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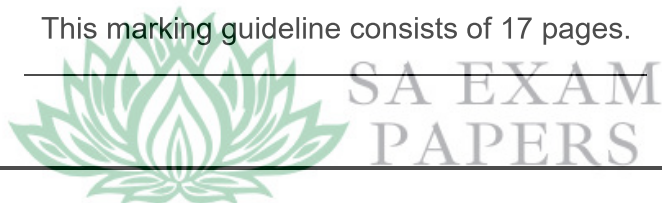
GRADE 12

SEPTEMBER 2024

CIVIL TECHNOLOGY: CONSTRUCTION MARKING GUIDELINE

MARKS: 200

This marking guideline consists of 17 pages.



INSTRUCTIONS FOR MARKERS**1. Markers should:**

- Familiarise themselves with the question and answer before evaluating the responses of candidates.
- Always interpret the responses of the candidates within the context of the question.
- Consider any relevant and acceptable answer during pre-marking but should strictly adhere to the answers after finalisation of the marking guideline.
- There are TWO approaches to answering questions; these are (1) to describe and (2) to explain.
 - If a candidate is required to explain e.g., a process in 4 steps, only the first 4 responses should be considered.
 - However, if for example candidate is required to explain or describe a process, we need to consider that that candidates may write a long description, not necessarily well organised. In this case the marker needs to evaluate the complete statement to judge if the candidate explained the required outcome satisfactorily and allocate marks on merit.
- Mark what the candidate wrote and do not interpret or predict responses.
- Indicate the tick or cross right at the position where the mark needs to be awarded or where the candidate made the error.
- Accept the letter corresponding with the correct answer as well as the answer written in full in multiple-choice questions or similar questions.
- Accept incorrect spelling in one-word answers unless the spelling changes the meaning of the answer.
- If a learner writes two or more answers separated by a slash (/) mark only the first response, unless the additional answer/s are different names for the same item e.g., Yale lock/Night latch. In this case, the answer for the response should be awarded and the slash (/) should NOT be considered as an additional answer.

2. For calculations:

- A mark is only awarded if the correct unit is written next to the answer. If the question states that the answer must be in a specific unit, a mark will ONLY be awarded if the answer has the correct unit as indicated in the question.
- Marks will only be allocated for the correct values if the candidates add instead of multiply. NO marks will be awarded for the calculations and the answer.
- Where an incorrect answer is correctly carried over, the marker must recalculate the values, using the incorrect answer from the first calculation. If correctly used, the candidate should receive the full marks for subsequent calculations.
- Alternative methods of calculations must be considered, provided that the correct answer is obtained.
- For the calculation of quantities marks will be awarded for the correct use of the dimension paper.

3. When marking drawings:

- The member for which the mark should be awarded should be drawn correctly in the correct position to receive a mark.
- A member incorrectly drawn but wrongfully repeated in another position will be awarded the mark for the repeated incorrect member provided that the marking guideline provide for TWO or more marks for that member (positive marking).
- Marks can only be awarded for a label if the label is correctly indicating the correct member.
- Scale drawings should always be marked using an appropriate mask.
- If the incorrect/wrong drawing was drawn, the candidate can be awarded for only what was provided for on the marking guideline.
- If a line diagram or an orthographic view instead of a pictorial drawing (isometric/oblique/perspective) is drawn, the first assessment criteria for each member will be marked wrong, but marks will be awarded for the subsequent members if TWO or more marks are awarded for the same member.
- If candidates draw/give more information than what is required, mark strictly according to the assessment criteria.

4. Incorrect numbering of questions:

- If a candidate numbered an answer incorrectly, but the answer is in the correct position according to the sequence of the questions in the question paper, circle then the incorrect numbering and mark the response.
- If questions were answered randomly not following the same sequence as in the question paper and the learner numbered incorrectly, the response should NOT be marked.

