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 5 pages.

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QUESTION 1

1.1
- Poorly/badly designed roads
- Inadequate or poor/bad drainage
- No or inadequate maintenance to drainage system
- Blocked drainage systems
- Damaged road shoulders
- Damaged embankments
- Stagnant water build-up seeping into base layer (Any 3 × 1) (3)

1.2
- Roadway/carriageway
- Shoulder
- Ditches
- Culverts (4)

1.3 *Rock/stone*
- Should be obtained from commercial crusher plant or specified by the engineer.
- Correct quantity of rock must be available.
- Must be clean and as smooth as possible.
- Must be durable and not erode easily.
- Well graded between 100 mm and 200 mm in size.
- Have a specific gravity of 2.3 ratio of density (mass unit volume).
- Have a range size allowing a variation allowing 5% oversize and/or 5% undersize.
- The stone should not have any loose edges that could break off when they are placed in the basket. (5)

1.4 1.4.1 At small streams where there is minimal water flooding✓ or minimal rainfall.✓ (Any 1 × 1) (1)

1.4.2 Designed to allow the free flow of water and debris over it✓ with minimal damage to traffic✓ passing over it. (2)

1.5
- Inspect the different elements regularly.
- Routine/regular cleaning and clearing of blockages.
- Check/test its functionality periodically.
- Routine/periodic maintenance
- Repair or replace broken elements. (Any 4 × 1) (4)

1.6 Subsoil drainage (1)

1.7
- At each point where a drain changes direction
- At the beginning of a drain
- At the end of a drain.
- At any junction in a drain.
- At any collection point in a drain
- At regular intervals along the length of a drain. (Any 2 × 1) (2)

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1.8
- Separation
- Drainage
- Filtration
- Reinforcement (4)

1.9 1.9.1 Perforated pipe
Pipe with open holes or open slotted sections✓ around the perimeter of the pipe.✓ (2)

1.9.2 Impermeable material
Material that does not allow water or any fines✓ to pass through✓ the material. (2)
[30]

QUESTION 2

2.1
- Provides structural support.
- Lessens/minimises the quantity of fines that intrude from the subgrade into the pavement structure.
- Improves drainage.
- Minimises frost action damage.
- Provides a working platform for construction. (5)

2.2
- Site clearance
- Layer works
- Spreading
- Loading
- Hauling (Any 3 × 1) (3)

2.3
- To increase the strength of the concrete
- To increase waterproofing
- To provide good finishing at joints and edges
- To provide a sound protection cover to the reinforcing steel (4)

2.4 Whereby a section of concrete will be manually casted,✓ levelled,✓ compacted✓ and finished off✓ before moving to the next section.✓
(Any 3 × 1) (3)

2.5
- Sufficient width
- Smooth surface
- Separation from vehicle traffic (3)

2.6 2.6.1 Bedding sand
Provides supports to concrete block paving.
Transmits forces laterally by means of shear stress. (Any 1 × 1) (1)

2.6.2 Grouting sand
Used to fill the gaps between the concrete blocks.
Resists tensile shear and compressive stresses. (Any 1 × 1) (1)

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2.7
- Must have a stable foundation that will not collapse or fail under load.
- Must be well compacted to prevent the development of uneven ground.
- Must provide good drainage.
- Must be free of any water. (4 × 1) (4)

2.8
- Environmental pollutant
- Highly soluble/dissolving in water
- Health and toxic tread to surface and ground water
- Releases toxic and volatiles during combustion/burning
- Highly flammable vapour
- Potentially explosive (Any 3 × 1) (3)

2.9
- Provides the physical properties of a binder at normal working service temperature in the road.
- Measures the relative hardness of the bitumen.
- Measures the consistency of the bitumen. (Any 2 × 1) (2)

2.10 The minimum/lowest temperature✓ at which the solvent produces enough vapour✓ to be ignited by a spark when mixed with surrounding air.✓ (3)

2.11 Can manufacture,✓ mix and deliver✓ in any quantity of asphalt✓ any time of the year.✓ (Any 3 × 1) (3)

2.12
- To carry the direct traffic load
- To reduce the stress on the lower parts of the pavement layers
- To provide a safe skid resistance surface
- To prevent water seepage into underlying road layers
- To provide adequate and good drainage away from the surface
- To extend the lifespan of the pavement layers
- To prevent high repair costs (Any 5 × 1) (5)

[40]

QUESTION 3

3.1
- To reduce structural failure
- To provide maximum functionality
- To provide good drainage from the road
- To keep roads in a good condition for a longer period
- To prolong the lifespan of the road
- To reduce maintenance cost to tax payers (Any 5 × 1) (5)

3.2 3.2.1 To indicate a detour or passageway during roadworks during the day

3.2.2 To prevent pedestrians and vehicles from entering a specific work area during roadworks

3.2.3 To introduce a narrowing/reduction of the road towards the work area during day or night

3.2.4 To indicate the line of any temporary barrier provided during roadworks

3.2.5 To indicate changes of the passageway during roadworks during the day and night

(Any 5 × 1) (5)

3.3
- Debris and rubbish
- Foreign materials/elements
- Loose branches and/or other vegetation
- Sand
- Sediment
- Vegetation growth
- Big rocks (Any 5 × 1) (5)

3.4
- Crack seals
- Fog seals
- Slurry seals
- Rejuvenators
- Bituminous surface treatment
- Patches (Any 5 × 1) (5)

3.5
- Clean the surface of all loose particles and road markings using a water jet blaster.
- Remove the previous layer completely by planning it out.
- Sweep off all the remaining loose particles from the surface.
- Water-blast the surface again and allow the cleaned surface to dry.
- Apply a tack coat to the dry surface.
- Spread the asphalt overlay as specified by the designer.
- Compact the overlay.
- Clean off all loose aggregate on completion. (Any 5 × 1) (5)

3.6
- An addition to an existing surface.
- An additional aggregate in cold-mix asphalt.
- If crushed, to be used for a granular base course.
- Used as a filler material. (4)

3.7 Cold in-place recycling (1)

[30]

TOTAL: 100

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