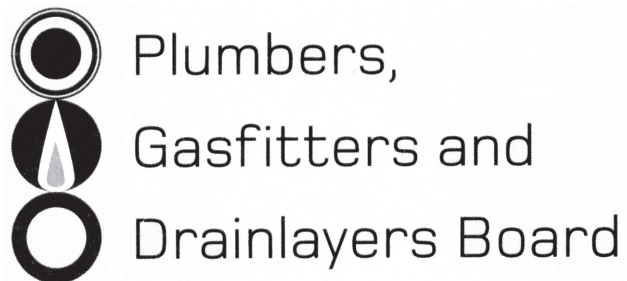


No. 9197



REGISTRATION EXAMINATION, JUNE 2009  
**DRAINLAYING**

**ANSWER SCHEDULE**



## ANSWER 1

- (a) (i) – Oxygen level is safe for breathing.  
– Temperature level in atmosphere is not extreme  
– Flammable contaminants in atmosphere are at a safe level.  
– Toxic contaminants in atmosphere are reduced to a safe level  
(1/2 mark each)  
(ii) A safety harness and life line (1 mark)
- (b) (i) Before lead and directly into power supply socket. (1 mark)  
(ii) Only from individual plug sockets in the RCD. (Must not run through double adaptors)  
(1 mark)

