



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

SEPTEMBER 2018

**CIVIL TECHNOLOGY: CIVIL SERVICES
MARKING GUIDELINE**

MARKS: 200

This marking guideline consists of 12 pages.

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 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.

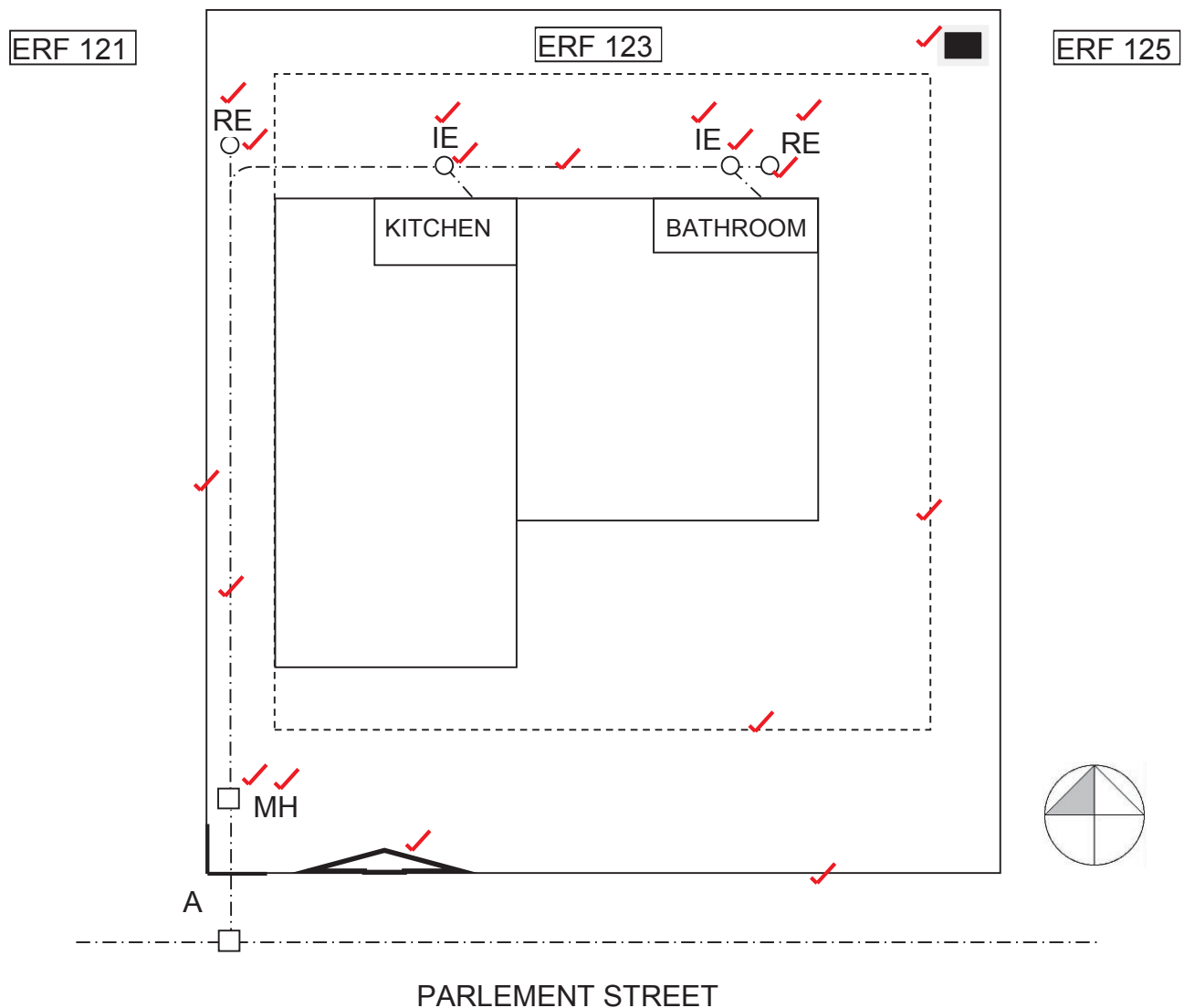
| | | | |
|--------|------------------------------------|---|--------|
| 6.12.1 | Sewer pipe size | F | 100 mm |
| 6.12.2 | Washbasin height above floor level | H | 800 mm |
| 6.12.3 | Washbasin water supply pipes | E | 15 mm |
| 6.12.4 | Washbasin waste pipe | G | 32 mm |
| 6.12.5 | Bathwater supply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

