



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**SEPTEMBER 2018**

**CIVIL TECHNOLOGY: CIVIL SERVICES  
MARKING GUIDELINE**

**MARKS: 200**

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This marking guideline consists of 12 pages.

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**QUESTION 1: SAFETY, MATERIAL AND EQUIPMENT (GENERIC)**

- 1.1    1.1.1    True (1)  
       1.1.2    False (1)  
       1.1.3    False (1)  
       1.1.4    True (1)
- 1.2    Any THREE requirements to which a trestle scaffold must comply.  
       • Soundly constructed with a solid material  
       • Prevent spreading of supporting legs  
       • Not higher than 3 m  
       • Consists of not more than 2 tiers (3 x 1) (3)
- 1.3    Similar answer.  
       (1) Aluminium conducts (2) electricity / workers subjected to electrical shock (2)
- 1.4    Similar answer.  
       (1) Paint will cover (2) weaknesses (2)
- 1.5    1.5.2    Improves the durability of concrete. (1)  
       1.5.5    It improves the strength of concrete. (1)  
       1.5.7    It makes concrete more watertight. (1)  
       1.5.8    It improves the resistance to abrasion. (1)
- 1.6    (1) Plastic finish / coating (2) in powder form by (3) using a spray-gun (3)
- 1.7    Briefly describe any ONE use of the dumpy level.  
       • (1) Determine (2) height differences  
       • (1) Determine (2) levels and slopes  
       • (1) Setting out (2) of buildings  
       • (1) Transferring of (2) levels and heights  
       • (1) Determine horizontal (2) distances (1 x 2) (2)
- 1.8    1.8.1    1.5 m (1)  
       1.8.2     $1.535 - 1,47 \times 100 = 6,5 \text{ m}$  (4)
- 1.9    Any THREE materials which can be detected in walls by the multi-detector.  
       • Ferrous metals  
       • Non-ferrous metals  
       • AC wiring  
       • Wood  
       • Metal studs  
       • Steel bars  
       • Copper pipes (3 x 1) (3)
- 1.10   1.10.1   Dry, soft cloth / Not cleaning agents or solvents (1)  
       1.10.2   Remove battery (1)

**[30]**

**QUESTION 2: GRAPHICS AND JOINING (GENERIC)**

- 2.1 Use the information on ANSWER SHEET A and complete the site plan on scale 1 : 200 according to the following requirements:
- 2.1.1 The site boundaries are measured from point A  
The site boundaries in front and back are 23 m long  
The site boundaries on the sides are 25 m long (2)
  - 2.1.2 The front building line is 4 m from the site boundary  
The back and side building lines are 2 m from the site boundaries (2)
  - 2.1.3 Show the site entrance, 3 m from the western site boundary (1)
  - 2.1.4 Show the datum level in the north-eastern corner of the site  
Complete the sewage lay-out and abbreviations of the sewage appliances according to the following requirements: (1)
  - 2.1.5 The main sewage from the bathroom to the municipal connection (2)
  - 2.1.6 The branch sewage to the bathroom and kitchen (2)
  - 2.1.7 Manhole on the site, before the municipal connection (2)
  - 2.1.8 Rodding eyes (4)
  - 2.1.9 Inspection eyes (4)
- 2.2
- Length of shank
  - Diameter
  - Type of thread
  - Head size (4)
- 2.3 (1) When square shoulder is driven in (2) it resists rotation (2)
- 2.4
- 2.4 A – Nut
  - 2.4 B – Thread
  - 2.4 C – Runout
  - 2.4 D – Shank (4)

