

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 2008

### 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, use the blank pages at the back of this booklet. Clearly write the question number 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

#### 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 17 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) Under the Health and Safety in Employment Act, when laying a drain where an excavation is deeper than 1.5m and is deeper than it is wide at the top, the work becomes notifiable.

State THREE other situations where drainage work is notifiable.

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

(3 marks)

- (b) Poor ventilation in confined spaces may create hazardous situations. One result of this could be asphyxiation.

- (i) Explain how asphyxiation occurs.

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

- (ii) State TWO symptoms of asphyxiation.

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

- (iii) State TWO effects of asphyxiation.

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

(6 marks)

**Total 9 marks**

## QUESTION 2

The drawing opposite shows an as-built plan of a foul water drainage system.

The drain is a 110mm uPVC, laid to a gradient of 1.65% (1:60), and has a minimum cover of 500mm.

The drainage system complies with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

- (a) In the table below, compile a list of all pipe work, inspections, junctions, bends and gullies required to meet the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage. Do not include inspections or fittings at the boundary sewer connection, or bends rising up from the drain to sanitary fixtures or ventilation.
- (b) Using the costs per item given, calculate the total cost of materials, including allowance for profit margin and GST.

Item	Number	Cost per item	Cost
Total drain length 80m		\$35.00/m	
Inspection fittings		\$40.00	
Plain fittings		\$16.00	
Overflow relief gully		\$125.00	
Sub total materials			
Profit margin (15%)			
Sub total			
GST (12.5%)			
Total			

(5 marks)

- (c) The main drain length is 65.000m. Calculate the depth of the drain invert at the boundary sewer connection. Show all working.

Formula:  $F = \frac{L}{G}$

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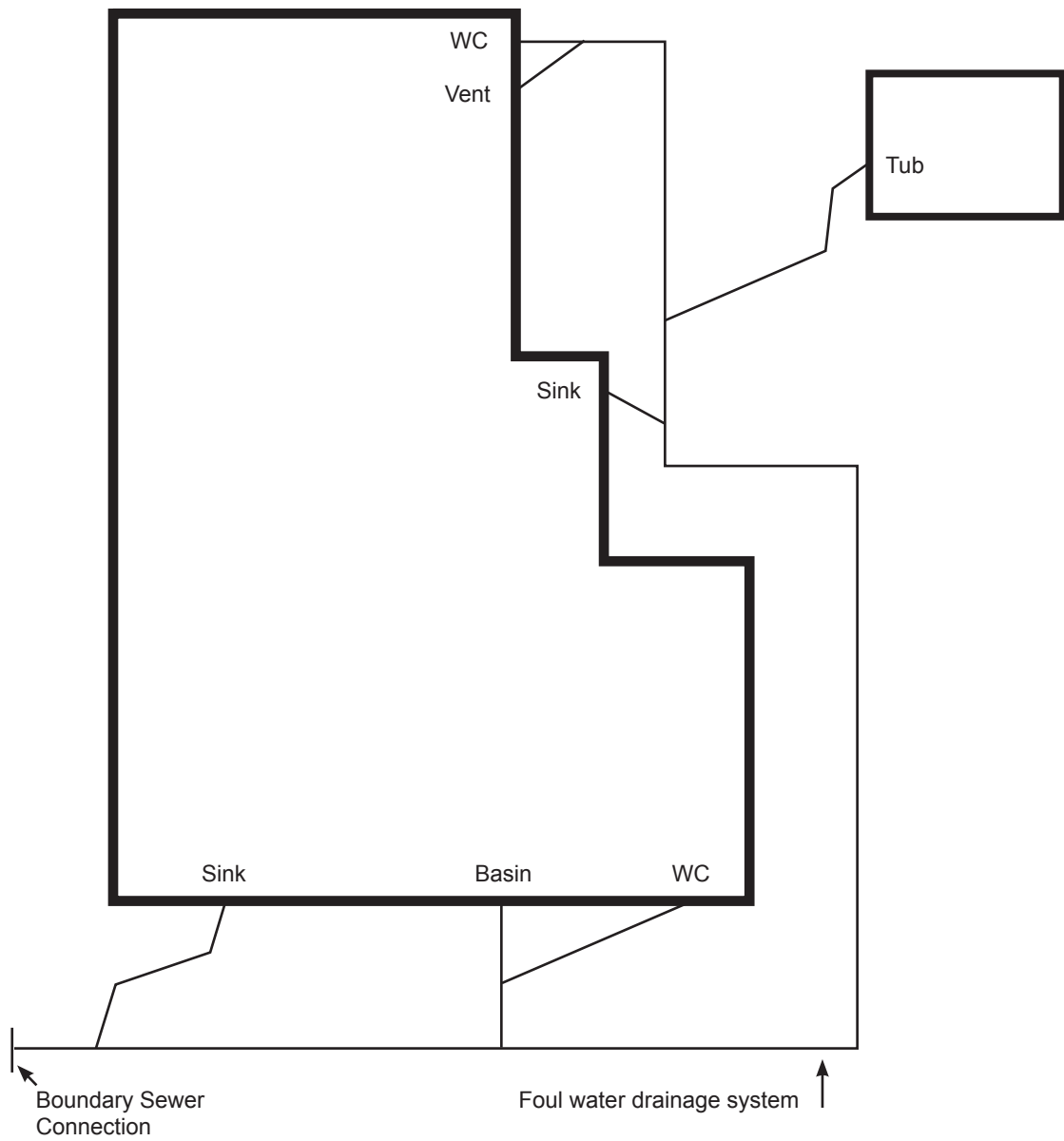