(5 x 1) (5)

[30]**TOTAL: 200**

| | | | |
|---------------------|----------|-------------------------------------|--------------------|
| ANSWER SHEET | A | CIVIL TECHNOLOGY GENERIC | NAME: _____ |
| | | | |

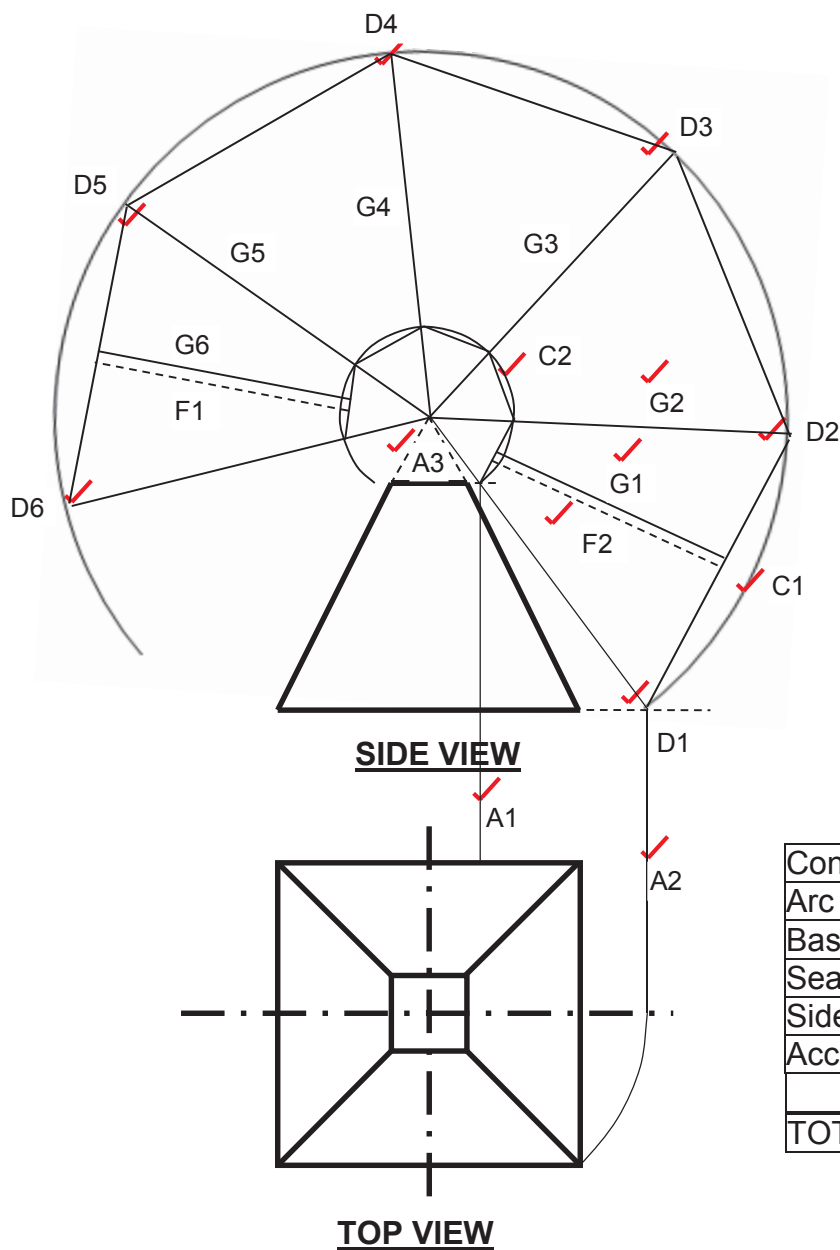
2.1 Use the information on ANSWER SHEET A and complete the site plan to scale 1 : 200.



| | | |
|-----------------|-----------|--|
| 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 | |
| TOTAL | 20 | |

| | | |
|-----------------------|--|-------------|
| ANSWER SHEET B | CIVIL TECHNOLOGY CIVIL SERVICES | 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.