**[30]****TOTAL: 60**

**QUESTION 3: SAFETY, MATERIAL, EQUIPMENT AND GRAPHICS (SPECIFIC)**

- 3.1 Similar answer.  
(1) Prevent (2) material / people / tools falling into the manhole (2)
- 3.2 3.2.1 Stairs (1)  
3.2.2 Safety net (1)  
3.2.3 Cover (1)
- 3.3 Any ONE responsibility of the contractor when working in elevated positions:  
  - (1) Appoint a competent person (2) responsible for the preparation (3) of a fall protective plan
  - (1) Ensure that the protective plan (2) is implemented and (3) amended when necessary
  - (1) Ensure that steps are taken (2) in order to adhere to (3) the fall protective plan (1 x 3) (3)
- 3.4 (1) When selectively removing zinc (2) from an alloy (2)
- 3.5 Any ONE consequence of dezincification when it occurs in an alloy:  
  - Leaves a porous metal
  - -Leaves a metal with little mechanical strength (1)
- 3.6 White powder on the metal surface. (1)
- 3.7 Describe any TWO methods of preventing corrosion in metals:  
  - (1) Electrically (2) insulating the two metals
  - (1) Make sure that there is no contact (2) with an electrolyte
  - (1) Applying an antioxidant paste (2) to copper and aluminium surfaces
  - (1) Choosing metals that (2) have similar electrode potentials
  - (1) Connecting a DC current supply to (2) oppose the corrosive galvanic current (2 x 2) (4)
- 3.8 3.8.1 Drain cleaning rods (1)  
3.8.2 Coil spring (1)  
3.8.3 (1) Jet wash with (2) soapy water and (3) disinfectant (3)
- 3.9 3.9.1 Centrifugal pump (1)  
3.9.2 Pipe-thread cutting machine (1)  
3.9.3 Water pressure testing pump (1)
- 3.10 FIGURE 3.10 on ANSWER SHEET B shows a square-based truncated pyramid.  
Draw on ANSWER SHEET B the pattern development for the pyramid. (16)  
**[40]**

**QUESTION 4: QUANTITIES AND JOINING (SPECIFIC)**

- |     |   |  |     |
|-----|---|--|-----|
| 4.1 | 4.1.1   | Polycop  | (1) |
|     | 4.1.2   | 1 3240 mm (13,24 m)  | (1) |
|     | 4.1.3   | Polycop  | (1) |
|     | 4.1.4   | 8 800 mm (1,5 + 5,48 + 1,82 = 8,8 m)   | (1) |
|     | 4.1.5   | Copper   | (1) |
|     | 4.1.6   | 1  | (1) |
|     | 4.1.7   | Copper   | (1) |
|     | 4.1.8   | 1  | (1) |
|     | 4.1.9   | Copper   | (1) |
|     | 4.1.10  | 1  | (1) |
|     | 4.1.11  | Copper   | (1) |
|     | 4.1.12  | 1  | (1) |
| 4.2 | 4.2.1   | Branch pipe. (1) Pipe that branches off from (2) the main sewerage                 | (2) |
|     | 4.2.2   | Cleaning eye. (1) Opening to (2) access the inside of a pipe                       | (2) |
|     | 4.2.3   | Soil water. (1) Discharged from (2) water closet / Water that contains human waste | (2) |
| 4.3 | 4.3.1   | Soil pipe – Green  | (1) |
|     | 4.3.2   | Soil-water vent pipe – Blue  | (1) |
|     | 4.3.3   | Existing sewerage – Black  | (1) |
| 4.4 | 4.4.1   | Pipe clip  | (1) |
|     | 4.4.2   | 40 mm and 50 mm  | (2) |
|     | 4.4.3   | (1) To bind/fix polycop pipes (2) to surfaces                                      | (2) |
| 4.5 | $= \pi r^2 h$ $= \frac{22}{7} \times 1,05 \times 1,05 \times 2,4$ $= 8,316 \text{ m}^3$ |  | (4) |
| 4.6 | 4.6.1   | True   | (1) |
|     | 4.6.2   | True   | (1) |
|     | 4.6.3   | False  | (1) |
|     | 4.6.4   | False  | (1) |
| 4.7 | 4.7.1   | Compression joint  | (1) |
|     | 4.7.2   | 4.7.A – Compression rubber seal<br>4.7.B – Compression screw                       | (2) |
|     | 4.7.3   | uPVC-pipes   | (1) |
| 4.8 | (1) Thin layer of tin / solder is (2) melted onto the tip of the soldering iron         |  | (2) |

