Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2018

CIVIL TECHNOLOGY: CONSTRUCTION MARKING GUIDELINE

MARKS: 200

This marking guideline consists of 15 pages, including 3 pages of answer sheets.

QUESTION 1: SAFETY AND MATERIAL (GENERIC)

1.1 1.1.1 Hard hat / Safety hat (1)
1.1.2 All building sites / construction sites (1)

1.2 1.2.1 Loose clothing – Button up / Remove (1)
1.2.2 Type of shoes in a workshop – Non-slip / Metal point (1)
1.2.3 When sharp object are carried – Point downwards (1)
1.2.4 Dangerous moving parts of power tools – Covered by guards (1)
1.2.5 Number of operators who operates a machine – Only one (1)

1.3 Contractor (1)

1.4 Any FOUR safety measures which are applicable to the storage of flammable liquids.

- Room must be well ventilated
- Door must have a threshold
- No material that may cause a spark
- Liquids that may interact chemically not to be stored in close proximity
- Containers sealed properly (4 x 1) (4)

1.5 1.5.1 Suspended concrete floors – Reinforced concrete (1)
1.5.2 Lintels above door openings – Precast concrete (1)
1.5.3 Foundations for single-storey buildings – Unreinforced concrete (1)

1.6 Any ONE use of screed.

- A finish for floors and walls
- Facing material
- Surfacing of suspended floors
- Insulated roof screed (1)

1.7 Any TWO reasons why lime can be added to a mortar mix

- Increases plasticity
- Makes mortar more workable (2 x 1) (2)

1.8 (1) Cheap (2) easy workable (2)

1.9 1.9.1 True (1)

1.9.2 False (1)

19.3 False (1)

1.9.4 True (1)

1.10 (1) High hygienic properties and (2) easy to clean (2)

1.11 (1) Two or more metals (2) are combined to (3) form a new metal / with better properties / other properties (3)

1.12 Any ONE use of thermosetting plastic.

- Sewerage pipes
- Gutters
- Cold- and hot water pipes (1 x 1) (1)

[30]

QUESTION 2: EQUIPMENT, TOOLS AND GRAPHICS (GENERIC)

2.1 2.1.1 Comb hammer (1)

2.1.2 Steel comb, finish bricks, blocks/roughen smooth surfaces (2)

2.1.3 (1) Hammering on hard bricks (2) decays the comb / make comb blunt (2)

2.2 (1) Mitre try square
Any THREE uses of it.(3)

- Testing squareness
- Marking out perpendicular lines
- Can be used as a ruler
- Marking square lines
- Test if surfaces are straight
- Drawing 45° lines (4)

2.3 (1) Radial arm saw
Any THREE caring measures for it.(3)

- Maintain – lubricate and adjust according to instructions
- Clean after use
- Repair damaged electrical cords
- Handle with care not to damage accuracy
- Use only for intended purpose
- Do not force the saw
- Avoid blunt blades
- Keep ventilation holes open
- Service regularly (4)

2.4 Any TWO caring measures for a concrete mixer.

- Clean inside after use
- Do not leave water in the drum
- Oil inside of drum when storing for a long time (2 x 1) (2)

2.5 2.5.1 Site plan (1)

2.5.2 124 (1)

2.5.3 Building boundary (1)

2.5.4 2.5.B – Manhole
2.5.C – Rodding eye (2)

2.6 FIGURE 2.6 on ANSWER SHEET A shows an incomplete section view of a single brick wall. Complete the section view on scale 1 : 20 and show the following parts with symbols and labels:

2.6.1 A strip foundation of 700 x 250 mm with the invert level of 400 mm (3)

2.6.2 A single brick wall with a height of 2 700 mm from the floor level and 10 mm plaster work on the outside and inside (5)

2.6.3 The hard core filling of 250 mm (1)

2.6.4 The damp proof course (2)

2.6.5 The blinding layer of 50 mm (1)

2.6.6 The concrete floor slab of 90 mm (1)

2.6.7 A door opening with a height of 2 100 mm (1)

2.6.8 A concrete lintel with a thickness of 70 mm above the door opening (2)

2.6.9 A wall plate of 114 x 38 mm (2)

2.10 Show any TWO labels. (2 x 1) (2)

[40]

QUESTION 3: QUANTITIES, JOINING AND GRAPHICS (GENERIC)

3.1 FIGURE 3.1 shows the foundation wall of a building. The width of the wall is 220 mm and the height 450 mm.
Use the quantity list on ANSWER SHEET B and calculate the following:

3.1.1 Determine the centre line of the foundation wall. (6)

3.1.2 Determine the quantity of bricks needed to build the foundation wall and make provision of 5% brick breakage damage. (9)

3.2 (1) Thorough description of the (2) item that was measured and (3) any preliminary calculations or sketches (3)

