



Province of the  
**EASTERN CAPE**  
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo  
Provinsie van die Oos Kaap: Departement van Onderwys  
Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

# **NATIONAL SENIOR CERTIFICATE**

## **GRADE 12**

### **SEPTEMBER 2025**

## **CIVIL TECHNOLOGY: CONSTRUCTION MARKING GUIDELINE**

**MARKS: 200**

---

This paper consists of 13 pages including 2 answer sheets.

---

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

- 1.1 1.1.1 760 mm x 560 mm (1)
- 1.1.2 3,7 m (1)
- 1.1.3 30° (1)
- 1.1.4 50° (1)
- 1.1.5 510 mm (1)
- 1.2 ANY **TWO** MATERIALS THAT LADDERS ARE GENERALLY MADE OF.  
- Wood  
- Aluminium  
- Fibreglass (2 x 1) (2)
- 1.3 - Lifting medium  
- Power type (2 x 1) (2)
- 1.4 Water-based – provides an elastic, flexible finish (1).  
Oil-base – provides a hard, durable finish (1). (2 x 1) (2)
- 1.5 ANY **THREE** PROPERTIES OF THE CURING PROCESS OF CONCRETE.  
- Surface of cured concrete is durable.  
- Improves the protection of the steel reinforcement.  
- Curing allows concrete to achieve optimal strength and hardness.  
- Avoids cracking where the surface dries out quickly.  
- Improves abrasion resistance. (3 x 1) (3)
- 1.6 **THREE** ADVANTAGES OF ELECTROPLATING.  
- Protects metal against corrosion.  
- Improves the engineering and mechanical properties of metal.  
- May also be used to increase the thickness of undersized parts. (3 x 1) (3)
- 1.7 Process of applying a plastic finish/coating in powder form (1), using a compressed air spray-gun (1). (2)
- 1.8 Zinc (1)
- [20]**

**QUESTION 2: GRAPHICS, JOINING AND EQUIPMENT**

- 2.1 Answers on ANSWER SHEET A. (20)
- 2.2 2.2.1 A – Laser level  
B – Telescopic staff  
C – Tripod (3)
- 2.2.2 ANY **TWO** BELOW:  
• Place the laser level in its case directly after use  
• Do not bump the instruments against objects or drop it  
• It must be properly calibrated  
• It must be handled carefully (2 x 1) (2)
- 2.3 2.3.1 The reading on the staff is 1,5 m (1)
- 2.3.2 Minimum = 30 m  
Maximum = 200 m (2)
- 2.4 2.4.1 Use a dry, soft cloth, not a cleaning agent or solvent. (1)
- 2.4.2 Remove batteries (1)
- 2.5 **A** Nut with built-in washer (1)
- B** Wing nut (1)
- C** Domed nut (1)
- 2.6 2.6.1 Rawl bolt (1)
- 2.6.2 **A** – Drill a hole to the required diameter and depth. (1)
- B** – Remove debris and clean the hole thoroughly with a brush or by blowing it. (1)
- C** – Remove the bolt and washer, insert the shield and place the fixture over the hole. (1)
- D** – Insert the bolt with washer through the fixture and tighten to the recommended torque. (1)
- 2.6.3 ANY **TWO** BELOW:  
• It is a strong fastener that resist pull-out failure.  
• Rawl bolts have excellent carrying capacity and tolerance to a variance in the hole size.  
• Excellent mechanical properties, such as tensile strength and yield stress. (2 x 1) (2)
- [40]**

**QUESTION 3: ROOFS, STAIRCASES AND JOINING****3.1 ANY THREE TYPES OF ROOF TRUSSES:**

- South African roof truss
- Single Howe truss
- Couple roof
- Closed couple roof
- Collar-tie roof
- King post roof truss
- W-truss or Fink truss
- Fan truss
- Scissors truss

(Any 3 x 1) (3)