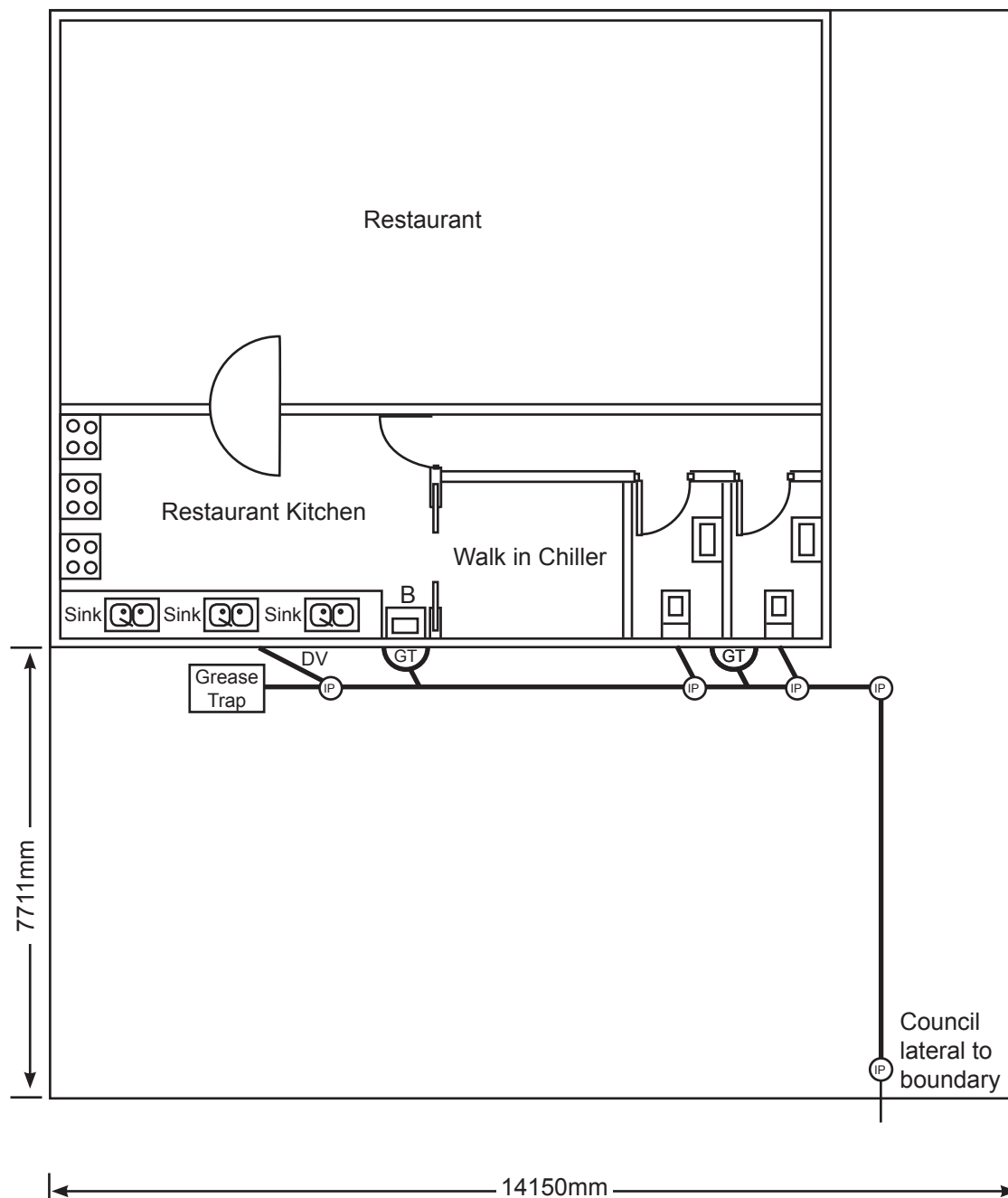
**Total 5 marks**

## ANSWER 2

- (a) (i) Swept in direction of flow  
(ii) Double Y junctions are not to be used on horizontal plane.  
(iii) Soffit of branch drain to be level or higher than the soffit of the pipe to which it connects.  
(iv) Not be used for the connection of stacks.
- (b) (i) – Accumulation of explosive gases.  
– Seals on traps may not be maintained.  
– Foul odours may accumulate.  
– Bacteria could multiply under these conditions.  
– The flow could be restricted.  
– Blockages may occur.  
(Any 4, 1/2 mark each, total 2 marks)
- (b) (ii) – Introduces free air and removes foul air.  
– Dries out growths within the drain.  
– Promotes an even flow of liquids within the drain.  
(Any 2, 1/2 mark each, total 1 mark)

**Total 7 marks**

### ANSWER 3

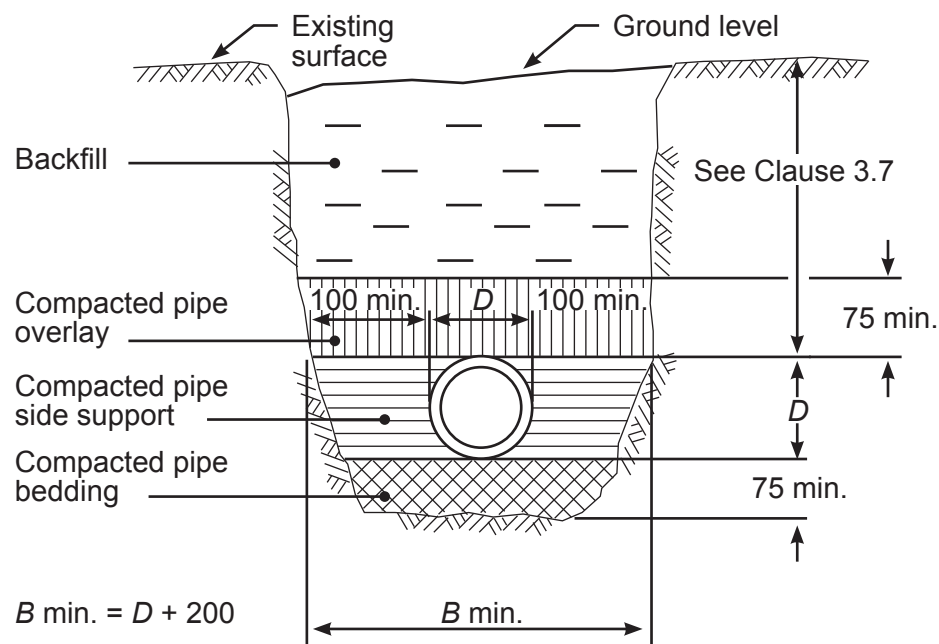


- ½ mark for inspection to council lateral
- ½ mark for inspection right angle bend
- ½ mark for gully trap
- ½ mark for inspection junctions to WC (both must be inspection)
- ½ mark for drain vent
- One mark for grease trap
- ½ mark labelled correctly

