

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, JUNE 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 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**



**QUESTION 1**

(a) State the main purpose of an overflow relief gully.

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(1 mark)

(b) From your knowledge of AS/NZS 3500 Part 2: Sanitary plumbing and drainage, list FOUR locations where overflow relief gullies must be positioned.

1 

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2 

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3 

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4 

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(4 marks)

**QUESTION 1 (cont'd)**

(c) Prior to the excavation of trenches, certain precautionary actions should be considered with regard to safety. List FIVE such precautions.

1 \_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_

3 \_\_\_\_\_  
\_\_\_\_\_

4 \_\_\_\_\_  
\_\_\_\_\_

5 \_\_\_\_\_  
\_\_\_\_\_

(5 marks)

**Total 10 marks**

## QUESTION 2

(a) The bedding requirements when laying solvent welded uPVC pipe and vitrified clay or concrete pipes using socket and ring jointing are different.

(i) Clearly explain this difference.

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(2 marks)

(ii) Neatly draw a side elevation of a vitrified clay or concrete drain to demonstrate this difference.

(1 mark)

**QUESTION 2 (cont'd)**

(b) From your knowledge of New Zealand Building Code Clause G14 Industrial Liquid Waste, answer the following questions.

(i) Give the meaning of the term industrial liquid waste (trade waste).

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(1 mark)

(ii) Industrial liquid wastes (trade wastes) that are prohibited from entering a sewage system fall under THREE categories. State these categories.

1 

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2 

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3 

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(1 mark)

(iii) In controlling the discharge of trade waste, state what and who are being protected.

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(1 mark)

**QUESTION 2 (cont'd)**

- (c) AS/NZS 3500 Part 3: Stormwater drainage states that when the diameter of a site stormwater connection to a street curb or gutter is larger than DN 100mm, the installation of an inlet pit may be required.

Using drawing equipment, draw and label a typical arrangement for an inlet pit with sump and footpath crossing. Show the position of the property boundary.

(4 marks)

**Total 10 marks**

### QUESTION 3

The drawing opposite shows a plan of a group of three shops and a restaurant.

The car parking area at the rear of the buildings has a sealed surface.

There is a paved public walk way from the parking area to the front of the buildings.

Foul water drainage is to connect to the appropriate sewer connection. All components of the foul water system are to be external to the building.

Surface water from the car park area and storm water drainage are to combine and discharge at the storm water sewer connection.

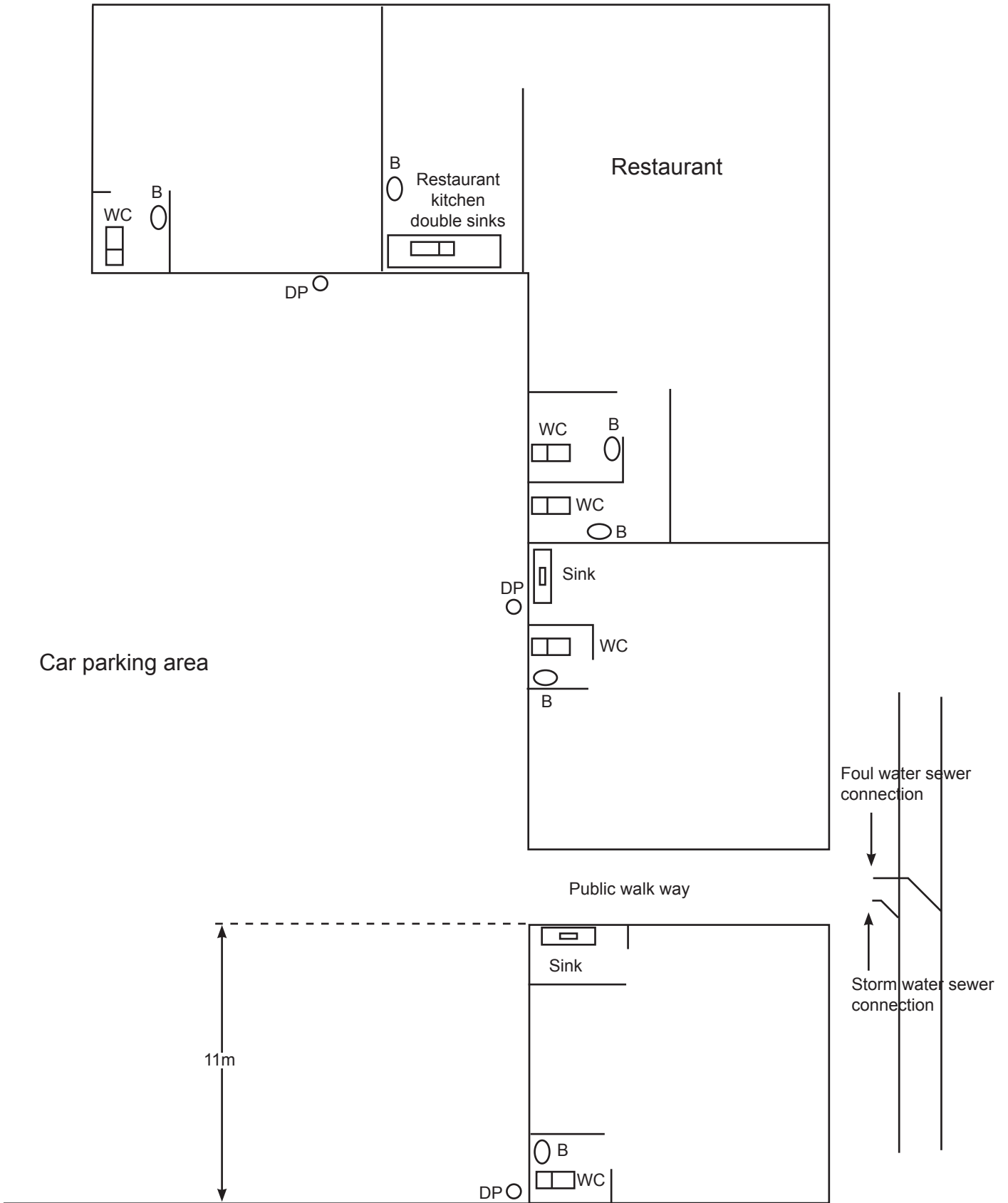
Drainage systems are to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