5. Duplication of responses and questions answered in the correct place:

- If a question has been answered twice, mark the first response.
- If a question should be answered on an answer sheet and the candidate answered it on both the answer sheet and in the answer book, mark the response on the answer sheet and cancel the response in the answer book.
- If the question has been answered in the answer book instead of on the answer sheet, mark the response in the answer book according to the assessment criteria on the marking guideline.

QUESTION 1: SAFETY AND MATERIAL (GENERIC)

- 1.1 1.1.1 2 (1)
- 1.1.2 228 mm (1)
- 1.1.3 900 mm (1)
- 1.1.4 150 mm (1)
- 1.1.5 Non-slippery layer (1)
- 1.2 **Similar answer:**
Prevent horizontal movement between the platform and structure. (1)
- 1.3 **Identify THREE of the following requirements that are applicable to the supplier of hazardous chemical substances:**
- 1.3.1 First-aid measures must be shown. (1)
- 1.3.4 Fire-fighting measures must be shown. (1)
- 1.3.6 Storage instructions must be shown. (1)
- 1.4 Minimum = 30° (1) and maximum = 50° (1) (2)
- 1.5 **Similar answer:**
Aluminium conducts electricity, (1) and workers who use the ladder could be shocked. (1) (2)
- 1.6 **Describe the difference between the surface finish of a water-based paint and an oil-based paint.**
- Water-based – provides an elastic, flexible finish. (1)
 - Oil-base – provides a hard, durable finish. (1) (2)
- 1.7 **Any THREE advantages of curing concrete:**
- Increases strength
 - Decreases permeability
 - Improves durability
 - Reduces cracks
 - Makes concrete more watertight
 - Provides volume stability
 - Concrete can carry more weight (Any 3 x 1) (3)
- 1.8 **Briefly describe the powder-coating process.**
Plastic finish in powdered form, (1) is applied by means of a compressed air spray-gun. (1) (2)

[20]

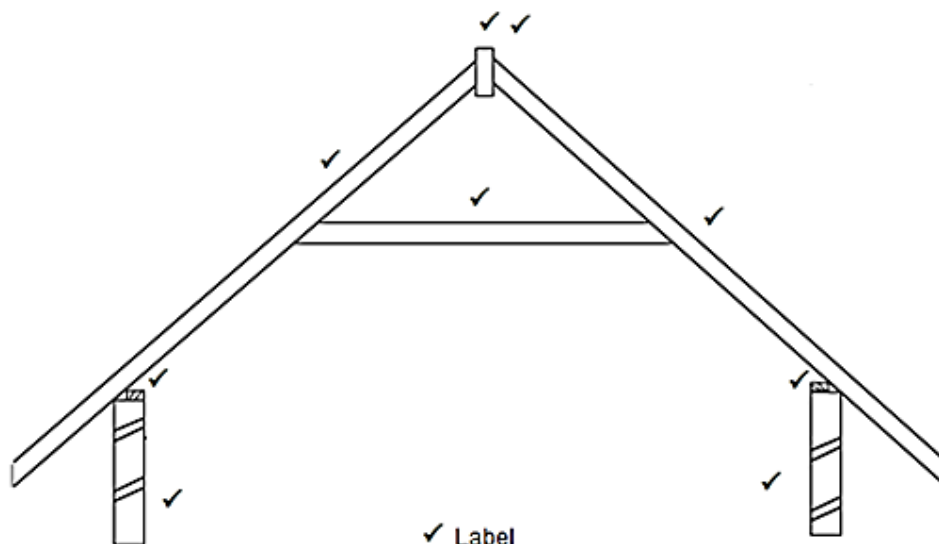
QUESTION 2: GRAPHICS, JOINING AND EQUIPMENT

