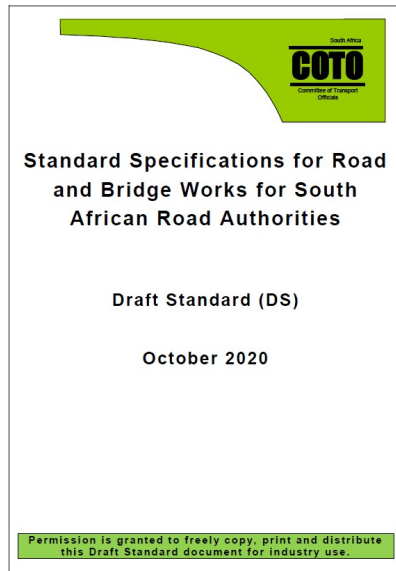


HIGH LEVEL OVERVIEW OF



Sean Strydom IntET(SA)

COTO RMC member (2013-2020)
Chair COTO MTC (2013-2020)

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BACKGROUND: **COTO SUITE OF DOCUMENTS**

VOLUME 1	GENERAL CONDITIONS OF CONTRACT (FIDIC; GCC, ETC)
VOLUME 2	STANDARD SPECIFICATIONS FOR:
	2.1 ROADS AND BRIDGE WORKS 2.2 ROUTINE ROAD MAINTENANCE ??
VOLUME 3	CONTRACT DOCUMENT
VOLUME 4	ROADWORK DRAWINGS
VOLUME 5	STRUCTURES DRAWINGS
VOLUME 6	MATERIAL UTILISATION
VOLUME 7	ENVIRONMENTAL MANAGEMENT PLAN

NEW FORMAT: CHAPTERS

EACH CHAPTER SECTION CONSISTS OF:

☐ PART A: SPECIFICATIONS

Table of Contents:

- 1.** Scope
- 2.** Definitions
- 3.** General
- 4.** Design by Contractor/Performance Based Systems
- 5.** Materials
- 6.** Construction Equipment
- 7.** Execution of the Works
- 8.** Workmanship

☐ PART B: LABOUR ENHANCED

1. to 8.

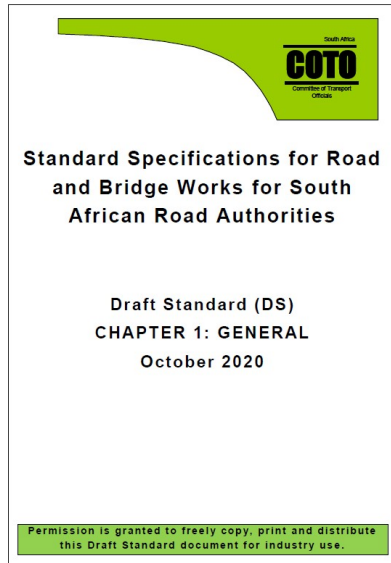
☐ PART C: MEASUREMENT AND PAYMENT

☐ PART D: GUARANTEES AND COMPLIANCE CERTIFICATES

NEW CHAPTERS OF REVISED COTO STANDARD SPECIFICATIONS (VOLUME 2)

- CHAPTER 1: GENERAL
- CHAPTER 2: SERVICES
- CHAPTER 3: DRAINAGE
- CHAPTER 4: EARTH AND PAVEMENT LAYERS: MATERIALS
- CHAPTER 5: EARTH AND PAVEMENT LAYERS: CONSTRUCTION
- CHAPTER 6: CONCRETE LAYERS
- CHAPTER 7: MAINTENANCE & REPAIR OF CONCRETE LAYERS
- CHAPTER 8: PRE-TREATMENT AND REPAIR OF EXISTING SURFACES
- CHAPTER 9: ASPHALT LAYERS
- CHAPTER 10: SEALS & MICRO-SURFACING
- CHAPTER 11: ANCILLARY ROAD WORKS
- CHAPTER 12: GEOTECHNICAL APPLICATIONS
- CHAPTER 13: STRUCTURES
- CHAPTER 14: REPAIR & REHABILITATION OF STRUCTURES
- CHAPTERS 15 TO 19: RESERVED FOR FUTURE USE
- CHAPTER 20: QUALITY ASSURANCE