**Total 4 marks**

## ANSWER 4

(a)



Legend:

	Backfill
	Pipe overlay
	Pipe side support
	Bed zone

DIMENSIONS IN MILLIMETRES

- ½ mark of bedding
- ½ mark for 75mm bedding
- ½ mark for compacted pipe side support
- ½ mark for Compacted pipe overlay.
- ½ mark for 75mm compacted overlay
- ½ mark for backfill
- 1 mark for min trench width (pipe diameter plus 100 either side)

(4 marks)

(b) A test to determine the suitability of soils for absorption (percolation)

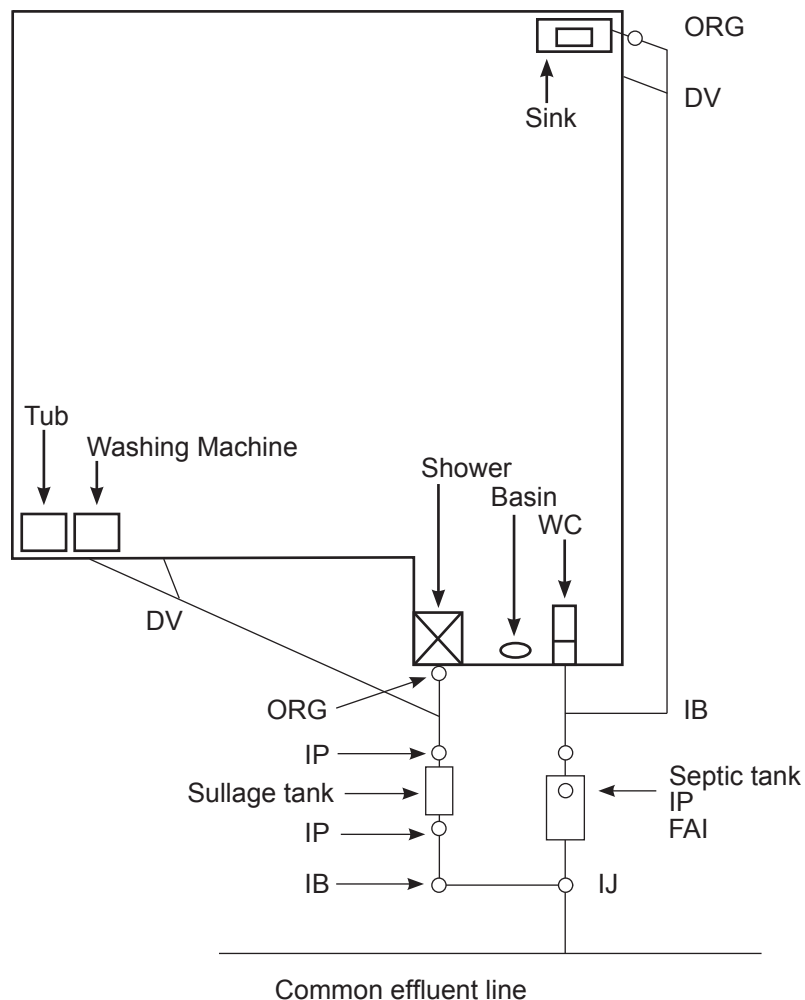
For septic or sullage disposal systems.

Soakage for storm water disposal

(1 mark each, total 2 marks)

**Total 6 marks**

## ANSWER 5



### Sanitary line

½ mark for ORG

½ mark for vent

½ mark for Sullage tank in correct position

½ mark each for inspections either side of Sullage tank (total 1 mark)

½ mark for effluent line to common line

½ mark for inspection at common effluent line

### Foul water line

½ mark for drain vent

½ mark for inspection pipe before septic tank

½ mark for FAI

½ mark for septic tank in correct position

½ mark for effluent line from septic tank

½ mark overflow relief gully

½ mark common effluent line

1 mark for labelling.