- 2.1 **Use the information on ANSWER SHEET A and complete the site plan on a scale of 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 (1)
- Complete the sewage lay-out and abbreviations of the sewage appliances according to the following requirements:
- 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 eye (4)
- 2.2
- Length of shank
 - Diameter
 - Type of thread
 - Head size (4 x 1) (4)
- 2.3 When square shoulder is driven in, (1) it will resist rotation. (1) (2)
- 2.4
- A – Nut
 B – Thread
 C – Runout
 D – Shank (4 x 1) (4)
- 2.5 **Any TWO 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 two tiers. (Any 2 x 1) (2)
- 2.6 **Name TWO precautionary measures when transporting a ladder.**
- Not protruding excessively.
 - End marked with a red or orange flag. (2 x 1) (2)
- 2.7 **Similar answer.**
 Paint will cover (1) weaknesses. (1) (2)
- 2.8 **Briefly describe any ONE use of the dumpy level.**
- Determine (1) height differences. (1)
 - Determine (1) levels and slopes. (1)
 - Setting out (1) of buildings. (1)
 - Transferring of (1) levels and heights. (1)
 - Determine horizontal (1) distances. (1) (Any 1 x 2) (2)

- 2.9 **Any TWO materials which can be detected in walls by a multi-detector.**
- Ferrous metals
 - Non-ferrous metals
 - WS-wiring
 - Timber
 - Metal pegs
 - Steel rods
 - Copper pipes
- (Any 2 x 1) (2)
[40]

QUESTION 3: ROOFS, STAIRCASES AND JOINING

3.1 Draw in good proportion, a neat sketch of a collar tie roof truss with a pitch of 45° resting on two supporting walls.



ASSESSMENT CRITERIA	MARK	CANDIDATE'S MARK
Walls	2	
Wall plates	2	
Rafters	2	
Collar beam/Collar tie	1	
Ridge beam correctly drawn	2	
Any ONE label	1	
TOTAL:	10	

(10)

3.2 5° (1)

3.3 1 400 mm (1)

3.4 3.4.1 Riser (1)

3.4.2 Baluster (1)

3.4.3 Going / Tread (1)

3.4.4 Landing (1)

3.4.5 Run (1)

3.5 Any ONE of the measurements:

- 50 mm (1) x 76 mm (1) OR,
- 76 mm (1) x 50 mm (1) OR,
- 76 mm (1) x 76 mm (1)

(Any 1 x 2) (2)

- 3.6 3.6.1 A – Landing (1)
B – Shutter board (1)
C – Bearer / Joist (1)
D – Prop (1)
E – Folding Wedges / Wedges (1)
- 3.6.2 850 mm (1)
- 3.7 **Any ONE:**
- 3.7.1 Anchor / Galvanised steel straps / Hoop iron / Wires (1)
- 3.7.2 Bolted / Nailed / Galvanised steel straps / Hoop iron / Wires built in (1)
- 3.7.3 Bolted / Welded / Glued (1)
- 3.7.4 Cast-in anchors / Bolted (1)
- 3.7.5 Screwed / Anchored to wall using sleeve anchors / Use support anchor (1)
- [30]**

QUESTION 4: MATERIAL, EXCAVATIONS, FOUNDATIONS EQUIPMENT AND TOOLS

- 4.1 4.1.1 H – alternative for glass (1)
- 4.1.2 C – tested in a laboratory (1)
- 4.1.3 D – non-ferrous metal (1)
- 4.1.4 G – packaging material (1)
- 4.1.5 F – tested on the site (1)
- 4.1.6 A – ferrous metal (1)
- 4.2 4.2.1 Slump test (1)
- 4.2.2 **Any TWO reasons for the purpose of the slump test:**
- To test the density of concrete (percentage water)
 - To determine the workability and consistency of batches
 - To determine the slump of the mixture (Any 2 x 1) (2)
- 4.2.3 **Any ONE tool used for slump test:**
- Rule
 - Level
 - Cone
 - Baseplate
 - Tamping rod (Any 1 x 1) (1)
- 4.3 **Any TWO methods of curing concrete:**
- Water by means of spraying
 - Cover with water-retaining substances such as damp sand, sacking, straw, hessian or canvas
 - Plastic membrane or plastic sheets
 - Commercial sealant
 - Pool forming
 - Similar answer (Any 2 x 1) (2)
- 4.4 **Purpose of cladding on building**
- Application of prefabricated materials onto the external surfaces of buildings for aesthetic and functional purposes.
 - Helps to control and direct weather elements, like rainwater and wind. (2 x 1) (2)
- 4.5 **Any THREE types of cladding for buildings:**
- Tile cladding
 - Brick slip cladding
 - Stone cladding
 - Timber cladding
 - Metal sheet cladding (Any 3 x 1) (3)

