higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

CONCRETE STRUCTURES
NQF LEVEL 3

10 March 2020

This marking guideline consists of 5 pages.

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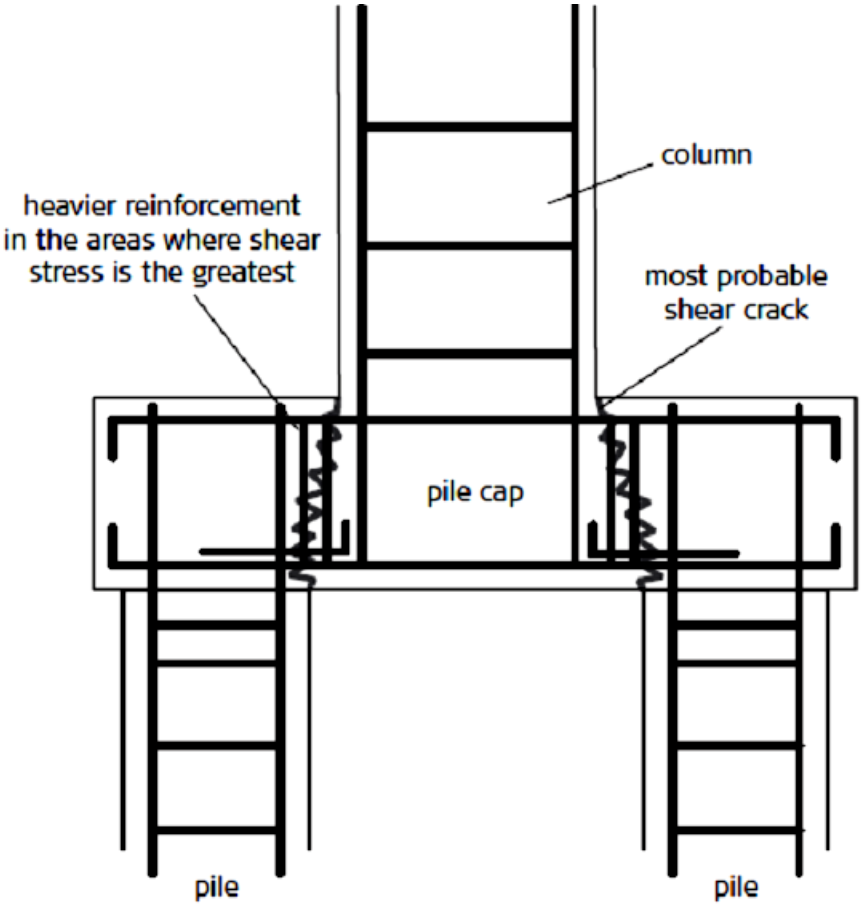
QUESTION 1: THEORY AND USE OF REINFORCED CONCRETE

1.1



CROSS SECTION OF PILES AND A PILE CAP WITH A COLUMN ON TOP

MARK ALLOCATION	
Correctness	9
Title	1
Labels	6
TOTAL:	**16**

(16)

1.2 1.2.1 Poor bonding between reinforcement and concrete (1)

1.2.2 Bearing area too small or too weak to carry load (1)

1.2.3 Steel corrosion (rust) expanding inside concrete, forcing it to crack (2)

1.2.4 Concrete confined and restrained from moving by load/temperature changes that cause concrete to crack (2)

1.2.5 Ground around foundation settling, causing cracks (1)

1.2.6 Temperature of freshly placed concrete rising because of chemical reaction and when concrete cools down or settles too quickly hairline cracks appear (2)

[25]

QUESTION 2: REINFORCED CONCRETE IN CONSTRUCTION

2.1 When steel is cut into short rebars and placed randomly the concrete grips these rebars which will strengthen the concrete. (2)

2.2 2.2.1 Metal is pulled through a small hole in a die which is a specification tool used in manufacturing industries to cut, shape and form various products and components.

2.2.2 A punch forces metal sheets into a die.

2.2.3 A metal strip is passed between two rolls that have only a narrow gap between them.

2.2.4 A metal sheet is pressed onto a shaped die or mould to form a complex shape, such as a car body panel.

2.2.5 Cold-working means changing the shape and size of a metal at room temperature.

(5 × 2) (10)

2.3
- Adds to the tensile strength of concrete
- Adds to the compressive strength of concrete
- Controls the shrinkage in concrete
- Good bonding between concrete and steel
- Any shape and size manufactured to add bond and avoid shear failure
- Reacts to changes in temperature in the same way as concrete
- Protected from corrosion by concrete (Any 6 × 1) (6)

2.4
- It is a sheet of steel mesh made by laying cold-rolled steel across each other.
- Welded steel mesh is generally used for slabs on the road and for suspended slab walls. (Any ONE) (1)

2.5

ADVANTAGES	DISADVANTAGES
• It is much faster to fix steel mesh than rebars. • Labour costs are cheaper and concrete can be placed into the formwork earlier. • There is less bending and sorting of the bars.	• Depending on the size of the panel welded mesh, special lifting equipment may be needed to lift and move sheets and reinforcement cages. • Steel mesh is very expensive to use. It is very difficult to change the amount of steel to suit the loading in the structure and so the reinforcing may not be very economical. • The size of the mesh panel is often different from the size needed and so there is lots of wastage from cutting the panels to size.