**[40]**

### QUESTION 5: CONSTRUCTION, COLD-WATER AND HOT-WATER SUPPLY (SPECIFIC)

- 5.1 FIGURE 5.1 on ANSWER SHEET C shows layer 1 of a double return angle in a one-brick wall in stretcher bond. Draw in good ratio on ANSWER SHEET C the alternative layer for the brick wall. (6)
- 5.2 FIGURE 5.2 on ANSWER SHEET D shows the incomplete top view of a concrete manhole. Complete in good ratio the branch connection and pipe work in the manhole. (3)
- 5.3 Any TWO reasons why the concrete benching in a manhole is constructed at a slope:
- Sewer spills can backslide into channel pipe
  - So that rats and other vermin cannot settle there (2 x 1) (2)
- 5.4 Any TWO positions where manholes must be installed:
- (1) Close as possible to municipal connection (2) but not further than 2 m from the boundary fence
  - (1) Every 20–25 m on a (2) straight section of a drain line
  - (1) At all important (2) changes of direction
  - (1) At changes of (2) gradient and levels
  - (1) At all important (2) junctions (2 x 2) (4)
- 5.5 5.5.1 Full-way valve (1)
- 5.5.2 5.5.A – Non-rising spindle  
5.5.B – Valve head  
5.5.C – Tapering gate  
5.5.D – Seating (4)
- 5.5.3 Any TWO positions where this type of valve must be installed.
- At the geyser
  - At the water meter
  - Low- and high-pressure cold water installations
  - Low- and high-pressure hot water installations (2 x 1) (2)
- 5.6 (1) Prevent the siphoning of water out of the cylinder (2) when the cold water is shut off (2)
- 5.7 5.7.1 Geyser (1)  
5.7.2 Heating (1)  
5.7.3 Northern side (1)
- 5.8 (1) After a disruption in the water supply / burst pipe / faulty plumbing  
(2) causing gas to be trapped in high points of the hot-water system.  
(3) When pressure is applied / taps are opened, the gas blocks the pipes, preventing the flow of water. (3)

**[30]**

### QUESTION 6: ROOFING, STORM WATER, DRAINAGE AND SANITARY APPLIANCES (SPECIFIC)

- 6.1 25 mm for each 4,8 m (3 mm for each 1 m of 10 mm for each 6 m of 1 : 600) (1)
- 6.2 Gutter bracket (1)
- 6.3 (1) Discharged storm water to (2) rivers and dams (2)
- 6.4 At least 5 m (1)
- 6.5 6.5.1 Inside of pipes – Be smooth (1)
- 6.5.2 Joints in pipes – Prevent gases from escaping (1)
- 6.5.3 Sharp bendings – Must be avoided (1)
- 6.5.4 Minimum diameter of pipes – 100 mm (1)
- 6.5.5 Height of vent pipes – At least 1 m (1)
- 6.6 Waste water – Comes from sink/bath/washbasin/shower  
Soil water – Comes from water closet (2)
- 6.7 6.7.1 Vent valve/Air admittance valve (1)
- 6.7.2 (1) Valve opens and (2) reduces the vacuum and allows (3) air into the system so that (4) the water can flow away freely / without releasing gases into the building (4)
- 6.8 Ground water may become polluted (1)
- 6.9 Any TWO causes of blockages in main sewer pipes:  
  - Material or objects that should not be flushed
  - Tree roots growing into pipe joints
  - Soil that seeps through joints
  - Heavy traffic over low-lying pipes
(2 x 1) (2)
- 6.10 0,25 kPa (1)
- 6.11 Any TWO properties of each of the following materials for sanitary fitments:  
6.11.1 Ceramic  
  - Durable
  - Pleasant surface
  - Glazed surface
  - Variety colours
  - Strong
(2 x 1) (2)

## 6.11.2 Stainless steel

- Readily available
- Very hygienic

(2 x 1) (2)

6.12 Choose a dimension from COLUMN B that matches a term in COLUMN A. Write only the letter (A-H) next to the question number (6.12.1 – 6.12.5) in the ANSWER BOOK, for example 6.12.6 J.

6.12.1	Sewer pipe size	F	100 mm
6.12.2	Washbasin height above floor level	H	800 mm
6.12.3	Washbasin water supply pipes	E	15 mm
6.12.4	Washbasin waste pipe	G	32 mm
6.12.5	Bathwater supply pipes	A	22 mm
		B	45 mm
		C	950 mm
		D	12 mm