- 4.6 4.6.1 Portable concrete vibrator (1)
- 4.6.2 **Any ONE purpose of this machine:**
- Compaction of ground
 - Force the trapped air out of the mixture
 - Refilling
 - Paving stones (Any 1 x 1) (1)
- 4.6.3 **Any TWO ways of maintaining the machine:**
- Maintain like all machinery – lubricate and adjust according to the manufacturer’s instructions.
 - Clean after use and store in a safe, dry place.
 - Repair or replace damaged electric cords.
 - Service regularly / ensure all parts are tightly secured
 - Remove loose sand and dust after use. (Any 2 x 1) (2)
- 4.7 4.7.1 True (1)
- 4.7.2 True (1)
- 4.7.3 True (1)
- 4.7.4 False (1)
- 4.8 **Any THREE causes for the collapse of an excavation:**
- Heavy rains
 - Poor soil strata, structure or composition
 - Sides not dug at the correct angle
 - Improper use of formwork or shoring to support walls
 - Vibration by machinery or heavy vehicles nearby
 - Water seeping into the excavated area
 - Contact with underground service
 - Access to and exit from the excavation
 - Soil slides due to cracks or loose soil (Any 3 x 1) (3)
- 4.9 **Any TWO ways of making excavations safe at night:**
- Warning signs
 - Warning lights (red or orange)
 - Covering
 - Fencing (Any 2 x 1) (2)
- 4.10 4.10.1 1,5 m (1)
- 4.10.2 1,3 m (1)
- 4.10.3 600 mm (1)

- | | | | |
|------|--------|--------------------|-----|
| 4.11 | 4.11.1 | Pile foundation | (1) |
| | 4.11.2 | Stepped foundation | (1) |
| | 4.11.3 | Strip foundation | (1) |
| | 4.11.4 | Pile foundation | (1) |
- 4.12 **Any THREE advantages of pile foundations:**
- It can be used in poor soil
 - It can be used anywhere, even in water
 - The larger base ensures stability
 - Quick and easy to install if the equipment is available
 - If prefabricated piles are used, much time is saved
 - It resists tensile stress well
 - Quick and less expensive to produce
 - Can be manufactured elsewhere and transported to the site
 - Installation can continue in poor weather conditions
 - Length of piles can be easily adjusted
 - Offers good resistance against moving soil
- (Any 3 x 1) (3)
[40]

QUESTION 5: BRICKWORK, GRAPHICS, PLASTER AND SCREED

- 5.1 5.1.1 C – Wet the wall / Prepare the wall / Clean (2 x 1) (2)
 B – Apply the plaster (2 x 1) (2)
 D – Level / Cut the plaster / Removing access
 Plaster (Sawing movement) (2 x 1) (2)
 A – Smoothen / Float / Finish the surface (2 x 1) (2)

5.1.2 **Any ONE purpose of wetting the wall:**

- If not done, the plaster will not stick properly to the wall.
- If not done, the plaster will dry out too quickly.
- If not done, the strength of the plaster will be affected.