**Total 8 marks**

## ANSWER 6

- (a) – Ingress of surface water. (½ mark)
- Foreign bodies likely to cause a blockage. (½ mark)
- (b) – Located at least 20mm above water seal level (½ mark)
- Located at least 20mm below the grating (½ mark)
- (c) 150mm (1 mark)
- (d) The grating must allow surcharge. (1 mark)
- (e) In a visible position. (1 mark)

**Total 5 marks**

## ANSWER 7

Formulae = Length × width × depth

Length 212m, width 350mm, average depth [depth 750mm to 1.900m]

$$212\text{m} \times 0.350\text{m} \times \frac{[0.750\text{m plus } 1.900\text{m}]}{2} = \frac{2.65}{2} = 1.325\text{m}$$

(i)  $212\text{m} \times 0.350\text{m} \times 1.325\text{m} = 98.315\text{m}^3$  (½ mark)

(ii)  $98.315^3 \text{ m} \div 3.4$  = Number of truck loads  
= 28.916 loads (29 loads) (½ mark)

29 loads at \$223 load = \$6467

Ans = \$6467 (½ mark)

(iii) Base course = 212m long by 350mm width by 250mm depth  
 $212\text{m} \times 0.35\text{m} \times 0.25\text{m} = 18.55\text{m}^3$

Base course = 18.55m<sup>3</sup> metres (½ mark)

(iv)  $18.55 \times \$44.50 = \$825.475$   
Ans = \$825.475 (½ mark)

(v) Total cost = excavation plus base material.

$\$6467 + \$825.475 = \$7292.475$   
Ans = \$7292.475 (½ mark)

**Total 3 Marks**

(b) Length in mm  $\times$  by grade divide by 100 = fall in mm

$$29\text{m} = 29000\text{mm} \times 1.65\% \div 100 = 478.5\text{mm} \quad (\frac{1}{2} \text{ mark})$$

$$27.5 = 27500 \times 2.5\% \div 100 = 687.5\text{mm} \quad (\frac{1}{2} \text{ mark})$$

$$\text{Total fall} = 478.5\text{mm} + 687.5\text{mm} = 1166\text{mm}$$

$$\text{Ans} = 1.166\text{m fall} \quad (1 \text{ mark})$$

OR

$$\text{Fall} = \frac{\text{Length}}{\text{Grade}} = \frac{29}{60} = 0.483\text{m} \quad (\frac{1}{2} \text{ mark})$$