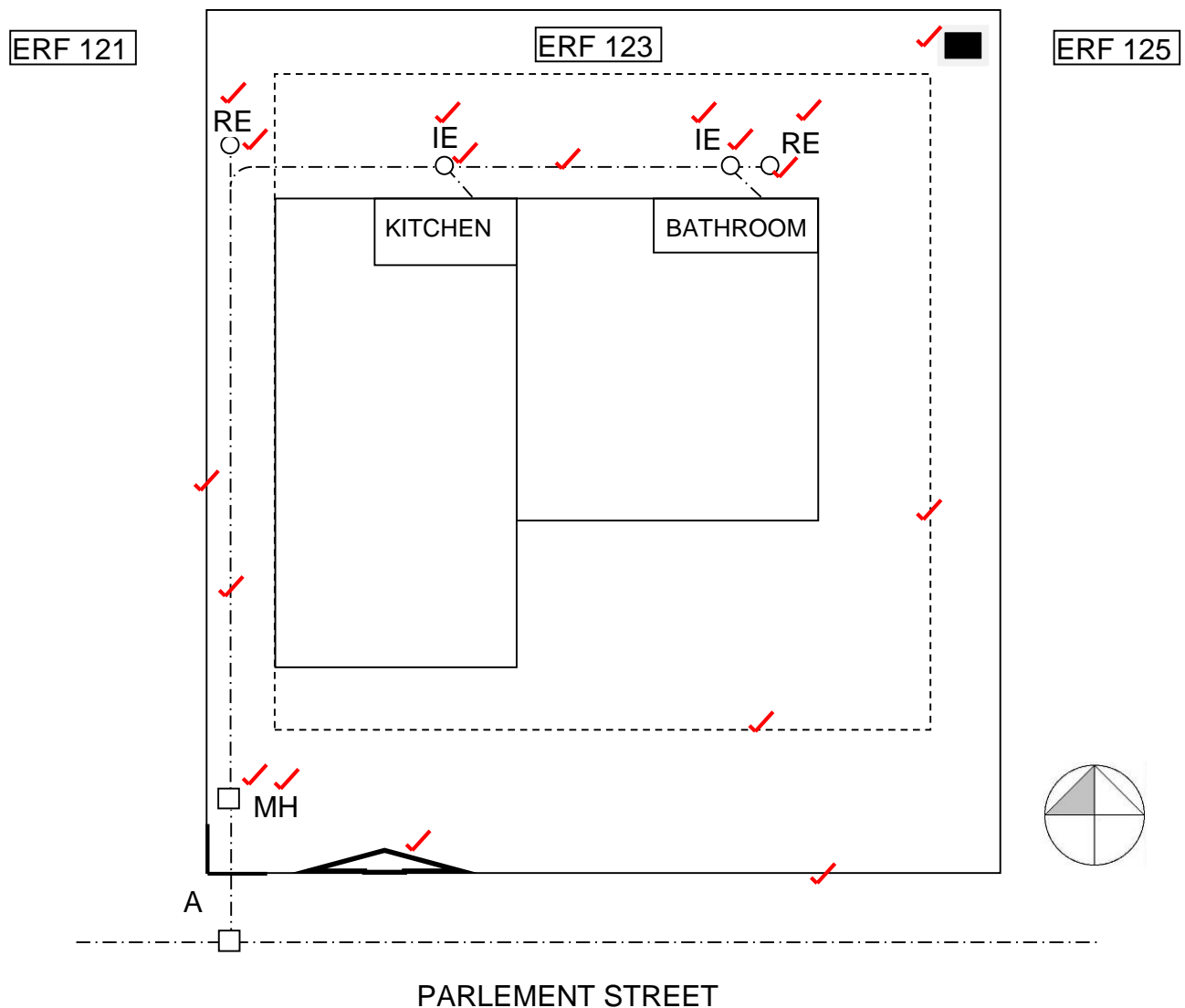
(5 x 1) (5)