On the plan, draw and label the drainage systems. Include foul water and storm water systems, all pipe work, bends, junctions, fittings, traps, inspections, chambers and ventilation points.

**Total 15 marks**



QUESTION 3 (cont'd)



#### QUESTION 4

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

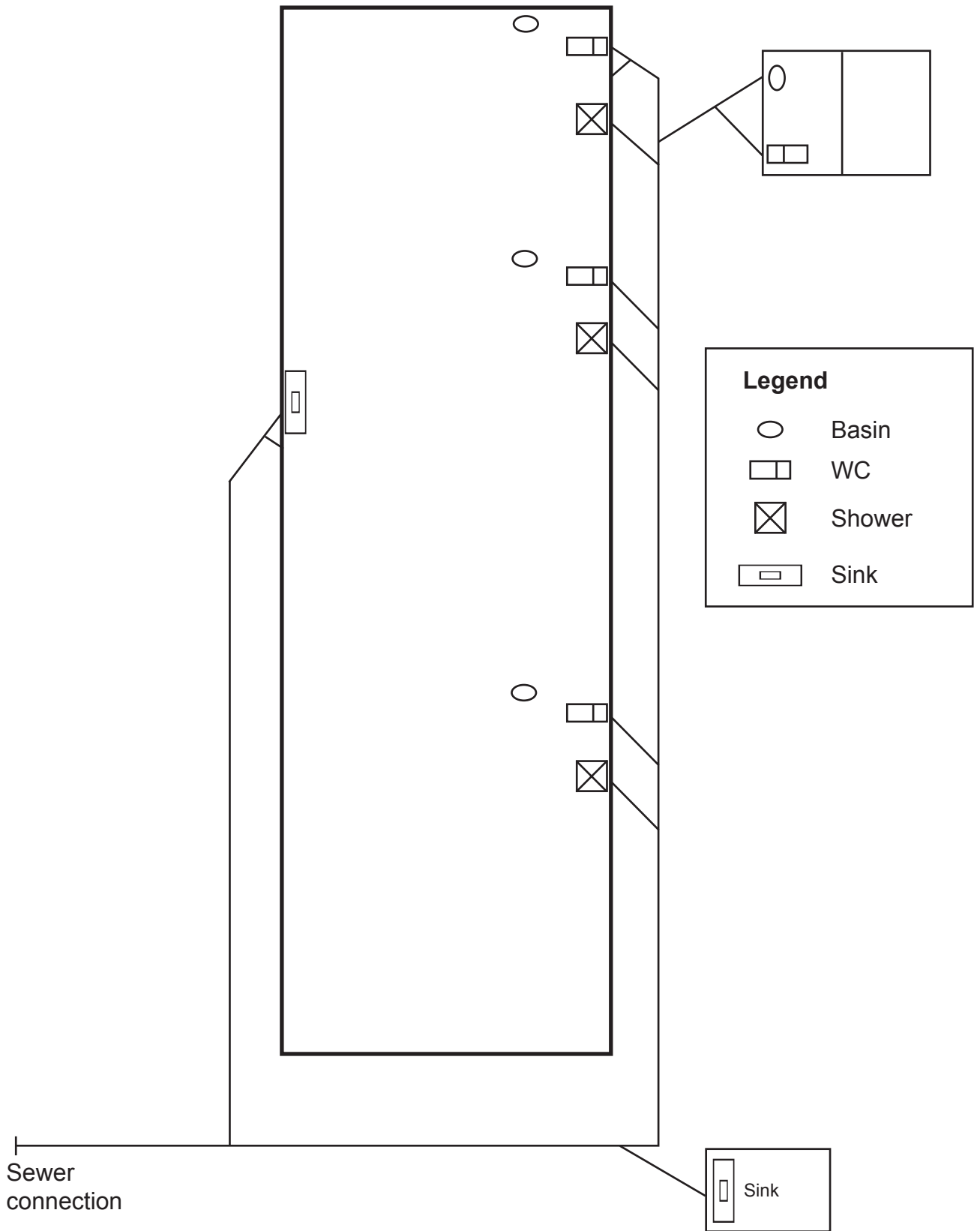
The drainage system complies with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.  
The scale used is 1 to 200.