HIGH LEVEL OVERVIEW OF



CHAPTER 1 (7 Sections)

- 1.1 GENERAL PREAMBLE**
- 1.2 GENERAL REQUIREMENTS AND PROVISIONS**
- 1.3 CONTRACTOR'S SITE ESTABLISHMENT AND GENERAL OBLIGATIONS**
- 1.4 FACILITIES FOR THE ENGINEER**
- 1.5 ACCOMMODATION OF TRAFFIC**
- 1.6 CLEARING AND GRUBBING**
- 1.7 LOADING AND HAULING**

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A1.2.5 MATERIALS

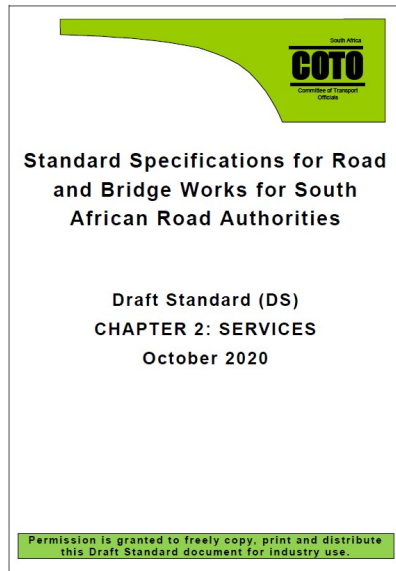
A1.2.5.1 General

The Contractor, before using manufactured articles or materials that are required to comply with any specification, shall furnish the Engineer with certificates showing that the materials do comply with that specification. Where so specified, materials shall bear the official mark of the appropriate authority. **All materials and products which should comply with a South African National Standard Specification (SANS) shall carry the certification mark of a SANAS accredited certification body.**

A1.2.5.2 Mix designs

Unless otherwise specified in the Contract Documentation, the Contractor shall be responsible for the design of all material mixes. The Contractor shall make allowance for the material mix design approval process in the Contractor's programme. Before commencing with the associated construction activities, the Contractor shall be responsible for the following procedures in connection with the design of material mixes: (see document).

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CHAPTER 2 (4 Sections)

- 2.1 GENERAL REQUIREMENTS AND TRENCHING FOR SERVICES
- 2.2 DRY SERVICES
- 2.3 WET SERVICES
- 2.4 ENERGY AND OTHER SERVICES

