absorption trench is one method used for effluent disposal.

Neatly draw and label both a side elevation and an end elevation of an absorption trench.

Include pipe work, measurements, filter media, filter cloth, and show a minimum of four field tiles in side elevation.

Field tiles to be earthenware 300mm in length laid to a fall of 1 in 200.

(4 marks)

QUESTION 6 (cont'd)

- (b) There are restrictions on where square junctions may be used on a foul water drainage system. AS/NZS 3500: Part 2 Sanitary plumbing and drainage states where square junctions may be used. List FIVE of these positions.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks)

- (c) Using your knowledge of AS/NZS 3500: Part 2 Sanitary plumbing and drainage, complete the following table.

The maximum length of an unvented branch drain	
The minimum grade as a percentage for a DN 100mm drain	
The minimum grade as a percentage for a DN 80mm drain	
The minimum separation between any underground drain and a communication cable	
The minimum cover for a uPVC drain subject to light vehicular traffic	

(5 marks)

Total 14 marks

QUESTION 7

(a) Trade waste must be cooled before discharging to a drain or sewer. In relation to this statement answer the following questions.

(i) A cooling tank must be a specific size. State the factor that determines this size.

(ii) Draw a side elevation of a typical cooling pit. [Cooling tank in ground].

(4 marks)

QUESTION 7 (cont'd)

- (b) A petrol trap is one type of special purpose interceptor trap. State what hazard the interceptor trap prevents and how it prevents it.

(2 marks)

- (c) State when a sewage pump is required on a foul water drainage system.

(1 mark)

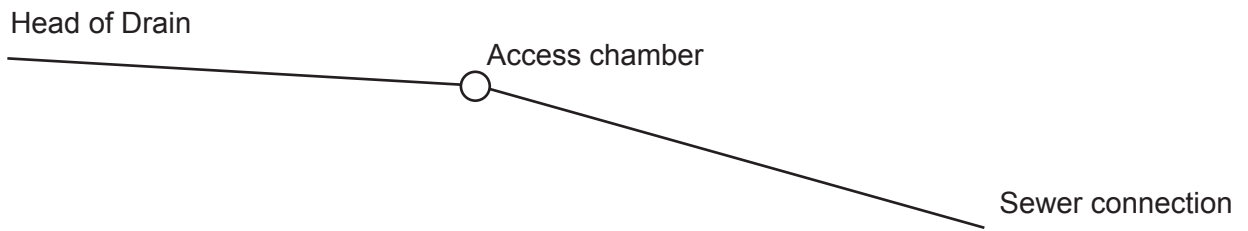
- (d) State where the non-return valve on the outlet of a sewage pump system should be installed in relation to the isolating valve.

(1 mark)

Total 8 marks

QUESTION 8

- (a) The following drawing represents a drainage profile, showing lengths and grade between fixed points. Answer the following questions from the information given.



- (i) A drain is 26 metres long and is laid to a grade of 1.65%. Calculate to three decimal places the fall between the head of the drain and the access chamber. Show all working.
-
-
-
-
-
-
- (ii) A drain is 31 metres long and is laid to a grade of 2.5%. Calculate to three decimal places the fall between the access chamber and the sewer connection. Show all working.
-
-
-
-
-
-
- (iii) Calculate to three decimal places the total fall in metres from the head of the drain to the sewer connection. Show all working.
-
-
-
-

(3 marks)

QUESTION 8 (cont'd)

(b) An excavation for a trench is to be carried out.

The excavation is to be 185m long with a width of 350mm, a depth of 620mm at the top end and 1.800m at the lower end.

Each truck has the capability to hold 4 cubic metres of excavated material.

Dumping fees are \$185.00 per load or part load for each truck.

Allow for 350mm depth of granular base course material along the full length of the excavation.

The cost of granular base course material is \$21 per cubic metre.

(i) Calculate the quantity of soil to be removed. Show all working.

(ii) Calculate the total cost of dumping fees. Show all working.

(iii) Calculate how many cubic metres of granular base course material are required. Show all working.

QUESTION 8 (cont'd)

(iv) Calculate the cost of granular base course material. Show all working.

(v) Calculate the total cost of both excavation spoil removal and granular base course material. Show all working.

(5 marks)

Total 8 marks

QUESTION 9

The diagram opposite shows a building site.

Foul water drainage from Warehouse 1 is to discharge into Access Chamber 1.

Foul water drainage from Warehouse 2 is to discharge into Access Chamber 2.

Foul water drainage from the Restaurant is to discharge into Access Chamber 3.

Drainage from Access Chamber 2 is to combine into Access Chamber 1 and then into Access Chamber 3.

Foul water drainage from Access Chamber 3 is to terminate at the foul water sewer connection at the roadway.

All three access chambers are 10m from the side boundary and 10m from the building they serve.

The stormwater drainage system is to incorporate all down pipe connections and terminate at the roadside storm water sewer connection.

On the plan, neatly draw in all foul water and stormwater drainage for each of the three buildings to comply to AS/NZS 3500: Part 2 Sanitary plumbing and drainage.

Draw and label all components.