(Any 1 x 1) (1)

- 5.1.3 Building lime (1)

5.2 5.2.1 **Any ONE jointing method:**

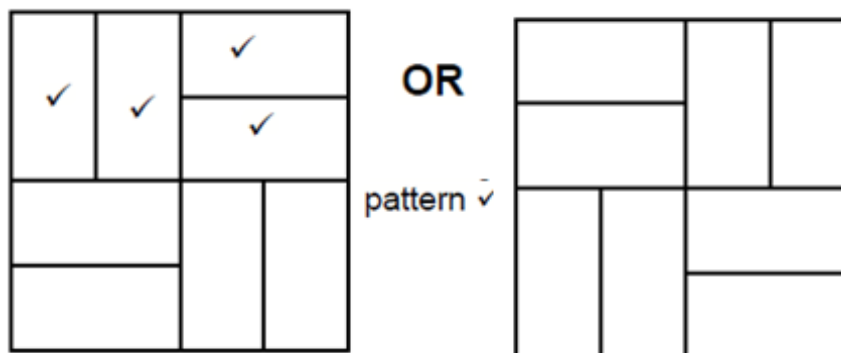
- River sand / Plaster sand is used as grouting between paving blocks / bricks
- Mixture of plaster sand and cement is used as grouting between paving blocks / bricks.

(Any 1 x 1) (1)

- 5.2.2 The final layer upon which the paving units are laid. (1)

- 5.2.3 Paving is subjected to only pedestrian use. (1)

- 5.3 5.3.1

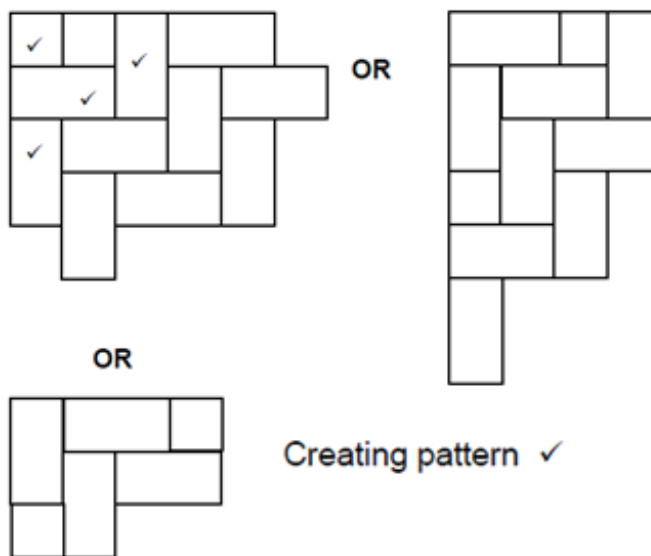


BASKET-WEAVE PAVING PATTERN

ASSESSMENT CRITERIA	MARK
Vertical first and second full bricks	2
Horizontal first and second full bricks	2
Creating pattern	1
TOTAL:	5

(5)

5.3.2



HERRINBONE PAVING PATTERN

ASSESSMENT CRITERIA	MARK
Half brick	1
Full bricks to create pattern	3
Creating pattern	1
TOTAL:	5

(5)

5.4 5.4.1 To hold the two skins (walls) of the cavity wall together. (1)

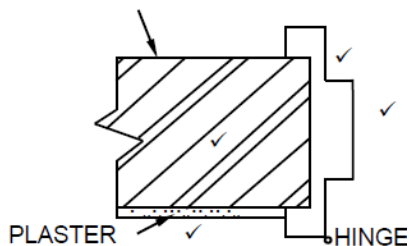
5.4.2 **Any ONE position where the weep holes must be positioned:**

- Above the horizontal damp-proof course of the external wall.
- On the same level as the concrete floor.
- Above the lintel on top of the window / door opening.
- Minimum 150 mm above NGL (Any 1 x 1) (1)

5.4.3 **Any ONE purpose of weep holes:**

- Water that penetrates the outside wall can drain out through the weep hole.
- For ventilation purposes. (Any 1 x 1) (1)

5.5 FACE BRICK



ASSESSMENT CRITERIA	MARK
Face brick wall (Correct hatching)	1
Plaster	1
Steel door frame	2
TOTAL:	4

DOOR FRAME IN FACE BRICK WALL

(4)
[30]