- (a) In the table below, compile a list of all pipe work, bends, inspections, junctions and gullies to meet the minimum requirements of AS/NZS 3500 Part 2: Sanitary plumbing and drainage. Do not include inspections or fittings at the sewer connection.
- (b) Using the costs per item given, calculate the total cost of materials.

Item	Number	Cost per item	Cost
Pipe length 74.5m	74.5	\$16.50 per m	
Plain junctions		\$22.60 each	
Inspection junctions		\$33.50 each	
Plain bends		\$19.60 each	
Inspection bends		\$29.30 each	
Overflow relief gully (ORG)		\$56.50 complete	
Sub total			
GST (12.5%)			
Total cost			

Total 9 marks

QUESTION 4 (cont'd)



**QUESTION 5**

(a) In relation to the pumping of foul water, give the meaning of the term “Duplex pumping system”.

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(1 mark)

(b) State the minimum diameter for a drain vent in accordance with each of the following acceptable solutions.

(i) Acceptable solution G13/AS2 Drainage.

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(ii) AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

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(2 marks)

(c) When drains are being laid in other than stable ground or where soil movement may affect the performance of the drain, the territorial authority requires specific information to be supplied.

(i) List THREE requirements that the territorial authority will require prior to the commencement of the laying of drains in these situations.

1 

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2 

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3 

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(3 marks)

(ii) State who must verify the information prior to submission of this information to the territorial authority.

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(1 mark)

**QUESTION 5 (cont'd)**

- (d) AS/NZS 3500 Part 2: Sanitary plumbing and drainage states that inspection shafts shall terminate at or near ground level with a removable air tight inspection cap.

State THREE important extra installation features a drainlayer must implement to comply with this standard where the inspection shaft may be subjected to damage by vehicular traffic.

1 \_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_

3 \_\_\_\_\_  
\_\_\_\_\_

(3 marks)

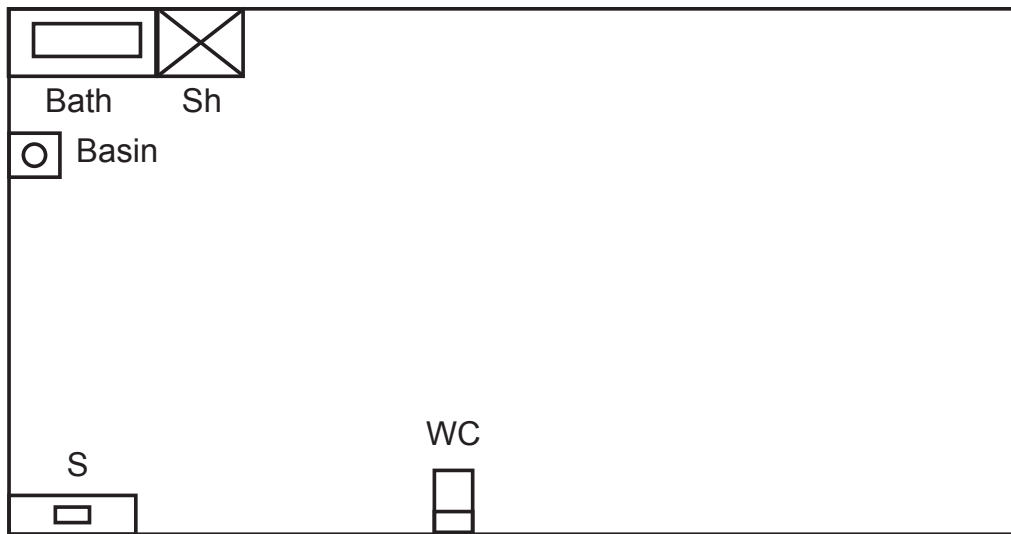
**Total 10 marks**

## QUESTION 6

The diagram below shows a plan of a house site.