**3.2 ANY THREE ADVANTAGES OF THE USE OF ROOF UNDERLAYS:**

- Acts as a secondary roof
- A weather shield during construction
- Waterproof and weatherproof
- Condensation barrier
- Dustproof
- Protects the building / structure
- Protects thermal insulation material
- Protects ceiling boards
- Superior wind uplifting strength prevents lifting of tiles
- Vapour resistant
- High tensile resistance
- Cost effective
- High heat resistance

(Any 3 x 1) (3)

3.3 3.3.1 **A** – Ridge tile (1)

**B** – Clay tile (1)

**C** – Batten (1)

**D** – Waterproof underlay / DPC (1)

**E** – Rafter (1)

3.3.2 38 mm (1) x 114 mm (1) (2)

3.3.3 Allows rainwater that is blown in under the tiles to flow to the gutters. (1)

3.4 3.4.1 Run (1)

3.4.2 Landing (1)

3.4.3 Tread/going (1)

3.5	<b>A</b> – Handrail	(1)
	<b>B</b> – Baluster	(1)
	<b>C</b> – Riser	(1)
3.6	750 mm	(1)
3.7	38°	(1)
3.8	3.8.1 True	(1)
	3.8.2 False	(1)
	3.8.3 True	(1)
3.9	3.9.1 Roof truss and brick wall are fixed to each other.	(1)
	3.9.2 <b>A</b> – Galvanised steel strap/hoop iron strap.	(1)
	<b>B</b> – Wall plate	(1)
	3.9.3 600 mm	(1)
	3.9.4 Nailed/Bolted	(1)
		<b>[30]</b>

**QUESTION 4: MATERIAL, EXCAVATIONS, EQUIPMENT AND TOOLS**

- 4.1 4.1.1 F (tested on site) (1)
- 4.1.2 G (high volume of concrete) (1)
- 4.1.3 E (ferrous metals) (1)
- 4.1.4 C (tested in a laboratory) (1)
- 4.1.5 A (small volume of concrete) (1)
- 4.1.6 B (non-ferrous metals) (1)

**4.2 ANY FOUR TYPES OF APPARATUS FOR THE SLUMP TEST:**

- Slump test cone/mould
  - Base plate
  - Tamping rod
  - Ruler/Tape measure
  - Spirit level/Rod
- (Any 4 x 1) (4)

**4.3 ANY TWO – DISCUSS THE PURPOSES OF THE CUBE TEST:**

- Determine the maximum compressive strength of cured concrete with load.
  - Ensure concrete complies with requirements of project specifications.
  - Indicate compressive strength in MPa, thus the its ability to resist loads.
- (Any 2 x 1) (2)

**4.4 DRAW A NEAT SKETCH OF A NORMAL FAILURE OF A CUBE TEST:**

(Any 3 x 1) (3)

**4.5 ANY THREE – DISCUSS THE PURPOSES OF CLADDING TO EXTERNAL SURFACES OF BUILDINGS:**

- Aesthetic purposes
  - Functional purposes
  - Help to control weather elements (rain/wind)
  - Prevent runoff (water) from penetrating the building
- (Any 3 x 1) (3)

**4.6 ANY TWO METHODS OF FIXING CLADDING:**

- Adhesive fixing
  - Face fixing
  - Proprietary fixing
- (Any 2 x 1) (2)