**QUESTION 6: FORMWORK, REINFORCEMENT, FOUNDATIONS,
CONCRETE FLOORS AND QUANTITIES (SPECIFIC)**

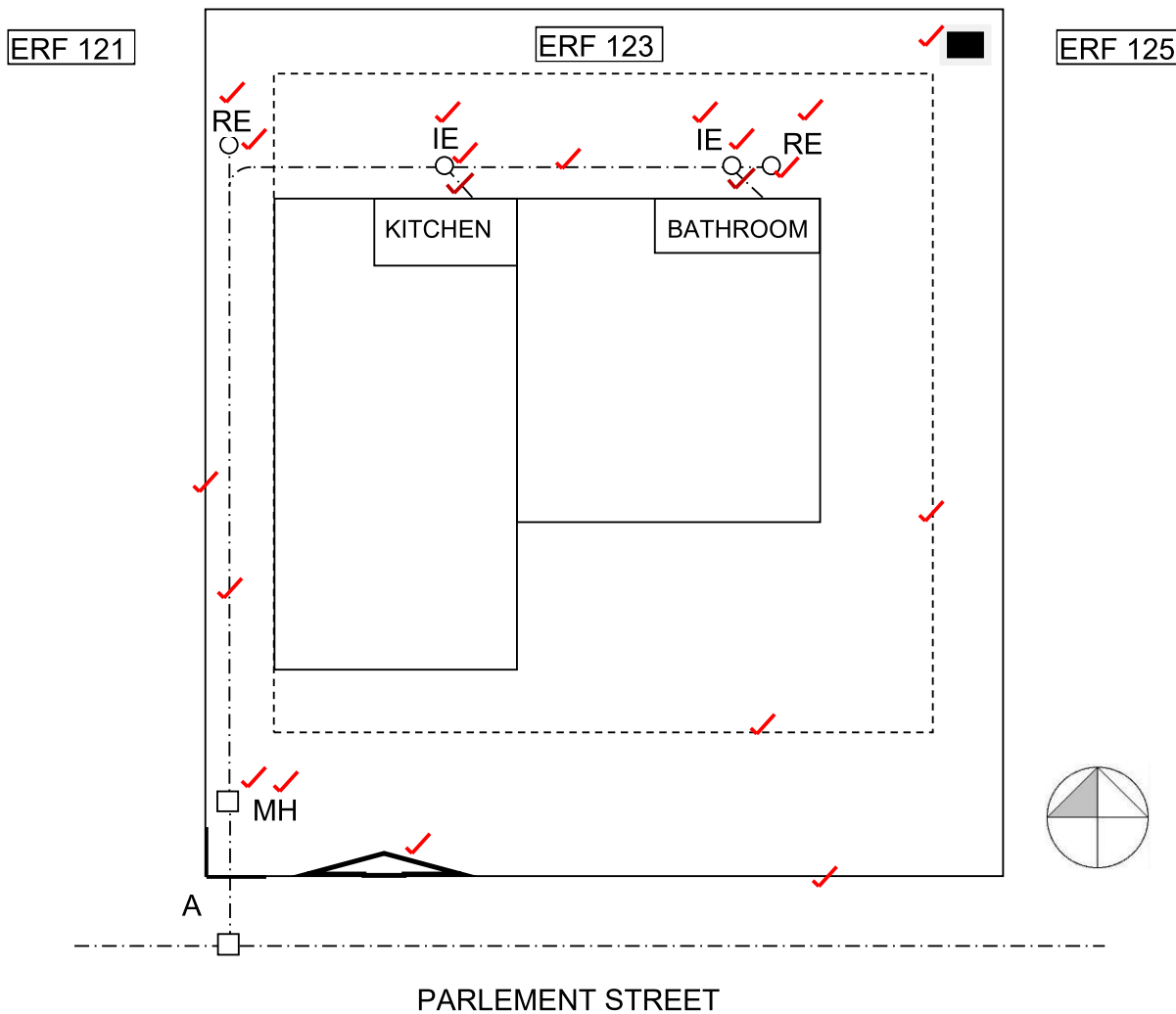
- 6.1 **Any ONE material that can be used to line the formwork, to obtain a smoother finish:**
- Plastic
 - Metal sheeting
 - Hardboard
 - Fibreglass (Any 1 x 1) (1)
- 6.2 A – Bearer / head tree (1)
- B – Brace / strut (1)
- C – Prop / strut (1)
- D – Soleplate (1)
- 6.3 6.3.1 Soft / mild steel (1)
- 6.3.2 200 mm (1)
- 6.3.3 10 mm (1)
- 6.4 6.4.1 Compressive forces (Anchor bars) (1)
- 6.4.2 Shear forces (Stirrups) (1)
- 6.5 **Any ONE method of joining steel bars with wire:**
- Crosswise method
 - Hair knot method
 - Crown method (Any 1 x 1) (1)
- 6.6 **Any TWO purposes of the cover depth at the reinforcing of concrete work:**
- To protect steel against corrosion
 - To ensure adequate bonding between the steel and concrete
 - To ensure adequate protection of steel in event of a fire (Any 2 x 1) (2)
- 6.7 **Any TWO types of pile foundations:**
- Precast concrete piles / prefabricated piles
 - Steel tube caisson piles
 - In-situ (driven) foundation piles
 - Short-bored (auger) piles (Any 2 x 1) (2)