Bends

Junctions

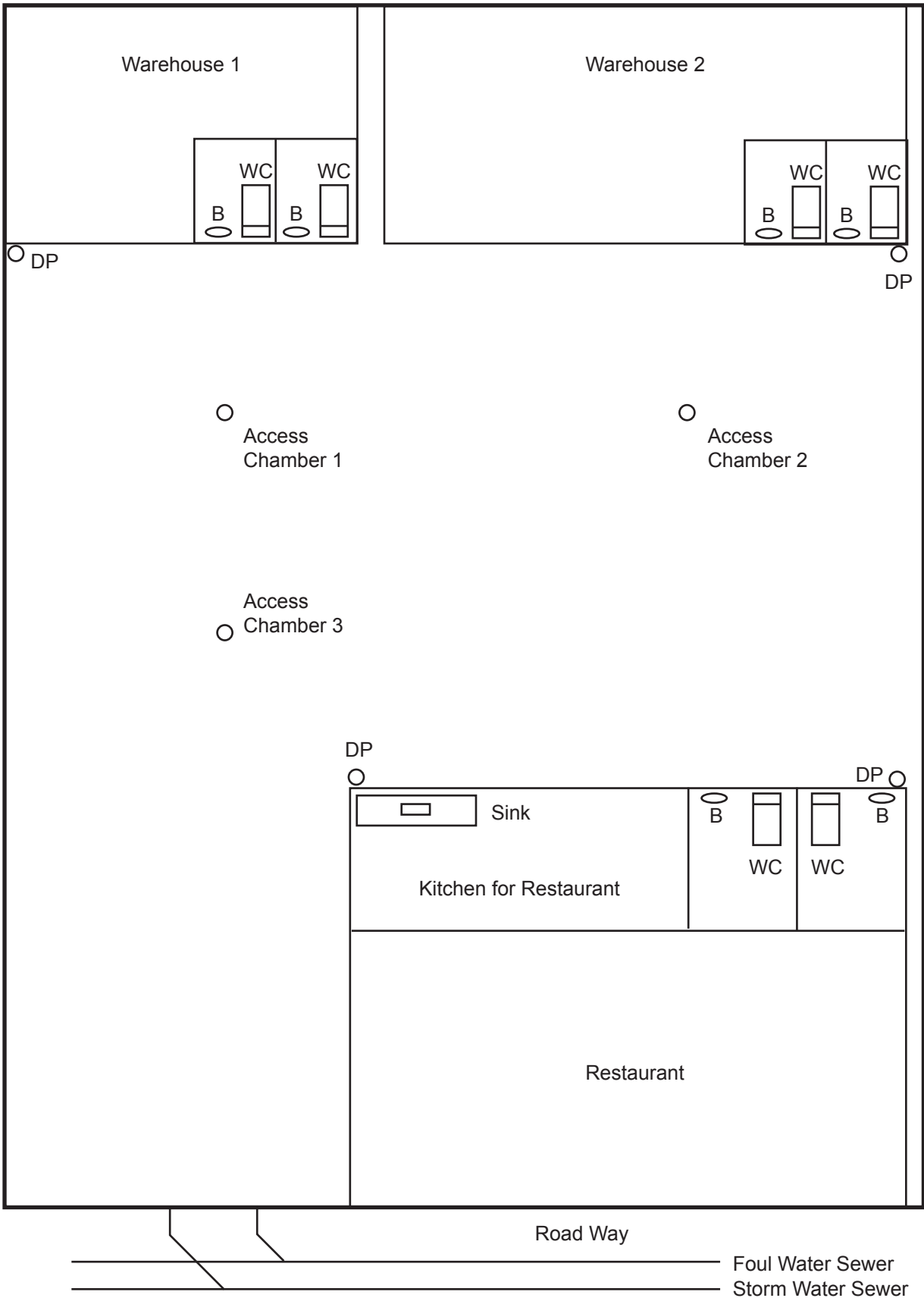
Inspections

Pipe runs

Ventilation points

Interceptor traps

and any other relevant components.



Total 13 marks

QUESTION 10

(a) When installing an underground stormwater drain, a drainlayer must ensure that there is separation between the drain and any electrical earthing electrode for an electrical supply.

(i) State the minimum distance between a stormwater drain and a earthing electrode for an electrical supply not exceeding 1000V.

(ii) When laying a drain which will be in close proximity to an electrical supply exceeding 1000V, state what the drainlayer must do prior to laying the stormwater drain.

(2 marks)

(b) When any underground stormwater drain is to cross another service, certain restrictions apply.

(i) State the minimum vertical separation between the drain and the other service.

(ii) State the minimum angle at which the drain and the other service must cross.

(iii) The stormwater drain shall be installed with a clearance of at least 300mm from any underground obstruction. Give TWO reasons for this clearance.

1 _____

2 _____

(iv) When crossing another service, marker tape must be laid 150mm above the installed service.

State where this marker tape is to be positioned, and the location and distance it is to be laid.

Position: _____

Location and distance: _____

(6 marks)

Total 8 marks

QUESTION 11

- (a) The principal object of the Health and Safety in Employment Act is to prevent harm to employees at work.

To achieve this, employers have a general duty to take all practical steps to ensure the safety of their employees.

List FOUR of these practical steps as set out in Health and Safety in Employment Act.

1 _____

2 _____

3 _____

4 _____

(4 marks)

- (b) State who, apart from a licensed drainlayer, is allowed to lay drains.

(1 mark)

QUESTION 11 (cont'd)

(c) When a drainlayer employs a trainee, a limited certificate for that trainee must be uplifted from the Plumbers, Gasfitters and Drainlayers Board. It must be signed by the trainee drainlayer and endorsed by the supervising registered drainlayer.

(i) State TWO undertakings that are given by the registered drainlayer who endorses the certificate.

1 _____

2 _____

(ii) State what the Plumbers, Gasfitters and Drainlayers Board must receive from a drainlayer before the Board will issue a limited certificate.

(2 marks)

(d) State THREE responsibilities of a trainee drainlayer with respect to his or her limited certificate.

1 _____

2 _____

3 _____

(3 marks)

Total 10 marks

For Candidate's use

Number of EXTRA sheets used (write NIL if none have been used).	
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For Examiner's use only

Questions Answered	Marks	Marks
1		
2		
3		
4		
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10		
11		
Total		