$$\frac{27.5}{40} = 0.6875\text{m} \quad (\frac{1}{2} \text{ mark})$$

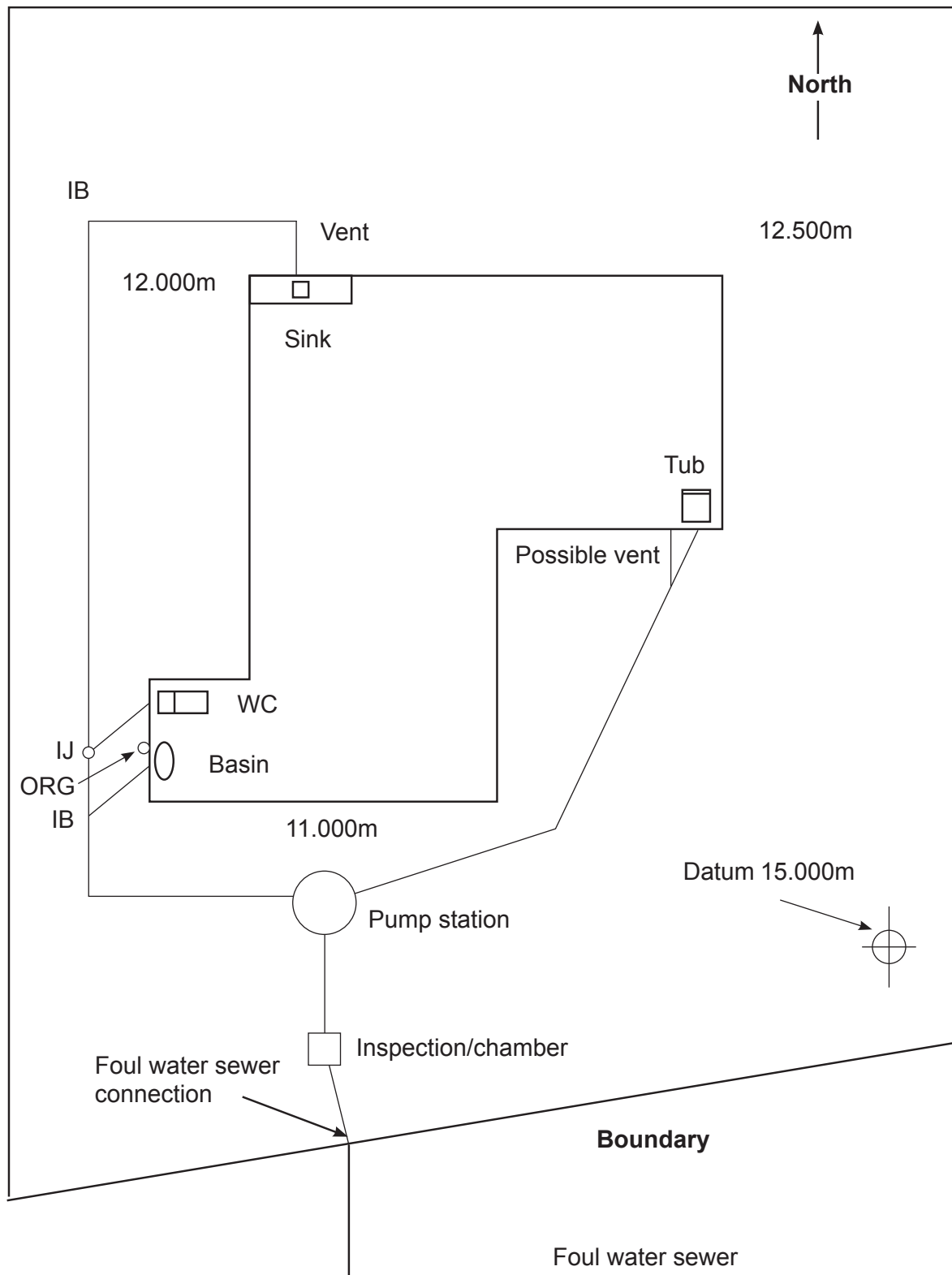
$$\text{Total fall} = 0.483 + 0.6875 = 1.170\text{m} \quad (1 \text{ mark})$$

(2 marks)

**Total 5 marks**



## ANSWER 8



½ mark for inspection fittings (Total 1 mark.)

1 mark for ORG

1 mark for vent.

2 marks for pumping station.

1 mark for inspection at boundary or chamber to allow for gravity fed to foul water connection.

-1 if system does not work.

**Total 6 marks**

## ANSWER 9

- (a) Ensure the surface is clear of plant, spoil heaps, materials, etc. for at least 600mm from the edge of the excavation

Plan to ensure spoil heaps are properly controlled and will stay controlled in wet weather

When working on spoil heap ensure the trench clear of employees

Plan the space between the trench and the spoil heap to remain clear of pipes, bricks, stones, tools, etc.

(Any 3, ½ mark each)

- (b) Ensure access adequate without anyone having to jump across

Footbridges with guard rails available and being used

ladders available and being used

Is others outside trench been made aware of people entering trench.

(Any 3, ½ mark each)