9

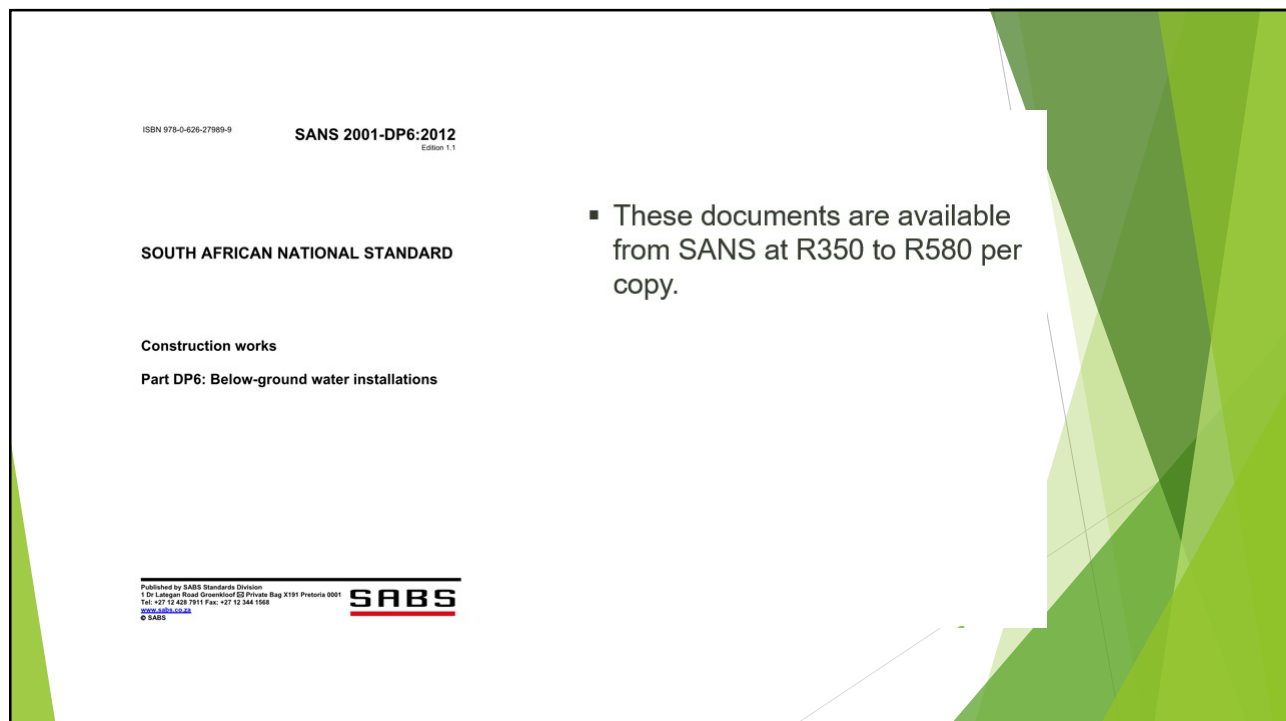
CHAPTER 2: STANDARD DOCUMENTATION

- Services not covered by existing COLTO (1998) document (ducts included under section 2200)
- No current national standard contract specification for services
- The SABS 1200 series contract specification no longer formally a national specification (withdrawn)
- The SANS 2001-DP series: 2010 replaced the SABS 1200 series and provides generic technical specifications

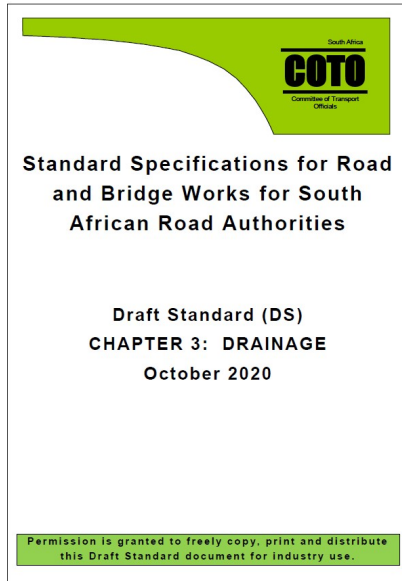
CHAPTER 2: SOURCE DOCUMENTATION

- Since Chapter 2 is new various source documents were used including:
 - SANS 2001- DP series
 - SABS 1200 series
 - Metro specifications (Tshwane, Cape Town, eThekweni etc)
 - Private sector service provider specifications
 - International specifications
- Section 2.3 relies heavily on reference to the SANS 2001- DP series





HIGH LEVEL OVERVIEW OF



CHAPTER 3 (3 Sections)

3.1 DRAINS

3.2 CULVERTS

3.3 CONCRETE KERBING AND CHANNELLING, ASPHALT BERMS, CHUTES, DOWNPIPES, AS WELL AS CONCRETE, STONE PITCHED AND GABION LININGS FOR OPEN DRAINS