The foul water discharge is to pass through a septic tank into a common effluent drain. Discharge from waste fixtures is to pass through a sullage tank to the common effluent drain. Drainage systems are to comply with AS/NZS 3500 Part 2: Sanitary plumbing and drainage.

On the plan, draw and label house drainage systems to include septic tank, sullage tank, pipe work, bends, junctions, fittings, inspections, gullies, ventilation requirements and effluent lines.



Total 10 marks

**QUESTION 7**

Answer the following questions as they relate to storm water intakes and/or outfalls.

(a) State the purpose of a wing wall for a storm water intake or outfall.

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(2 marks)

(b) Describe TWO different situations where wing walls may be installed.

1 

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2 

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(2 marks)

(c) State TWO purposes of the baffles on the outlet side of a wing wall.

1 

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2 

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(2 marks)

**QUESTION 7 (cont'd)**

(d) A grate is often installed to prevent large items entering into a wing wall.

(i) State where the grate should be installed.

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(1 mark)

(ii) State the angle at which the grate should be installed.

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(1 mark)

(iii) Explain the importance of the angle in (ii).

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(1 mark)

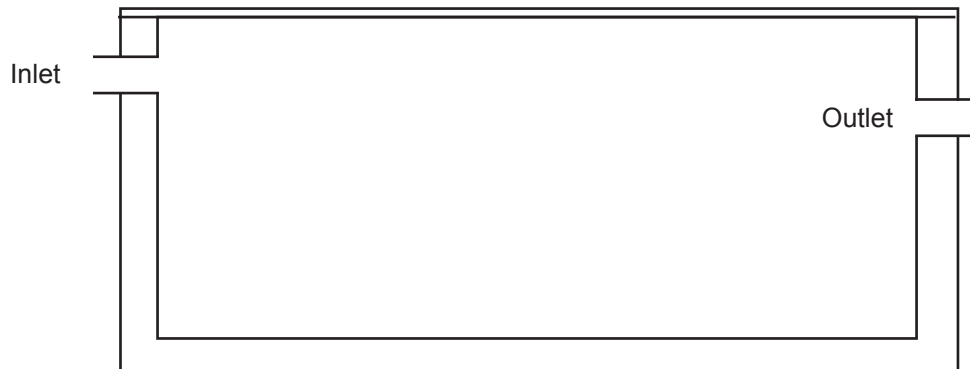
**Total 9 marks**



### QUESTION 8

The starter drawing below shows a neutralising tank for acidic trade waste.

Complete and label the drawing to show marble chips, water level, compartments, the marble chip line, baffles and the sampling point.



Total 5 marks

**QUESTION 9**

(a) If a surcharge is likely to occur regularly in a drainage system, a reflux valve may be installed. Using your knowledge of AS/NZS 3500 Part 2: Sanitary plumbing and drainage, state the position where the reflux valve must be installed in each of the following situations.

(i) Where the drain has an inspection shaft installed.

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(1 mark)

(ii) Where the drain has a boundary trap.

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(1 mark)

(b) (i) Draw and label a reflux valve.

(2 marks)

**QUESTION 9 (cont'd)**

(ii) Fully describe the workings of a reflux valve.

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(3 marks)

(c) Drainage pipe and fittings come in several sizes and are constructed of a variety of materials. Complete the table below by giving two acceptable jointing methods for each material listed.

<b>Pipe material</b>	<b>Jointing method one</b>	<b>Jointing method two</b>
ABS plastics		
Ceramic		
Ductile Iron		
High density polyethylene (HDPE)		
Vitrified Clay		

(5 marks)

**Total 12 marks**

**QUESTION 10**

- (a) The New Zealand Building Code has clause numbers and titles that relate to drainlaying. One of these is G13 Foul Water.

List TWO other relevant clause numbers and their titles from this Code.

	Number	Title
1		
2		

(2 marks)

- (b) State who is allowed to lay drains under the Plumbers, Gasfitters and Drainlayers Act.

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(2 marks)

- (c) List the THREE main gases that are produced by the decomposition of sewage.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

**QUESTION 10 (cont'd)**

(d) In considering drainage design in relation to an application to a territorial authority for a building consent, a drainlayer must choose a method of compliance. Give a brief description of each of the following methods of compliance.

(i) Acceptable solution.

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(ii) Alternative solution.

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(iii) Verification method.

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(3 marks)

**Total 10 marks**





For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
Total		