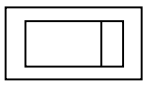
3.3 (1) Apply adhesive to both surfaces (2) allow to dry and (3) when almost dry, clamp parts together (3)

3.4 Epoxy (1)

3.5 Any TWO properties of mastic sealant.

- Works well on metals
- Prevents dust penetration in joints
- Flexible, yet keeps surfaces together
- Adhesion for 5 years
- Smooth exterior
- Can be used outdoors
- Water tight
- Withstand low and high temperatures
- Not weakened by exposure to sun (2 x 1) (2)

3.6 3.6.1 Gully



(2)

3.6.2 Check valve

(2)

3.6.3 Dressed wood

(2)
[30]

QUESTION 4: MATERIALS, EQUIPMENT AND JOINING (SPECIFIC)

4.1 4.1.1 False

4.1.2 False

4.1.3 False

4.1.4 True

4.1.5 True

4.1.6 True (6)

4.2 (1) A queen closer is a specially shaped brick (2) used to close gaps in a brick bond (English bond) (2)

4.3 Any THREE properties of cement bricks.

- Available in variety of colours
- Not colourfast and fade in time
- Can be plastered or left unfinished
- Edges are less inclined to crumble or break
- Less likely to suffer damage during transport
- More porous, absorb 2 to 3 times more moisture than clay bricks
- Can't be cut using a trowel or brick hammer – angle grinder required

(3 x 1) (3)

4.4 (1) Prevent excess moisture from burning off too quickly and (2) which will cause cracking (2)

4.5 4.5.1 Portable concrete vibrator (1)

Any ONE use.

- Removing voids from concrete
- Ensuring that concrete flows into all the corners of the formwork
- Preventing honeycombing once the concrete has set (1)

4.5.2 Rammer (1)

Any ONE use.

- Compacting disturbed and loose soil up to 150 mm
- Tamping fillings for a hardcore layer underneath concrete floors (1)

4.6 4.6.1 D
4.6.2 C
4.6.3 A
4.6.4 H
4.6.5 B
4.6.6 E (6)

4.7

(2)

4.8 See ANSWER SHEET C. (4)

4.9 To allow the removal of wasted mortar in the wall or on wall ties (1)

[30]

QUESTION 5: EXCAVATIONS, FOUNDATIONS AND STEEL (SPECIFIC)

5.1 (1) Topsoil contains vegetation remains that may weaken foundations as they decay
(2) Topsoil is rarely firm enough to bear any load (2)

5.2 5.2.1 5.2.A – Boning rod
5.2.B – Profile board (2)

5.2.2 (1) Brickwall thickness and (2) foundation width (2)

5.2.3 Ensure that the top surface of the foundation is level (1)

5.3
- Pumping out of water
- Creating drains
- Bailing of water (3)

5.4 5.4.1 False
5.4.2 False
5.4.3 True
5.4.4 True (4)

5.5 (1) To withstand all the loads from the building and (2) to transfer the loads to the soil, that settlement is restricted and that failure is avoided (2)

5.6 5.6.1 Reinforced concrete strip foundation / wide strip foundation (1)

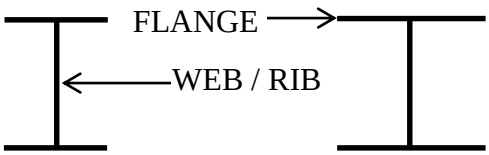
5.6.2 Soil with a soft / a low load-bearing capacity (1)

5.6.3 (1) Concrete is weak under tensile force and (2) the tensile force is at the bottom of the foundation (2)

5.7 Any THREE factors that will require the use of foundation piles.
- Low carrying capacity of the soil
- New filling material that has not been thoroughly compacted
- An extremely high water table
- Clay subsoil that is subject to movement (expanding and shrinking)
- High moisture content (3 x 1) (3)

5.8 (1) The hole is drilled to the required depth. (2) The previously prepared reinforcing is lowered into the hole. (3) Concrete is poured into the hole. (3)

5.9



I-beam H-beam (4)

[30]

QUESTION 6: TOOLS, CONCRETE, FORMWORK AND LINTELS (SPECIFIC)

6.1 6.1.1 Power float (1)

6.1.2 (1) Provides a level, smooth finish (2) on large concrete floors (2)

6.2 (1) A temporary platform / gantry (2) that is erected to reach parts of a building, (3) that are hard to reach. (3)

6.3 6.3.1 Tensile force
6.3.2 Compression force
6.3.3 Shear force (3)

6.4 (1) Oiliness will influence the bonding to the concrete and (2) can cause movement. (2)

6.5 6.5.1 Steel stand (1)
6.5.2 To ensure that the required concrete cover is obtained during the pouring of the concrete (1)
6.5.3 Round bar / soft steel / mild steel (1)