- 4.7 **ANY THREE SAFETY FACTORS AND REGULATIONS THAT A SITE MANAGER MUST HAVE IN PLACE, BEFORE EXCAVATION COMMENCES:**
- Ensure a competent person evaluates the stability of the ground
  - Draw safety plan and take steps to ensure safe working conditions
  - Ensure that planned excavations/trenches be supported by a protective system (formwork/shoring) and be indicated on safety plan
  - Eliminate as many risks and hazards as possible
  - Erect fencing (at least one metre high) around perimeter of excavations
  - All excavations done under qualified supervision
  - Carry out of inspections to determine position of services (cables, pipes)
- (Any 3 x 1) (3)
- 4.8 4.8.1 Fencing/Warning signs/Warning lights/Covering (1)
- 4.8.2 All workers must wear protective clothing (1)
- 4.8.3 With a ladder/scaffolding (1)
- 4.8.4 Inspections must be done daily (1)
- 4.9 4.9.1 True (1)
- 4.9.2 True (1)
- 4.9.3 False (1)
- 4.9.4 False (1)
- 4.10 4.10.1 Firm ground/Hard ground (1)
- 4.10.2 **A** – Poling boards (1)
- B** – Strut (1)
- C** – Walling boards (1)
- D** – Folding wedges (1)
- 4.11 4.11.1 Plate compactor (1)
- 4.11.2 **ANY THREE WAYS TO CARE AND MAINTAIN THE PLATE COMPACTOR:**
- Maintain – lubricate and adjust to manufacturer's instructions
  - Clean after use and store in a safe, dry place
  - Repair/replace damaged electrical cords
  - Service regularly
  - Remove loose dirt and soil after use
  - Ensure that all parts are firmly attached
- (3 x 1) (3)

**[40]**

**QUESTION 5: BRICKWORK, GRAPHICS, PLASTER AND SCREED**

- 5.1 5.1.1 Half brick wall/Internal wall (1)
- 5.1.2 110 mm (1)
- 5.1.3 2,4 m (1)
- 5.2 **ANY THREE ADVANTAGES OF CAVITY WALLS:**
- Prevent rainwater from penetrating the interior wall surface
  - Provide good thermal and sound insulation
  - Cheaper materials can be used for internal walls
  - Reduces / prevent expensive exterior finishes (Any 3 x 1) (3)
- 5.3 5.3.1 50 mm (1)
- 5.3.2 8 m (1)
- 5.3.3 To remove wasted mortar (1)
- 5.3.4 Wall ties (1)
- 5.3.5 Allows water that penetrates the outside wall to drain. (1)
- 5.4 Double triangular pattern (1)
- 5.5 5.5.1 **A** – Gutter (1)
- B** – Fascia board (1)
- C** – Ceiling board (1)
- 5.5.2 Closed eave construction. (1)
- 5.6 5.6.1 F (prepared layer beneath paving and bedding sand) (1)
- 5.6.2 C (best edge restraint for paving) (1)
- 5.6.3 A (natural soil on which the paving will be laid) (1)
- 5.6.4 D (final layer upon which paving is laid) (1)



**5.7 ANY TWO ADVANTAGES OF MORTAR-SET PAVING:**

- Little maintenance is required
- Low life-cycle cost
- Resistant to point loads
- Resistant to fatigue and reflecting traffic patterns
- Resistant to edge movement
- User-friendly installation material is used
- No weeds will be able to grow in between the joints
- No off-gassing installation products used
- Insects will not be able to ruin the appearance of the paved structure

(Any ( 2 x 1) (2)

**5.8 ANY TWO REASONS FOR CONSTRUCTION FAILURE OF PAVING:**

- Concrete haunch too thin to support itself and cracks or crumbles under pressure
- Too little weight to retain the structure and keep paving in place
- Bond between haunch and edge units is weak and will easily crumble
- Subbase is not contained and will be washed out by groundwater

(Any 2 x 1) (2)

5.9 5.9.1 Segmental gauged arch (1)

5.9.2 **A** – Key brick (1)

**B** – Skewback (1)

**C** – Extrados (1)

**5.10 ANY TWO TYPES OF SCREED:**

- Dry screed
- Monolithic screed
- Bonded screed

(Any 2 x 1) (2)

**[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
  - Fibre-glass
- (Any 1 x 1) (1)
- 6.2 6.2.1 **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 diameter (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, resist pile foundations 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 Answers on ANSWER SHEET B. (5)