Item	Description	Unit
C3.1.1	Excavation for open drains:	
C3.1.1.1	Excavating all material situated within the following depth ranges below the surface level using conventional methods:	
(a)	0 m to 1,5 m	cubic metre (m ³)
(b)	Exceeding 1,5 m and up to 3,0 m	cubic metre (m ³)
(c)	Etc, in increments of 1,5 m	cubic metre (m ³)
C3.1.1.2	Extra over sub-item C3.1.1.1 for excavation in hard and boulder material, irrespective of depth	cubic metre (m ³)
C3.1.1.3	Extra over sub-item C3.1.1.1 for excavation in stabilised existing road layers, irrespective of depth	cubic metre (m ³)
C3.1.1.4	Excavating soft material situated 0 m to 1,5 m below the surface level using labour enhanced construction methods	cubic metre (m ³)
C3.1.1.5	Excavating intermediate material situated 0 m to 1,5 m below the surface level using labour enhanced construction methods	cubic metre (m ³)
<p>The unit of measurement shall be the cubic metre of material excavated in accordance with the authorised dimensions, measured in place before excavation. Only excavation for open drains as defined in Clause A3.1.7.2 shall be measured.</p> <p>Irrespective of the total depth of the excavation, the quantity of material in each depth range shall be measured and paid for separately.</p> <p>Excavations shall be done using conventional construction methods and/or labour enhanced construction methods as specified.</p> <p>Payment made for either hard, boulder or stabilised existing road layers shall only be measured for the one applicable extra over category.</p> <p>The tendered rates shall include full compensation for the excavation of the material to the required dimensions, lines, levels and grades, the trimming of the open drain and the loading and disposal/utilisation of the material as directed, including haul of 1,0 km when using conventional construction methods.</p> <p>Loading and hauling, where applicable, including a haul of 1,0 km, shall be measured and paid under Section C1.7 of Chapter 1. Where the excavation of material is specified by means of labour enhanced construction methods, the tendered rates shall include loading and transport by wheelbarrow if the material is disposed of or utilised within a radius of 50 m, alternatively loading by hand onto transport vehicles for such disposal or utilisation elsewhere, within a haul distance of 1,0 km.</p> <p>For payment purposes a distinction shall be made between materials as classified according to Clause A3.1.7.1 under Classification of Materials.</p>		

Item	Description	Unit
C3.1.2	Clearing, shaping and disposal of accumulated sediment in existing unlined open drains	
C3.1.2.1	Using conventional methods	cubic metre (m ³)
C3.1.2.2	Using labour enhanced construction methods	cubic metre (m ³)

The unit of measurement shall be a cubic metre of sediment, including accumulated existing cut slope rubble and vegetation, removed measured in place before removal. Where such measurement is impractical or impossible, as decided by the Engineer, quantity measurement shall be determined as 70 % of volume measured in haulage vehicles.

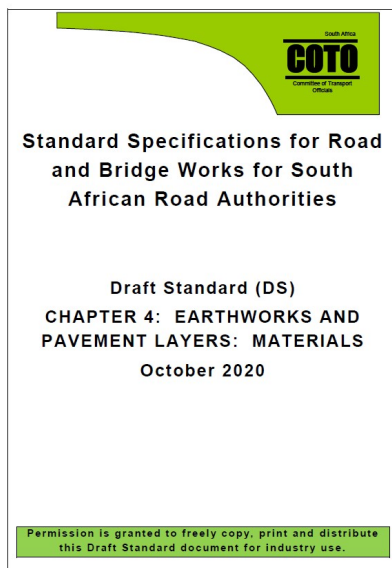
Excavations shall be done using conventional construction methods and/or labour enhanced construction methods as specified.

The tendered rate shall include full compensation for excavating the material, protecting the existing drainage structures, trimming the floors and sides of the open drains and loading and disposing of material as prescribed.

Loading and hauling, where applicable, including a haul of 1,0 km, shall be measured and paid under Section C1.7 of Chapter 1. Where the clearing and shaping of existing unlined open drains is specified by means of labour enhanced construction methods, the tendered rates shall include loading and transport by wheelbarrow if the material is disposed of or utilised within a radius of 50 m, alternatively loading by hand onto transport vehicles for such disposal or utilisation elsewhere, within a haul distance of 1,0 km.