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(2 marks)

**Total 7 marks**

## QUESTION 2 (cont'd)



### QUESTION 3

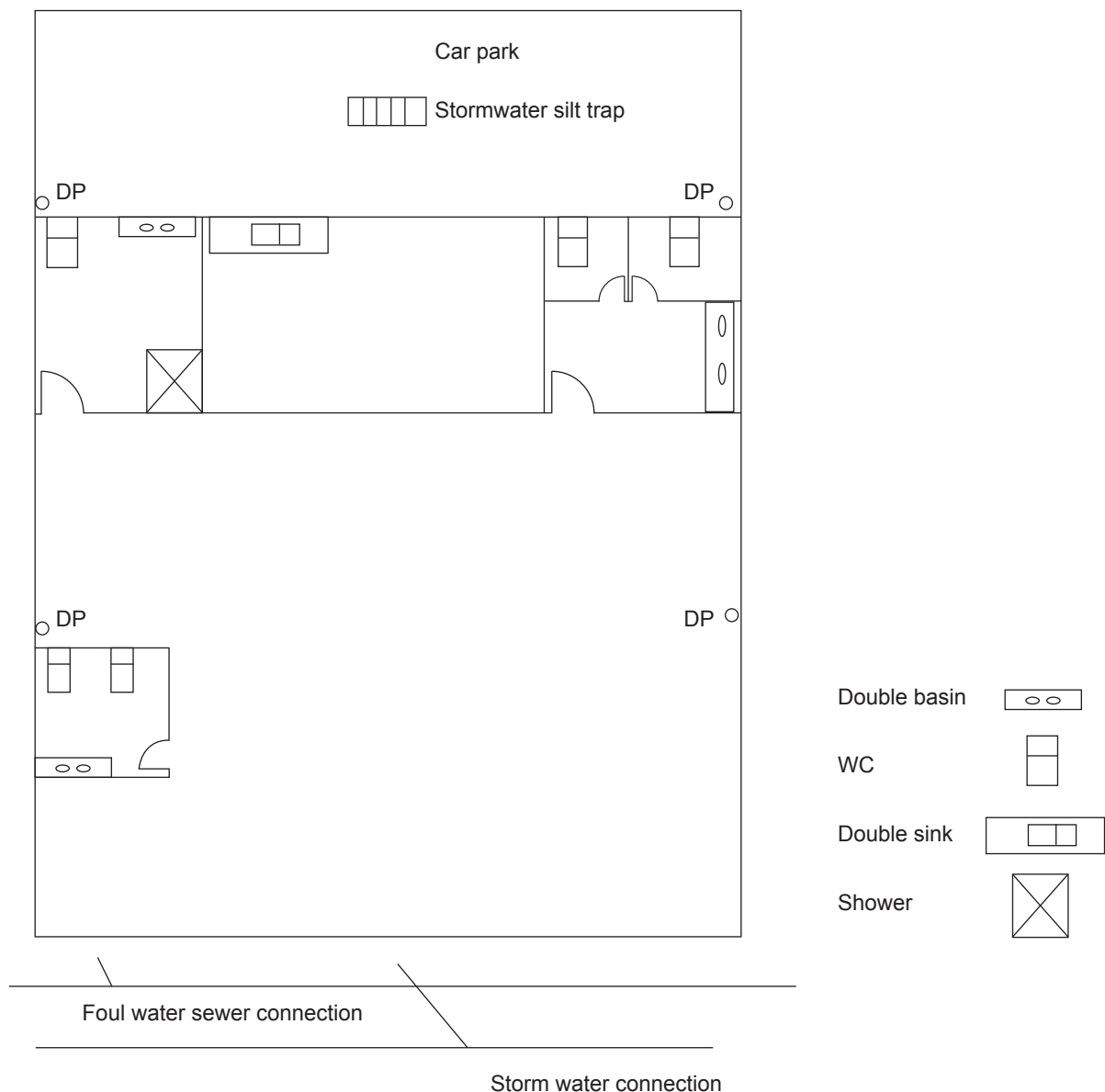
The diagram below shows the plan of a proposed restaurant. The restaurant has buildings on each side, there is provision for staff car parking at the rear of the building, and there is a public walkway at the front which is owned by the restaurant.