(3 + 3) (6)

[25]

QUESTION 3: REINFORCING DOCUMENTATION

3.1
- Type of steel
- Which shapes to cut
- Dimensions (3)

3.2

A	B	C	D	E	F	G	H			
Member							Bending dimensions			
	Bars per member	Total bars	Type/ diameter	Bar mark	Shape code	Total length	A	B	C	D
4	1	4	Y32	1	20	8940	**8940**			
4	2	8	Y25	2	33	92	**8940**			
4	2	8	R20	3	33	92	**8940**			
4	36	144	R6	4	72	1000	**490**	**340**		

(20)

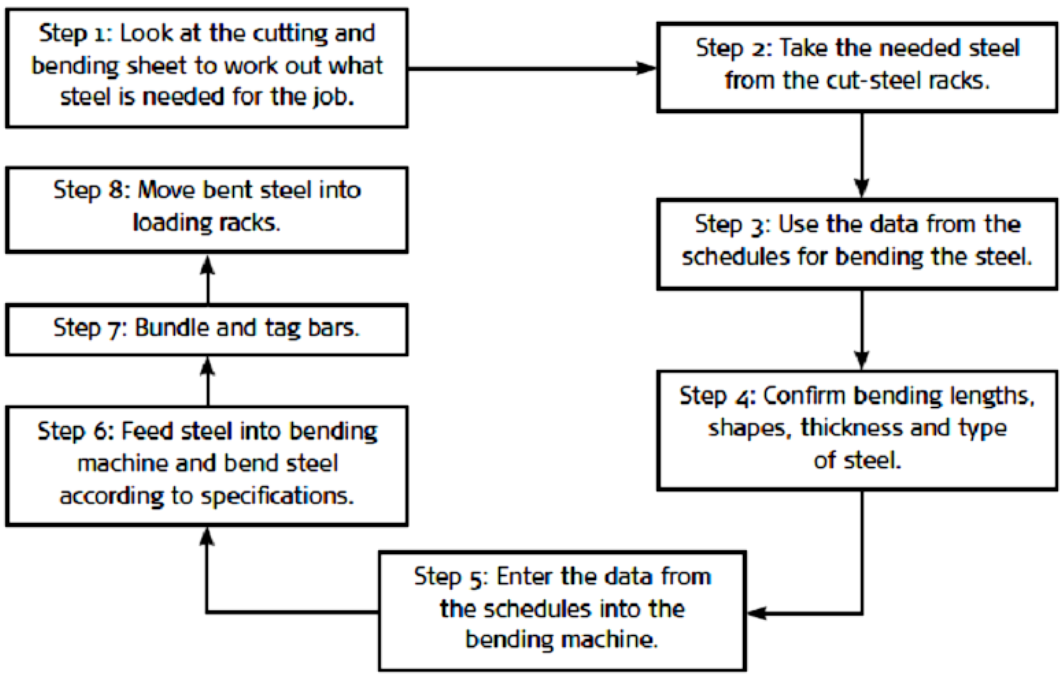
3.3 3.3.1 Top of grating
3.3.2 Top of concrete

(2 × 1) (2)
[25]

QUESTION 4: FABRICATION OF REINFORCING STEEL

4.1
- Cutting and bending sheet
- Bar label
- Delivery note (3)

4.2



Steel-bending procedure (8)

4.3
- Checks the cutter before cutting the steel
- Follows steel-cutter procedures
- Has all required documents
- Knows machinery and equipment used to cut the steel (4)

4.4
- Sets out work area by following engineering drawings
- Uses hand and power tools to cut and bend bars or mesh
- Ties rebars together with wire, clips or welds to build up cages or sections
- Fixes the formwork and shuttering used to hold setting concrete in place
- Joins cages and sections
- Fits spacers and chairs
- Fixes steel to concrete bases (7)

4.5 It keeps the reinforcing bars firmly in place✓ and at the right cover distance.✓ (2)

4.6
- It will stop the bond between steel and concrete.
- It will make the reinforcing concrete weaker. (Any ONE) (1)

[25]

TOTAL: 100

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