The clearing of existing lined side drains will be measured and paid for under item C3.1.3.

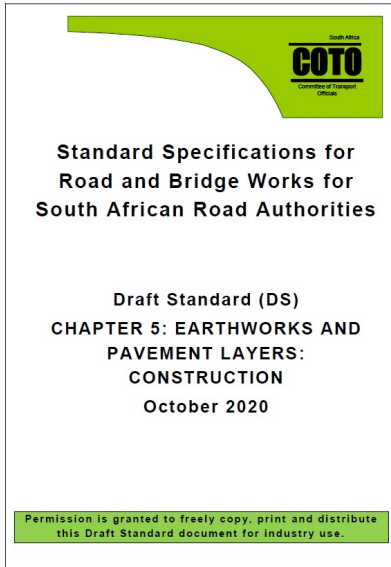
HIGH LEVEL OVERVIEW OF



CHAPTER 4 (5 Sections)

- 4.1 BORROW MATERIALS
- 4.2 CUT MATERIALS
- 4.3 EXISTING ROAD MATERIALS
- 4.4 COMMERCIAL MATERIALS
- 4.5 ALTERNATIVE MATERIALS

HIGH LEVEL OVERVIEW OF



CHAPTER 5 (5 Sections)

- 5.1 ROADBED
- 5.2 FILL
- 5.3 ROAD PAVEMENT LAYERS
- 5.4 STABILISATION
- 5.5 RECONSTRUCTION OF PAVEMENT LAYERS

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Why are we looking at
Chapter 4 and Chapter 5
together?

Because I want to ask the
following question:

What was changed from old
to new?

EVERYTHING !

SERIES 3000 versus CHAPTER 4 & 5 LAYOUT

3000	EARTHWORKS AND PAVEMENT LAYERS OF GRAVEL OR CRUSHED STONE
3100	BORROW MATERIALS
3200	SELECTION, STOCKPILING AND BREAKING DOWN THE MATERIAL FROM BORROWPITS, CUTTINGS AND EXISTING PAVEMENT LAYERS, AND PLACING AND COMPACTING THE GRAVEL LAYERS
3300	MASS EARTHWORKS
3400	PAVEMENT LAYERS OF GRAVEL MATERIAL
3500	STABILIZATION
3600	CRUSHED-STONE BASE
3700	PLANT-MIXED PAVER-LAID PAVEMENT LAYERS
3800	BREAKING UP EXISTING PAVEMENT LAYERS
3900	PATCHING AND REPAIRING EDGE BREAKS



	CHAPTER 4
4.1	BORROW MATERIALS
4.2	CUT MATERIALS
4.3	EXISTING ROAD MATERIALS
4.4	COMMERCIAL MATERIALS
4.5	ALTERNATIVE MATERIALS

	CHAPTER 5
5.1	ROADBED
5.2	FILL
5.3	ROAD PAVEMENT LAYERS
5.4	STABILISATION
5.5	RECONSTRUCTION AND REHABILITATION OF PAVEMENT LAYERS

UNCOMPARABLE, COMPLETE CHANGE?

YES

THROW THE GREEN BOOK AWAY?

YES

What does this mean for
industry?

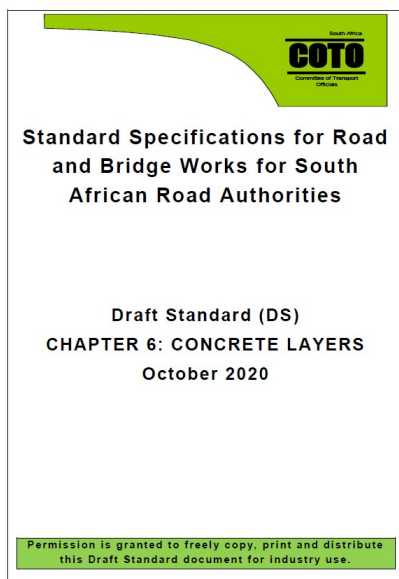
Materials are approved and
paid for in Chapter 4.