The floor of the restaurant is constructed of concrete and is raised 200mm above the paved car park area. If required, internal chambers are to be confined within the ablution blocks.

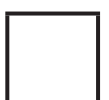
Foul water is to discharge to the Territorial Authority sewer at the front of the building.

The storm water drainage system is to include surface water from the car parking area and underground drainage for all downpipes (DP) terminating at the Territorial Authority storm water sewer.

Using your knowledge of the New Zealand Building Code Clause E1 and G13 AS2, draw and label the foul water and storm water drainage systems. Include all pipe work, connections, fittings, chambers, inspections and any other relevant factors for a complete drainage system.



**Total 10 marks**



#### QUESTION 4

(a) Give FOUR examples of situations where a drain needs extra protection.

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

(4 marks)

(b) (i) State the term used to describe the lowering of the water table in an area.

\_\_\_\_\_

(1 mark)

(ii) When lowering the water table, a perforated pipe may be driven into the ground. State the term given to this pipe.

\_\_\_\_\_

(1 mark)

(iii) State the name given to the distance between the inlet level and the outlet level of a septic tank.

\_\_\_\_\_

(1 mark)

(iv) The use of a mechanical type valve (reflux valve) is unacceptable to the owner of a property who is having problems with drain surcharge. State what could be used in its place.

\_\_\_\_\_

\_\_\_\_\_

(1 mark)

(v) State the most probable cause of accumulation of explosive gases in a drain.

\_\_\_\_\_

(1 mark)

**Total 9 marks**

## QUESTION 5

(a) In relation to drainage systems answer the following questions.

(i) Give the meaning of the term surface water.

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(2 marks)

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(ii) Give TWO purposes of a retention tank in relation to stormwater drainage.

1 

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2 

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(2 marks)

☐

(b) (i) State the purpose of a trade waste interceptor trap.

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(2 marks)

☐

(ii) Give TWO examples of where a trade waste interceptor trap must be used.

1 

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2 

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(2 marks)

☐



**QUESTION 5 (cont'd)**

- (c) State TWO acceptable systems, other than an absorption trench, that could be used to dispose of the effluent from an on-site foul water treatment system.

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

(4 marks)