**[30]****TOTAL: 200**



<b>ANSWER SHEET    A</b>	<b>CIVIL TECHNOLOGY GENERIC</b>	<b>NAME:</b> _____
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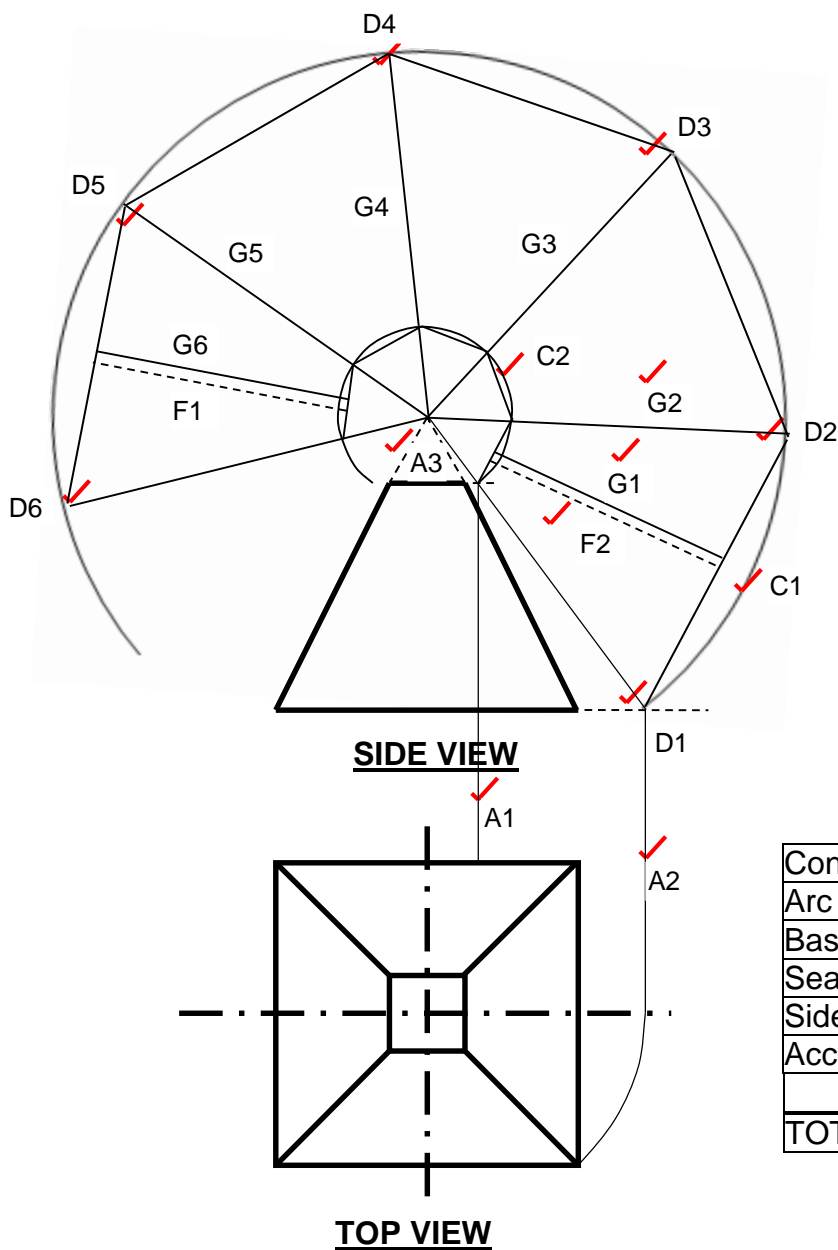
2.1 Use the information on ANSWER SHEET A and complete the site plan to scale 1 : 200.



Site boundaries	2	
Building lines	2	
Site entrance	1	
Datum level	1	
Main sewerage	2	
Branch sewerage	2	
Manhole	2	
Rodding eyes	4	
Inspection eyes	4	
<b>TOTAL</b>	<b>20</b>	

<b>ANSWER SHEET B</b>	<b>CIVIL TECHNOLOGY CIVIL SERVICES</b>	NAME: _____

3.10 FIGURE 3.10 on ANSWER SHEET B shows a square-based truncated pyramid. Draw on ANSWER SHEET B the pattern development for the pyramid.