The construction effort,
incl placement, shaping,
treating and compacting the
layer are paid for in
Chapter 5.

Conflict resolution



HIGH LEVEL OVERVIEW OF



CHAPTER 6 (2 Sections)

6.1 PAVER LAID CONCRETE LAYERS

6.2 SEGMENTAL BLOCK PAVING LAYERS

A6.1.3 GENERAL**A6.1.3.1 Quality Plan**

Prior to commencing with any permanent works, the Contractor shall submit a Quality Plan, for review and acceptance by the Engineer, detailing all checks and hold points relating to construction of the specified product. All work shall be completed in accordance with accepted Plan, with any deviations resubmitted to the Engineer for evaluation and acceptance prior to implementation thereof.

A6.1.3.2 Trial sections

Where so provided for in the pricing schedule, the Contractor shall construct a trial section for each pavement type specified. The location and area of the trials in an area that simulates the permanent work condition shall be as directed by the Engineer. The purpose of the trial is for the Contractor to demonstrate that the equipment, processes and intended concrete mix that he proposes to use will enable him to construct the particular concrete layer in accordance with all the specified requirements. Evaluation and monitoring of the trial section shall include all items listed in the South African Pavement Engineering Manual (SAPEM), Chapter 12 Appendix, Table 19: Concrete Pavement Trial Section Checklist. The Contractor shall calibrate the equipment and refine the mix design and construction process at his own cost.

The Contractor may, unless advised of any deficiencies in the trial section, proceed with the construction of the pavement ten days after the completion of the trial section or such earlier time as the Engineer may determine. In the event of deficiencies in the trial section, the Engineer may order the Contractor to construct a further trial section, which shall again be regarded as the initial trial section with no additional cost. The Contractor may then proceed with the construction of the pavement ten days after the satisfactory completion and acceptance of the second or subsequent trial section.

If the Contractor should make any alterations in the methods, processes, equipment or materials used and approved, or if he is unable to comply consistently with the specifications, the Engineer may require that a new trial section be constructed, at the Contractor's cost, before allowing the Contractor to continue with any permanent work. The intention of this clause is to avoid any experimentation by the Contractor on the permanent work.

The trial sections shall be laid where indicated by the Engineer. The Contractor shall prepare the surface on which to lay the trial section and shall also, if required, remove the trial section after completion and restore the surface on which it was constructed, all at the Contractor's cost.

Provision is made for payment of the first approved trial section of any particular mix type, but subsequent trial sections that may be required for the same mix type shall be at the Contractor's own cost. Payment will be made for the specified area of each approved first trial section for any particular mix type.

A6.1.3.3 Weather limitations**a) Responsibility for protection**

The Contractor shall be responsible for the quality and strength of the concrete placed and for its protection. Any concrete damaged by adverse weather, such as, any combination of high or low ambient temperature, low humidity, wind, rain and hail, shall be removed and replaced at the Contractor's expense.

b) Protection against rain or hail

No concrete shall be placed during rainy weather. For the concrete to be properly protected against rain and hail before it has sufficiently hardened, the Contractor shall have available at all times frame-mounted waterproof covers for protecting the surface of the unhardened concrete. In addition, when slip-form pavers are used, the Contractor shall also provide acceptable emergency protection for the slab edges. When rain appears to be imminent, all paving operations shall cease and the Contractor shall take the necessary steps to protect the unhardened concrete. The Contractor shall be responsible for the repair of any damage to the concrete, texturing or the curing compound that may occur.