**Total 12 marks**

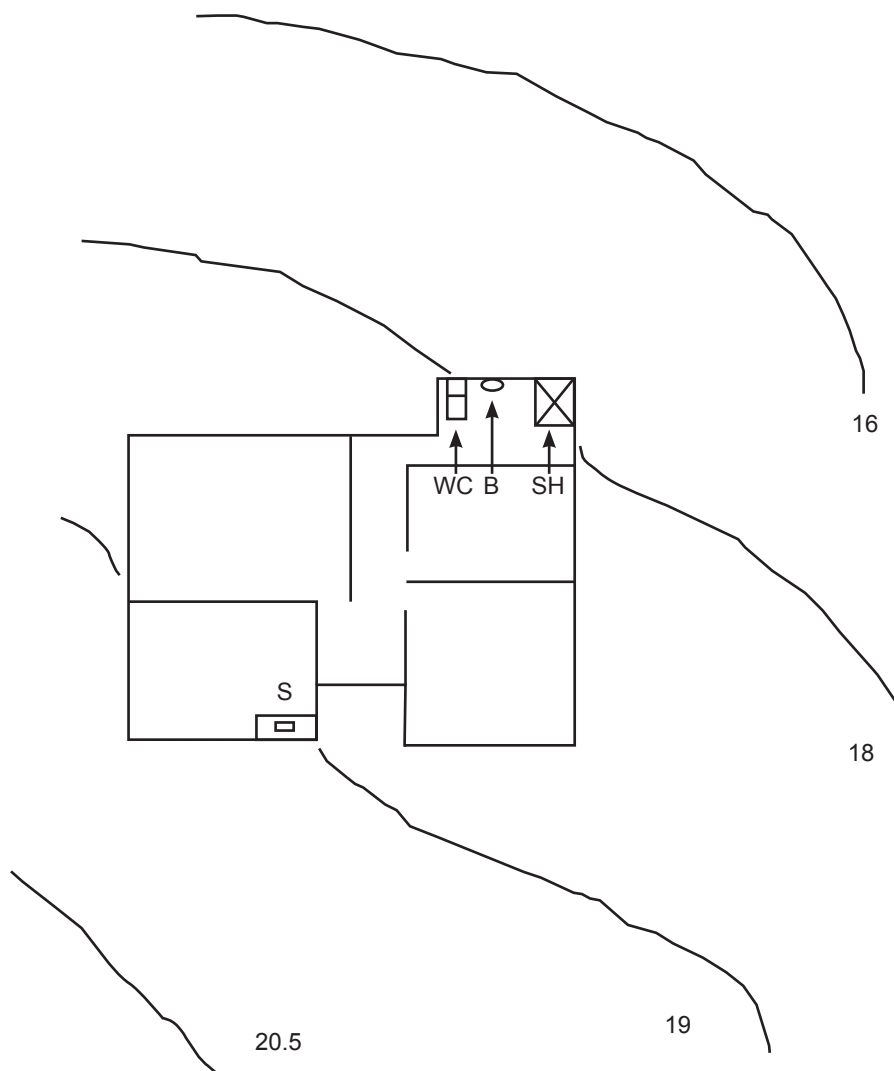
## QUESTION 6

The plan below shows a house site.

The foul water drainage system is to be a typical single stage septic tank.

The foul water is to include a septic tank, distribution box, and two effluent lines from the distribution box each approximately 40m in length.

Draw and label all pipe work, bends, junctions, gullies, ventilation, access, septic tank, distribution box and effluent lines to meet the minimum requirements in compliance with AS/NZS 3500: Part 2 Sanitary plumbing and drainage.