6.10.2 Answers on ANSWER SHEET B. (4)

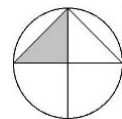
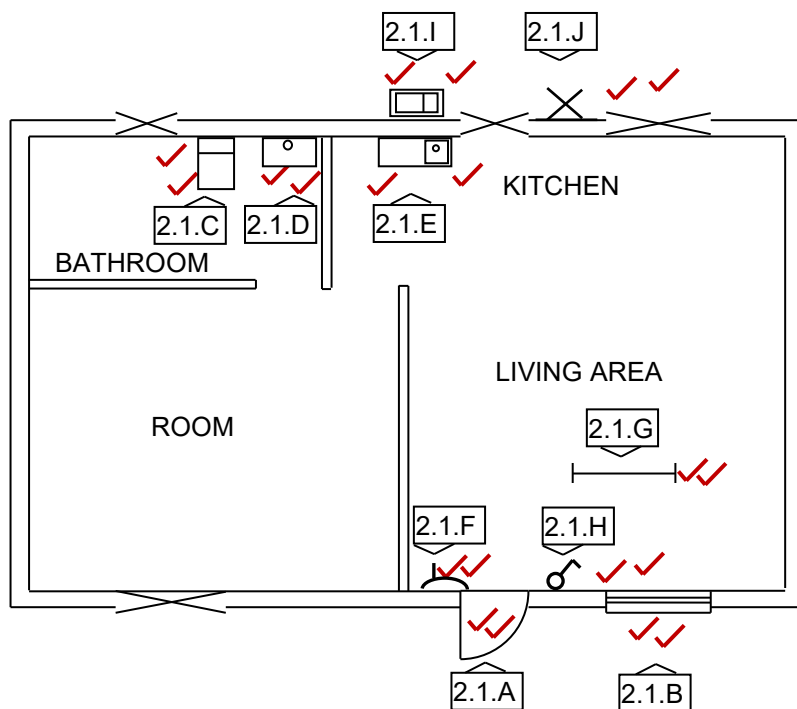
6.11 6.11.1 Answers on ANSWER SHEET B. (5)

6.11.2 Answers on ANSWER SHEET B. (5)

**[40]****TOTAL: 200**

ANSWER SHEET	<b>A</b>	CIVIL TECHNOLOGY (GENERIC)	NAME AND	
			SURNAME:	

- 2.1 Use the information on ANSWER SHEET A and complete the floor plan on scale 1 : 100. (20)



Outside door at 2.1.A	2	
Window at 2.1.B	2	
Water closet at 2.1.C	2	
Wash basin at 2.1.D	2	
Single sink unit at 2.1.E	2	
One-way switch – single pole at 2.1.F	2	
Fluorescent light at 2.1.G	2	
Socket outlet at 2.1.H	2	
Grease trap at 2.1.I	2	
Wall-mounted light at 2.1.J	2	
<b>TOTAL</b>	<b>20</b>	

ANSWER SHEET				B	CIVIL TECHNOLOGY (SPECIFIC)	NAME AND SURNAME:		
A	B	C	D		A	B	C	D
6.10.1					6.11.1			
Calculate the centre-line of the external walls.					Calculate the volume of the concrete needed for the concrete footing.			
			8 000 x 2 = 16 000 mm ✓ 5 000 x 2 = <u>10 000 mm</u> ✓ = 26 000 mm ✓ -4 x 270 = <u>-1 080 mm</u> ✓ = 24 920 mm ✓ = 24.92 m		1/ ✓	31.50 ✓ 0.35 ✓ <u>0.65</u> ✓	<u>7.17</u> m³ ✓	
(5)					(5)			
6.10.2					6.11.2			
Calculate the quantity of bricks needed for the external walls of the building if the walls are 2.4 m high.					Calculate how many bags of cement will be needed for the concrete footing.			
2/ ✓	50 ✓ <u>24.92</u>	<u>✓2492</u>	Bricks ✓		$\frac{1}{9}$ / ✓	7.17 ✓	0.80	m³ ✓  $\frac{0.80}{0.03} = 26.6$ ✓ = 27 Bags of cement
(4)					(5)			
PAGE 1					PAGE 2			