- (c) Is the work properly fenced off

Signage in appropriate places

Lit during the night

If required guarded

Covered

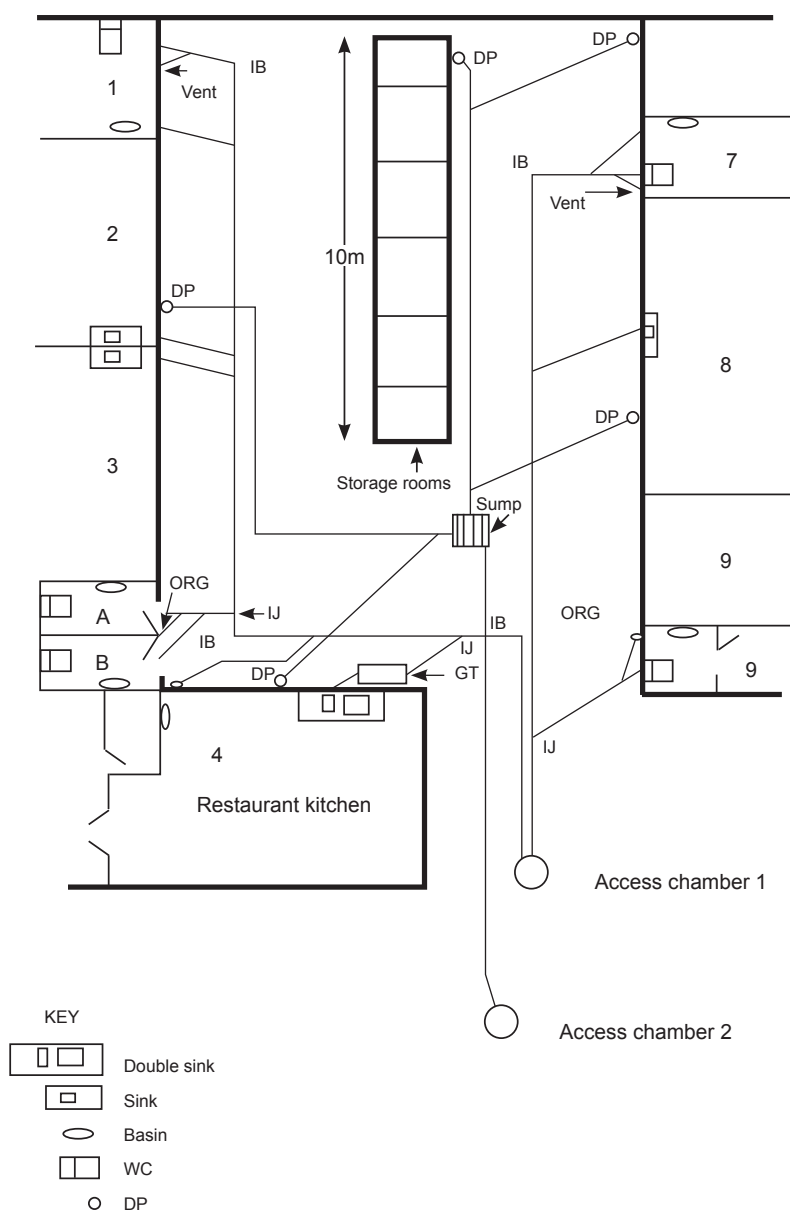
(Any 3, ½ mark each)

- (d) Buried services should be located (And marked gas, power, telephone)

(½ mark)

**Total 5 marks**

## ANSWER 10



- (a) Foul water drainage  
Main to shops 1 to 4
- ½ mark for vent
  - 1 mark for all connections individually connected to main drain
  - 1 mark for ORG
  - ½ mark for inspections (Max 2 marks)
  - 1 mark for grease trap
  - ½ mark for combined branch from ablution blocks A and B
- Main to shops 7 to 9
- ½ mark vent
  - ½ mark inspections (Max 1 mark)
  - ½ mark connected to access chamber
  - ½ mark ORG
- (b) Stormwater drainage
- ½ mark for pipe from sump to access chamber 2
  - 1 mark for all DP to sump