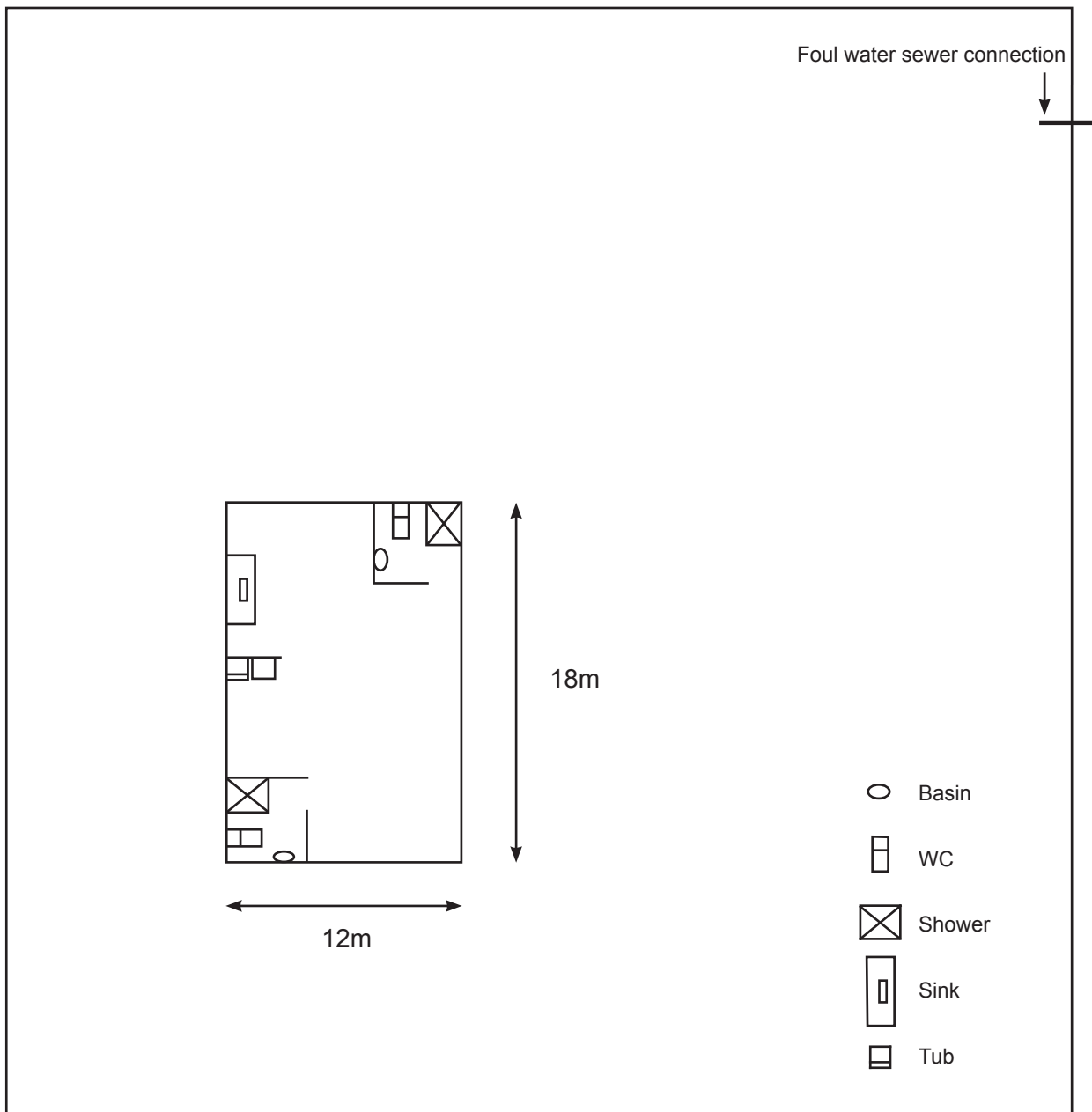
Total 10 marks

## QUESTION 7

The drawing below shows the plan of a house site.

The floor level of the house is 3m lower than the Territorial Authority sewer connection.

On the plan provided, draw and label the foul water drainage system to satisfy AS/NZS 3500 Part 2: Sanitary plumbing and drainage. Include all pipe work, connections, ventilation, chambers, junctions, bends, access points and any other requirements to meet the minimum requirements in compliance with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.



Total 10 marks

## QUESTION 8

- (a) When a drain passes through a below-ground external wall, it must comply with certain criteria.

Using your knowledge of AS/NZS 3500 Part 2: Sanitary plumbing and drainage, answer the following questions.

- (i) State what two fittings must be fitted to the drain within 800mm of the external face of the wall, and state the distance apart they must be.

Fittings: \_\_\_\_\_

Distance: \_\_\_\_\_

(2 marks)

- (ii) State the requirement that must be met between the drain and the penetration of the wall.

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

(1 mark)

- (b) During the course of any work, extraneous matter must be prevented from entering a sewer. List THREE different types of extraneous matter.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

### QUESTION 8 (cont'd)

- (c) AS/NZS 3500 Part 2: Sanitary plumbing and drainage states that concrete pads used to support drains must be a minimum of 100mm thick.

Based on your knowledge of this standard, answer the following.

- (i) State THREE situations, apart from unstable ground, where concrete pads used to support drains must be laid.

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

(3 marks)

- (ii) Concrete pads supporting drainage must be laid no closer than 20mm to a joint.  
State the type of joint.

\_\_\_\_\_

(1 mark)

**Total 10 marks**

## QUESTION 9

- (a) Using your knowledge of New Zealand Building Code Clause G13/AS2, draw and label a gully trap complete with dish set in unpaved ground against a concrete reinforcing wall. Include all measurements, and clearly show all details as required for a complete construction.

(3 marks)

- (b) State the minimum height the top of the gully dish is required to be in the following circumstances:

- (i) above paved surfaces.

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- (ii) above unpaved surfaces.

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(2 marks)

- (c) State the minimum pipe diameter of a gully trap according to New Zealand Building Code Clause G13/AS2.

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(1 mark)

**Total 6 marks**

## QUESTION 10

With regard to the acceptable solutions of the New Zealand Building Code, answer the following questions.

(a) State fully TWO circumstances under which the provision of grease traps is required.

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

(2 marks)

(b) Explain fully what an inspection chamber is.

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

(2 marks)

(c) List THREE precautionary methods that could be used during construction to minimize soil erosion and escape of sediment from the site due to rainfall and storm water.

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

(3 mark)

**Total 7 marks**

## QUESTION 11

- (a) Under the Health and Safety in Employment Act, when laying a drain where an excavation which is deeper than 1.5m and is deeper than it is wide at the top, this work becomes notifiable. State which Government Department or representative must be notified.

\_\_\_\_\_

(1 mark) ☐

- (b) State the name and clause of the New Zealand Building Code that deals with each of the following.

Interceptor traps: \_\_\_\_\_

Industrial liquid waste: \_\_\_\_\_

(2 marks) ☐

- (c) NZ Building Code Acceptable Solutions G13/AS2: Drainage is for below-ground non-pressure (gravity flow) foul water drains having a diameter of no greater than 150mm. State the foul water drainage systems to which it does NOT apply.

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

(3 marks) ☐

- (d) A drainlaying business requires extra staff. List FOUR details, apart from the name and address, that must be recorded in an employment agreement when employing a new employee.

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

(4 marks) ☐

**Total 10 marks** ☐



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For Examiner's use only

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