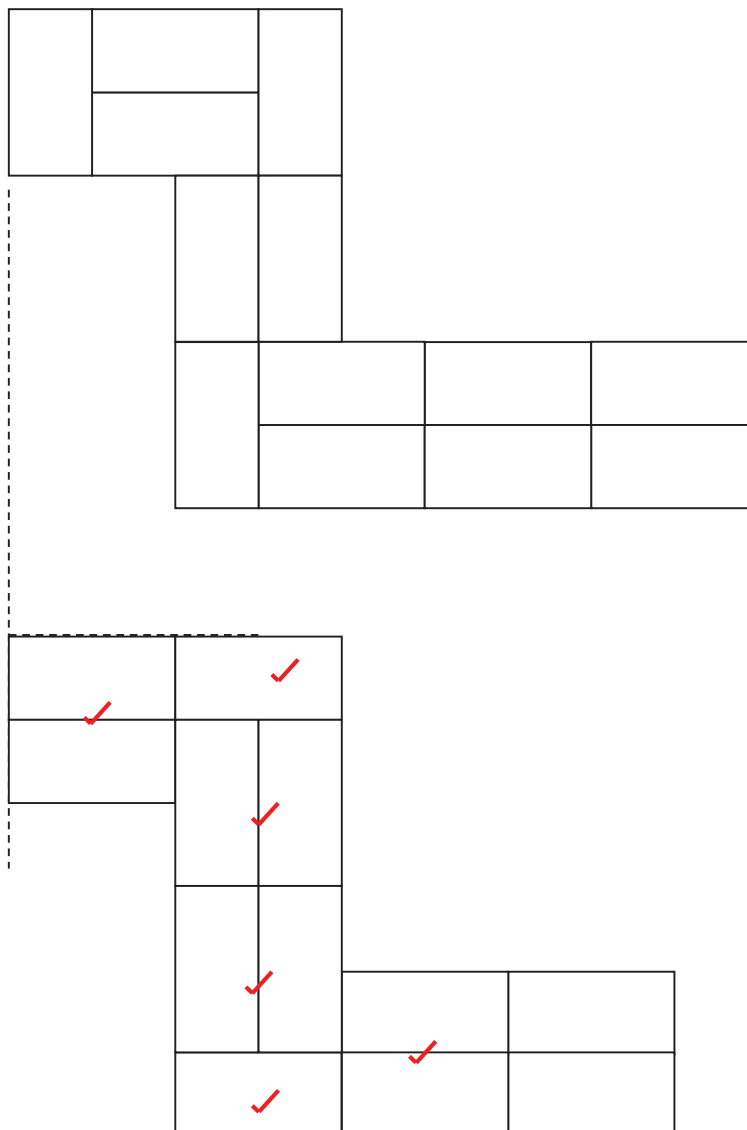


Accuracy + neatness ✓✓

| | | |
|----------------------------|-----------|--|
| 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 | |
| | | |
| TOTAL | 16 | |

| | | |
|-----------------------|------------------------------------|-------------|
| ANSWER SHEET C | CIVIL TECHNOLOGY CIVIL SERVICES | NAAM: _____ |
| | | NAME: _____ |

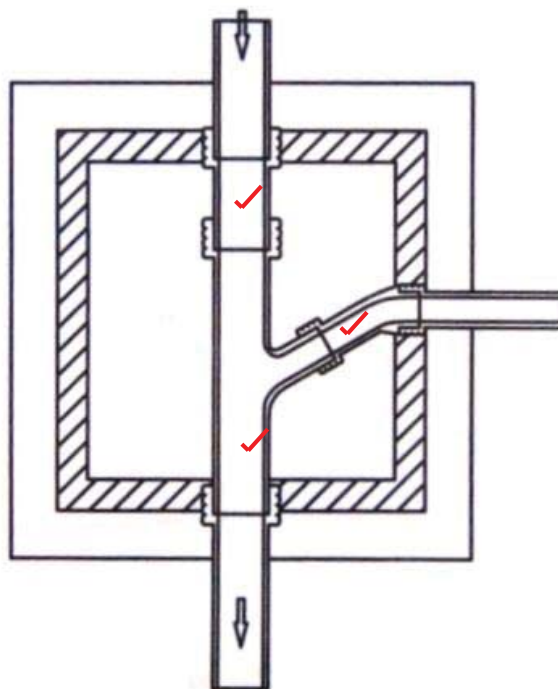
- 5.1 FIGURE 5.1 on ANSWER SHEET C shows layer 1 of a double return angle in a one-brick wall in stretcher bond. Draw in good ratio on ANSWER SHEET C the alternative layer of the brick wall.



(6)

| | | |
|--------------------------|--|--------------------|
| ANSWER SHEET D | CIVIL TECHNOLOGY CIVIL SERVICES | NAME: _____ |
|--------------------------|--|--------------------|

- 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)