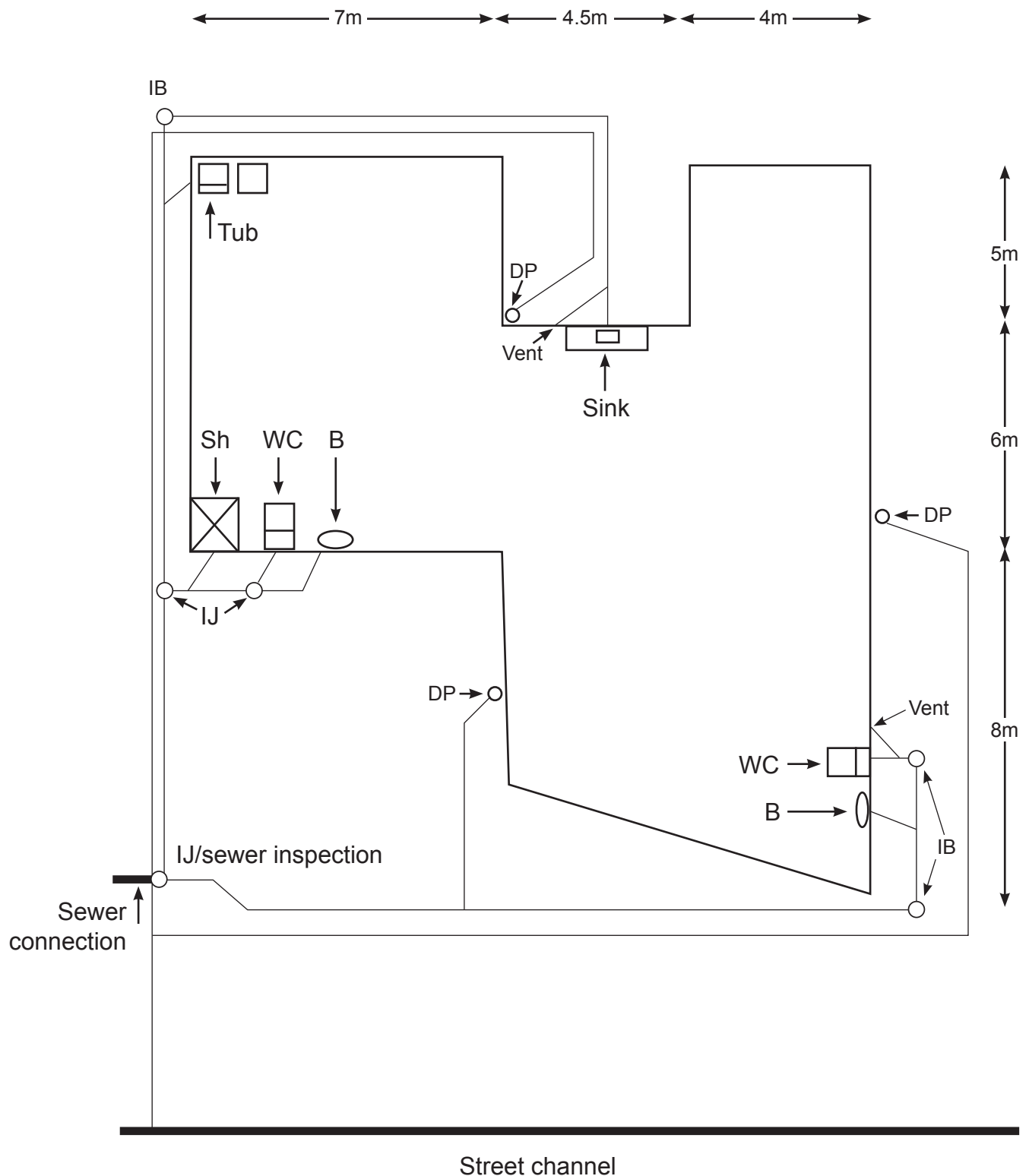
**Total 10 marks**

## ANSWER 11

- (a) – Datum  
– Ground level  
– Invert depths for any section of the drain  
– Gradients between pegs or connections.  
– Whether ground cover over a drain is available  
– Position of connection (Any 4, 1 mark each )
- (b) Allows access to the head of the effluent lines  
So any one line can be isolated to rest that section.  
Even distribution of effluent lines (Any 2, 1 mark each)
- (c) (i) For pre treatment of sullage.  
(ii) An effluent drainage system. (1 mark each)
- (d) (i) A test carried out on pipes and fittings by the internal application of water under a specific head to prove soundness. (1 mark)  
(ii) A test for the tracing of the flow in a pipe line, or for locating leaks, by introducing colouring matter. (1 mark)
- (e) – Constructed to prevent the ingress of surface water  
– Constructed to prevent the ingress of foreign bodies  
– Be located within the legal boundary of the land to which the building is erected.  
– Grating will allow surcharge  
– A water seal depth of at least 65mm  
– At least one discharge pipe discharging to the gully trap to avoid water seal  
– Evaporation.  
– Waste pipes that discharge to the gully trap arranged to permit easy cleaning of the gully trap.  
– The top of the water seal no more than 600mm below the top of the gully dish  
– A minimum of 600mm clear access space above the gully dish.  
– 20mm below grate and 20mm above water seal  
– Minimum outlet pipe drain 100mm  
– Located in a visible position  
– Positioned so top of gully dish is no less than 150mm below the overflow level of the lowest sanitary fixture  
– 75mm concrete surrounding gully dish (Any 4, ½ mark each, total 2 marks)