6.6 See ANSWER SHEET C (7)

6.7 TWO advantages of steel reinforcement in concrete constructions.

- The size of the beam or column can be reduced
- The beam can carry heavier loads (2)

6.8 1 : 2 : 4 (3)

6.9 Describe the purpose of the following requirements that are applicable to formwork:

6.9.1 For the concrete not to leak and form honeycomb or fins (1)

6.9.2 Dirt can influence the bonding to the concrete (1)

6.9.3 For the concrete not to stick to the shutter boards (1)

6.9.4 To withstand the mass of the wet concrete / provide sufficient support, without too much deflection, until concrete has set (1)

6.10 6.10.1 6.10.A – Landing
6.10.B – Tread
6.10.C – Riser (3)

6.10.2 150 mm (1)

6.11 6.11.1 220 mm (1)

6.11.2 Lintel (1)

6.11.3 (1) It's a horizontal beam (2) and it supports a wall or any construction above the lintel (2)

6.11.4 Any TWO advantages of part 6.11.B.

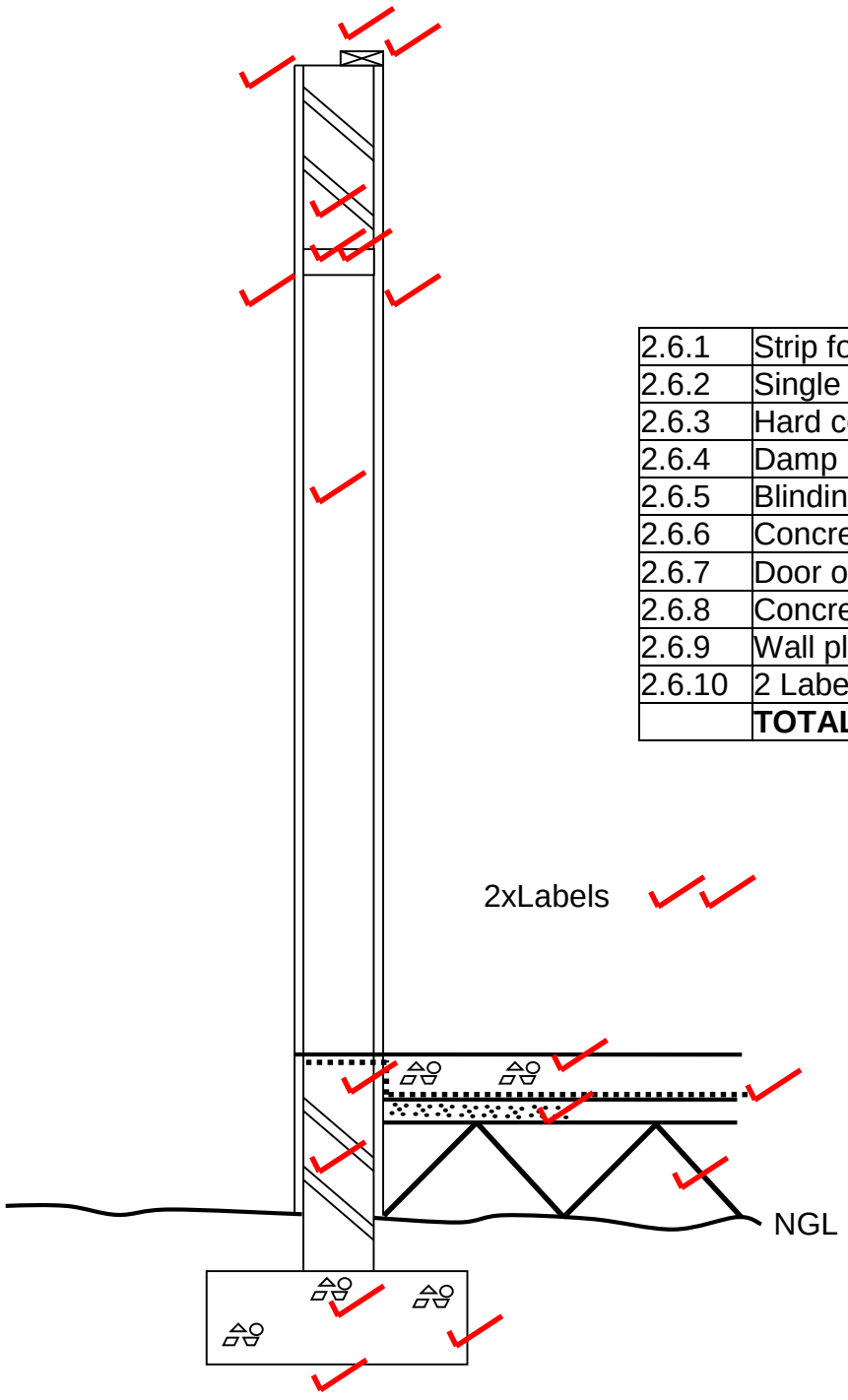
- Readily available
- Saves time and labour to construct formwork
- Strongest lintels
- Suitable for spanning widths of 900 mm and more
- Restricts cracks from forming
- Easier to handle (2 x 1) (2)

[40]

TOTAL: 200

ANSWER SHEET **A**	CIVIL TECHNOLOGY GENERIC	NAME: _____

2.6 FIGURE 2.6 on ANSWER SHEET A shows an incomplete section view of a single brick wall. Complete the section view to scale 1 : 20.