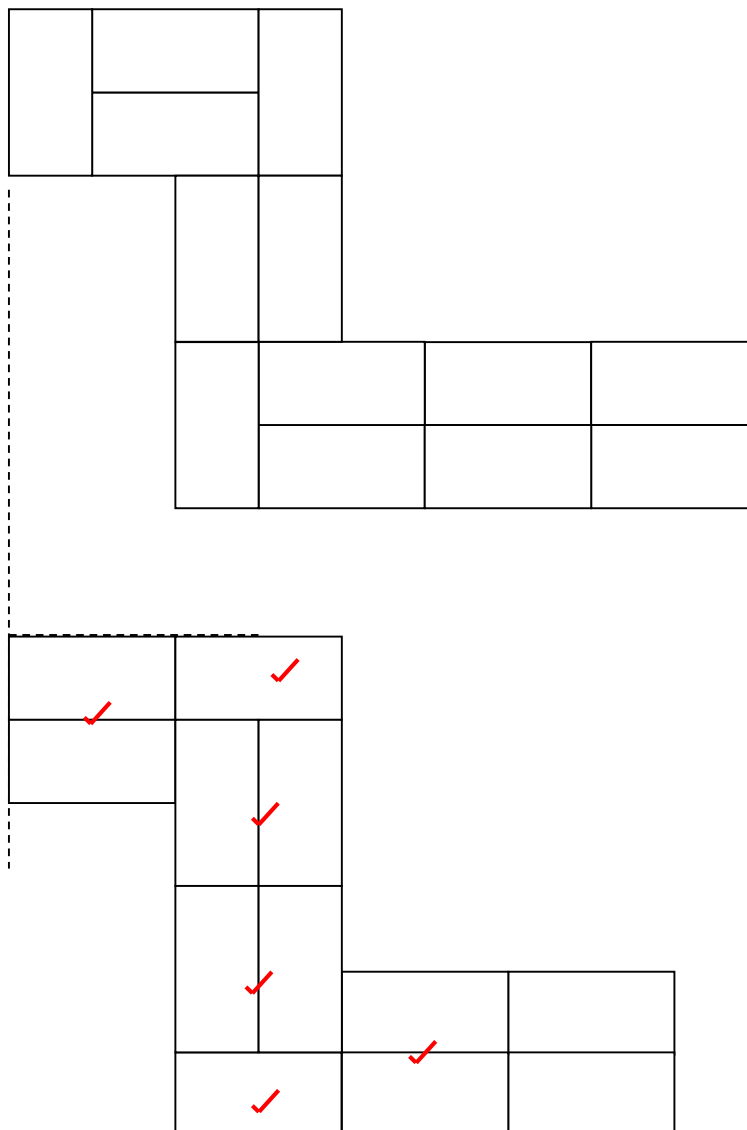


Accuracy + neatness ✓✓

Construction lines A1 – A3	3	
Arc lines C1 + C2	2	
Base points D1 – D6	6	
Seam lines F1 + F2	1	
Side lines G1 – G6	2	
Accuracy + neatness	2	
<b>TOTAL</b>	<b>16</b>	

ANSWER SHEET <b>C</b>	CIVIL TECHNOLOGY CIVIL SERVICES	NAAM: _____
		NAME: _____

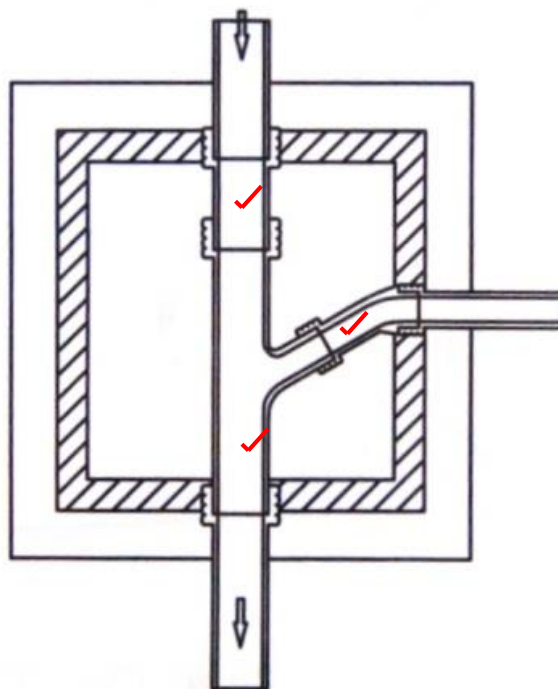
- 5.1 FIGURE 5.1 on ANSWER SHEET C shows layer 1 of a double return angle in a one-brick wall in stretcher bond. Draw in good ratio on ANSWER SHEET C the alternative layer of the brick wall.



(6)

<b>ANSWER SHEET    D</b>	<b>CIVIL TECHNOLOGY CIVIL SERVICES</b>	<b>NAME:</b> _____
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- 5.2    FIGURE 5.2 on ANSWER SHEET D shows the incomplete top view of a concrete manhole. Complete in good ratio the branch connection and pipe work in the manhole.



(3)