**Total 5 marks**

**ANSWER 12**



Mark ORG

Mark inspection to foul water sewer

Half mark for vent

Half mark for second vent

Half mark inspections (Max 2 mark total)

Mark all foul water connected correctly

Half mark all DP connected

Half mark storm water to kerb

**Total 7 marks**

## ANSWER 13

- (a) (i) The main conduit of a drainage system to which branches are connected. It is that portion of sewage service on private property normally located in ground and which conveys or is intended to convey the discharge from all fixtures to the outfall. (2 marks)
- (ii) Domestic wastes from baths, basins, showers, laundries, and kitchens including floor wastes from these sources. (1 mark)
- (iii) The unintended ingress of ground water and storm water into a sanitary drainage installation. (1 mark)
- (iv) Overflow from a sewer or combined sewer caused by overloading, or blockage. (1 mark)
- (b) – Chamfer spigot end.
- Lightly roughen end of pipe to give solvent something to bite into.
- Measure and mark depth of socket on pipe. (1 mark for 2 out of 3 steps)
- Clean both surfaces with appropriate cleaning fluid
- Apply even coating of appropriate solvent to socket and then spigot. (1 mark for both steps)
- Push spigot into full depth of socket.
- Remove excess solvent from pipe.
- Do not move for at least five minutes. (1 mark for 2 out of 3 steps)

**Total 8 marks**

## ANSWER 14

- (a)
- Convey *foul water* to an appropriate *outfall*,
  - Be constructed to avoid the likelihood of blockage,
  - Be supported, jointed and protected in a way that will avoid the likelihood of penetration of roots or the entry of ground water,
  - Be provided with reasonable access for maintenance and clearance blockages,
  - Be ventilated to avoid the likelihood of foul air and gases accumulating in the drainage system and *sewer*, and
  - Be constructed to avoid the likelihood of damage from superimposed loads or normal ground movement.

(Any 4, ½ mark each) (2 marks)

- (b) Below ground non pressure [gravity flow] foul water drains having a diameter of no greater than 150mm.

(1 mark)

- (c) NZ Building Code Acceptable Solutions G13/AS2 States that Drainage does not apply to foul water drainage systems where it is necessary to dispose of industrial wastes, chemical or toxic wastes which cannot be discharged to a sewer without pre treatment.

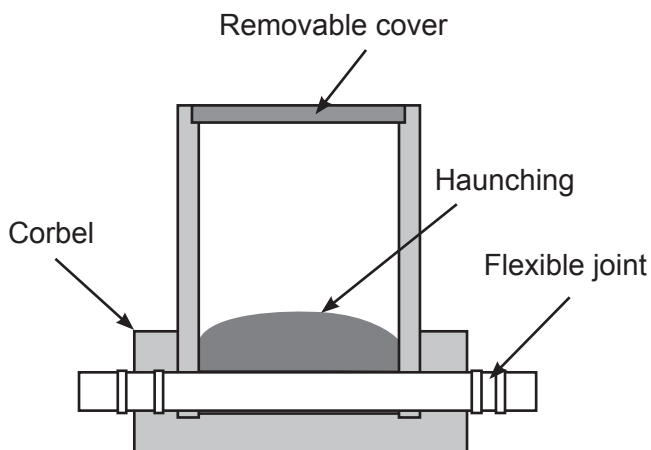
(2 marks)

- (d)
- (i) Plumbers, Gasfitters and Drainlayers Board.
  - (ii) The applicant.
  - (iii) The registered person who gives an undertaking that they will directly supervise the applicant.
  - (iv) Twelve months or until 31 March.
  - (v) The holder must have a current licence OR have the licence renewed each year.

(1 mark each, total 5 marks)

**Total 10 marks**

## ANSWER 15



½ mark removable cover  
½ mark Haunching  
½ mark Corbel  
½ mark flexible joints (Includes both)

**Total 2 marks**