- 6.8 **Any THREE reasons for using pile foundations:**
- Ground conditions not stable / solid enough
 - Distribute the load to more stable ground (underground / water supports)
 - Provides stability when raft / floating foundation is used
 - When structures are subjected to horizontal forces, pile foundations resist bending stress while still lending vertical support
 - Soils prone to swelling and shrinking (clay soil)
 - Superstructure is exposed to uplifting forces (offshore platforms)
 - Where soil erosion is possible (bridges) (Any 3 x 1) (3)
- 6.9 6.9.1 A – Hollow-core blocks / Concrete floor block (1)
- B – Rib / Reinforced ribs / Pre-stressed ribs (1)
- 6.9.2 **Any ONE disadvantage of the rib-and-block floor construction:**
- Mechanical handling for the ribs requires on site
 - Manual labour required to place blocks between ribs (Any 1 x 1) (1)
- 6.10 6.10.1 Calculate the length of the wall plate (See ANSWER SHEET B) (3)
- 6.10.2 Calculate the number of roof trusses (See ANSWER SHEET B) (6)
- 6.10.3 Calculate the number of purlins (See ANSWER SHEET B) (4)
- 6.10.4 Calculate the length of fascia board (See ANSWER SHEET B) (6)
- [40]**

TOTAL: 200

ANSWER SHEET	A	CIVIL TECHNOLOGY GENERIC	NAME AND SURNAME:	

2.1 Use the information on ANSWER SHEET A and complete the site plan on a scale of 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 (GENERIC)	NAME
			AND SURNAME:

A	B	C	D	A	B	C	D
6.10.1				6.10.3			
Wall plate needed between gable walls:				Number of purlins needed:			
			Internal dimensions for				Length of rafter
			Long walls = 5 560 mm				=
✓ 2/	✓ 5,56	✓ 11,12	m wall plate needed.				Dist. Btw. Centres of purlins
							<u>2,44</u>
							= 0,813
							= 3 purlins needed
			(3)				(4)
6.10.2				6.10.4			
Number of roof trusses needed:				Length of fascia board needed:			
			Internal Dimensions				Length of fascia board =
			= Dist. Btw. centres				Length of purlin
			$\frac{11,12}{1,2} + 1$ roof truss				= 150 + 6 000 + 150
			= 9,27 + 1 roof truss				= 6 300 mm purlin ✓✓
			= 10 + 1 roof truss	✓ 2/	✓ 6,3	✓ 12,60	Fascia board =
			= 11 roof trusses needed				6 300 mm ✓
			(6)				m Fascia board needed
							(6)
PAGE 1				PAGE 2			