2.6.1	Strip foundation	3	
2.6.2	Single brick wall	5	
2.6.3	Hard core filling	1	
2.6.4	Damp proof course	2	
2.6.5	Blinding layer	1	
2.6.6	Concrete floor slab	1	
2.6.7	Door opening	1	
2.6.8	Concrete lintel	2	
2.6.9	Wall plate	2	
2.6.10	2 Labels	2	
	TOTAL	**20**	

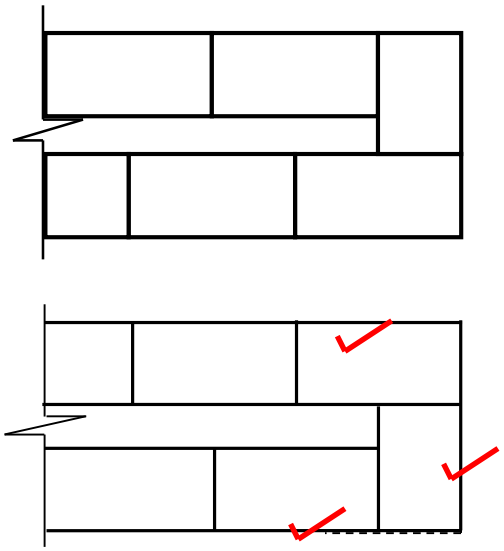
ANSWER SHEET **B**	CIVIL TECHNOLOGY GENERIC	NAME: _____

QUESTION 3.1

A	B	C	D
			3.1.1 CENTRE LINE: (6)
			2 x 9 m = 18 m
			2 x 6 m = 12 m
			= 30 m
			Minus: 4 x 0.22 m = 0.88 m
			TOTAL CENTRE LINE = 29.12 m
			3.1.2 QUANTITY OF BRICKS: (9)
			AREA:
			Total wall area
1	29.12		
	0.45	13.104.	Thus: Total wall area = 13.104 m²
			TOTAL BRICKS
	13.104		100 bricks/ m² for single brick wall
	100	1 310.4	Thus: 1 311 bricks for total wall
			5% BREAKAGE
			$^{5}/_{100}$ x 1 311
			= 66 bricks
			TOTAL BRICKS :
			1 311 + 66 = 1 377 total quantity bricks

ANSWER SHEET C	CIVIL TECHNOLOGY CONSTRUCTION	NAME:

4.8 Draw in good ratio on ANSWER SHEET C the consecutive layer bricks for a dead-end. (4)

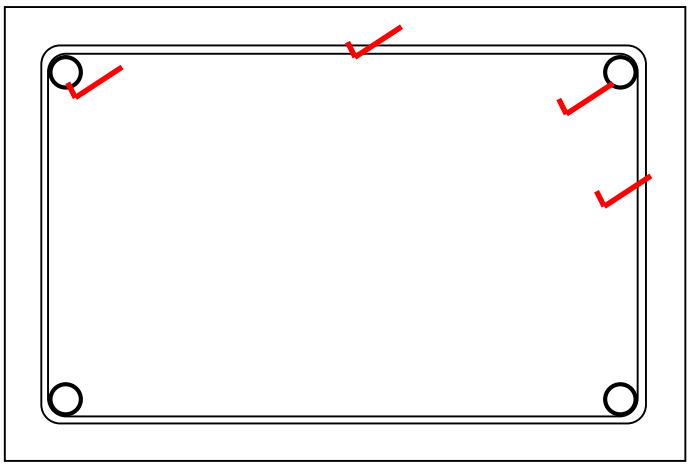


Brick work	3	
Ratio	1	
TOTAL	**4**	

CONSECUTIVE LAYER

6.6 FIGURE 6.6 on ANSWER SHEET C shows the outside lines of a top view from a concrete column.
Draw the following steel reinforcing on scale 1 : 10:

6.6.1 10 mm Stirrups with a concrete cover of 50 mm (4)
6.6.2 Four main reinforced bars with a diameter thickness of 40 mm (3)



Stirrups	2	
Scale	1	
Concrete covering	1	
Main reinforcement	2	
Scale	1	
TOTAL	**7**	