higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ROADS
NQF LEVEL 4

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This marking guideline consists of 6 pages.

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QUESTION 1

1.1
- Prevents excess of water on the road surface
- Reduces damaging effects to the road surface
- Reduces damaging effects to the road shoulder.

(Any 2 x 1) (2)

1.2 When a thin film or layer of water√ builds up between the tyres and road surface.√ (2)

1.3
- Type of material used for the road surface
- Method of compaction
- Treads of the tyres
- Amount of water on the road surface.

(Any 2 x 1) (2)

1.4 1.4.1 Longitudinal drains.
Used to guide water parallel from the road surface√ and into a drainage system that will channel the water away√ from the road. (2)

1.4.2 Cross drains.
Used to channel the water away, beneath the road surface√ from the upstream side to the downstream side of the road.√ (2)

1.4.3 Fords.
Used to allow the free flow of water and debris during flooding√ while maintaining minimal damage to traffic passing over it.√ (2)

1.5 1.5.1 Place the gabion on a hard flat surface√, unfold and stretch it out and stamping out all kinks√. (2)

1.5.2 Place the sheet of geotextile on the prepared foundation. √
Stretched sheets should be placed or laid on well compacted material.√
Place geotextile at each contact between the soil and gabion structure.√
When overlapping geotextile ensure a minimum overlap of 300mm.√
Ensure the upstream section overlaps the downstream section.√
Ensure geotextile is not torn or damaged.√

(Any 2 x 1) (4)

1.6
- Capillary rise from the water table
- Infiltration from irrigation water
- Infiltration from rainfall
- Infiltration from nearby canals or dams.

(Any 2 x 1) (2)

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1.7 To collect and draw off all the excess water and moisture from the road structure√ and direct it away√ from the underlying road layers.√ (3)

1.8
- Checking and inspecting the different elements regularly
- Checking the working/functionality periodically
- Routine cleaning programmes
- Repair broken parts.

(Any 3 × 1) (3)

1.9 Slotted plastic agricultural drain is a PVC pipe with perforations or slotted holes around them√ to allow water from the surrounding soil to seep through into the pipe√. (2)

1.10
- Separation
- Drainage
- Filtration
- Reinforcement. (2)

(Any 2 × 1) **[30]**

QUESTION 2

2.1
- Asphalt or bituminous material
- Concrete (2)

2.2 A section of the formwork will be put in position√ casted with concrete√, levelled and compacted√ before moving to the next section. (3)

2.3 To account for the movement between segments due to expansion and contraction √ in the joints of the concrete pavement.√ (2)

2.4
- Class 25
  Can be used for light to medium traffic loads.
- Class 35
  Used where heavy traffic loads are uncounted. (4)

2.5 2.5.1 Sub-grade
- Suitable natural materials found on site
- Combination of soil and rock

(Any 1 × 1) (1)

2.5.2 Sub-base
- Brought in (imported) layer of road building material. (1)

2.5.3 Bedding sand
- Selected uniformly graded clean sand. (1)

2.6
- Install a temporary restraint against the free edge of the pavement before compaction
- Place paving blocks into position
- Use a plate compactor to compact/vibrate the blocks with at least two passes. (3)

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2.7
- Sweep dry jointing sand into the joints between the paving blocks until they are full.
- Use a plate compactor to vibrate the jointing sand into joints by two or three passes.
- Alternate the process with sweeping and vibrating until the joints are full. (3)

2.8
- Overall
- Respiratory mask
- Thermal insulated safety gloves to handle bitumen
- Steel-capped safety boots
- Face and eye protection.

(Any 2 × 1) (2)

2.9 2.9.1 Bitumen is a viscous/sticky√ or dark brown material/substance√ (2)

2.9.2 Obtained from the distillation of a specific quality of crude oil √ during the production of petroleum products.√ (2)

2.10
- Environmental pollutant
- Potentially explosive
- Highly flammable
- Releases toxic volatile gases during combustion
- Thread to contaminate surface or ground water
- Slightly soluble in water.

(Any 2 x 1) (2)

2.11 Grading of bitumen is determined by the stiffness√ of the bitumen at various temperatures√ by using a penetration test.√ (3)

2.12 Applying the correct viscosity will result in an effective√ low-cost√ and more efficient compaction process√ of the road surface.

(Any 2 x 1) (2)

2.13 Paver or distributer (1)

2.14
- Provide a waterproof barrier
- Protects sub-layers from damage
- Improves safety minimizing loose stones on the road surface
- Provides good driving conditions
- Provides good surface drainage
- Transmits loads through to various layer works
- Provides additional strength to the road

(Any 3 × 1) (3)

2.15
- Resealing the existing surface
- Improve skid resistance
- Reduce tyre wear
- Enhance appearance.

(Any 3 × 1) (3)

[40]

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QUESTION 3

3.1 3.1.1 Preventative maintenance.
Process where regular and systematic inspections√ cleaning and replacement of worn components and systems√ are applied to prolong the lifespan √ of the road. (2)
(Any 2 x 1)

3.1.2 Routine maintenance.
Also known as reactive maintenance√ involves treatments applied to the road to keep it functioning properly √and for maintenance take pace as a reaction to a certain problem√. (2)
(Any 2 x 1)

3.2 3.2.1 Edge breaks occur at the edge of the road surface and gravel shoulder. (1)

3.1.2 Edge breaks are caused by
Insufficient lateral support from the gravel shoulder.
Wind and water erosion.
Tyre ware.
(Any 2 × 1) (2)

3.3 On a surfaced road with:
- Severe cracks
- Ravelling
- Rutting
- Potholes.

(Any 2 × 1) (2)

3.4 3.4.1 During extensive rehabilitation work
When road expansions are taking place. (2)

3.4.2 During lane closure one of the lanes will be closed off√ while directing traffic onto another lane(s)√ during each section of the construction. (2)

3.5
- To increase the safety of the road and road reserve
- To provide clearer visibility
- To provide a controlled environment
- To provide a clean road reserve that will limit any hazards.

(Any 3 × 1) (3)

3.6
- Repair surface failures
- Pothole repairs
- Cracking repairs
- Rutting repairs
- Cutting and clearing obstructive vegetation to increase visibility
- Culvert cleaning
- Cleaning and clearing drains
- Erosion control

(Any 3 × 1) (3)

3.7 3.7.1 Road rehabilitation involves the repair or replacement of certain sections of the road.
Removal and restoration of the original slope of the road.
Restoration of natural drainage patterns (3)

3.7.2 Deterioration of the roads surface over a years of exposure
Road lost its original quality
Becomes unsafe
When it reaches a point where maintenance is no longer possible
(Any 2 x 1) (2)

3.8 South African National Road Agency Limited (2)

3.9 3.9.1 Structural overlays.
Add structural support to the road surface (2)

3.9.2 Non-structural overlays.
Provide protection against wear of the road surface (2)
[30]

TOTAL: 100

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