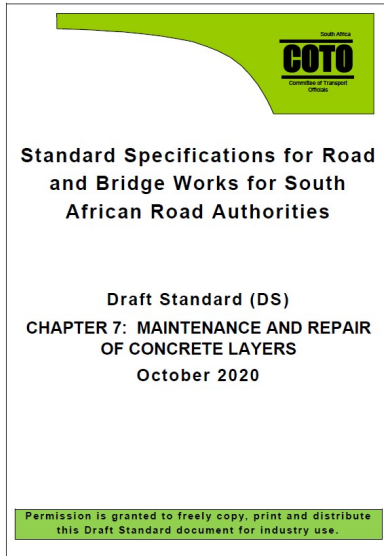
c) Cold-weather paving

All reasonable precautions shall be taken to prevent the temperature of the pavement concrete from falling below 5°C during the first 48 hours after casting. When prevailing temperatures are low, or when cold weather is forecast and there is a danger that the temperature of the freshly constructed concrete pavement will fall below the prescribed limits the Contractor shall either cease all pavement operations, or he may be permitted to proceed, provided that the Engineer is satisfied that adequate protective measures are available and will be taken to ensure that the temperature of the pavement will be maintained above 5°C for the period stated.

A6.2.3 GENERAL

Not applicable to this Section.

HIGH LEVEL OVERVIEW OF



CHAPTER 7 (6 Sections)

- 7.1 REPLACEMENT OF EXISTING JOINT SEALANT
- 7.2 REPAIR TO EXISTING JOINTS AND UNCONTROLLED CRACKS IN CONCRETE PAVEMENTS
- 7.3 REMOVAL AND REINSTATEMENT OF EXISTING CONCRETE LAYERS
- 7.4 REINSTATEMENT OF SLAB SUPPORT BY GROUT INJECTION
- 7.5 REINSTATEMENT OF RIDING QUALITY
- 7.6 REINSTATEMENT OF SURFACE TEXTURE

(iii) Items that will not be measured separately

The following activities, whether required to complete the specified work or not, will not be measured and paid for separately and the Contractor shall include the cost thereof in other pay items as he deems appropriate:

1. No separate payment will be made for setting out the works.
2. No separate payment will be made for the protection or repair as required of any existing or new road furniture, structures, buildings, infrastructure or services damaged by the Contractor's activities.
3. No additional payment shall be made, nor shall any claim for additional payment be considered, for any specified work in confined or restricted areas. Any additional costs associated with working in confined or restricted areas shall be deemed to be included in the standard applicable pay items.
4. No separate payment will be made for the loading of any materials.
5. No separate payment will be made for the hauling of any materials where the material is moved over a distance of less than, and up to 1,0 km.
6. No separate payment will be made for transporting materials from commercial sources irrespective of the haul distance.
7. No separate payment will be made for the removal or any surplus material imported to complete the works.
8. For all Works performed, precautionary measures required in terms of the Occupational Health and Safety Act (Act 85 of 1993) and the latest amendments thereof as well as the latest Construction Regulations shall be deemed included in the rates tendered for the relevant products.

(iv) Items to be measured and paid for using items specified elsewhere in the specifications

Not applicable to this Section.

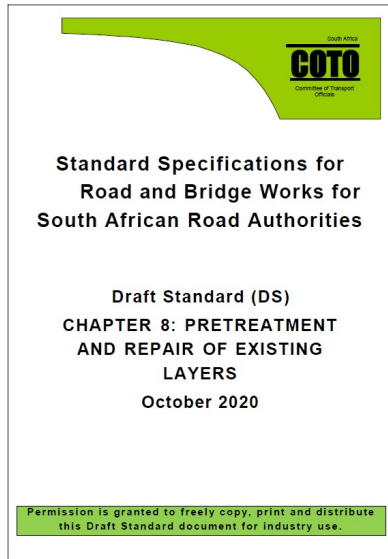
(v) Items specifically for this Section of the specifications

Item	Description	Unit
C7.4.1	Sub-sealing of the concrete pavement	number of 50 kg cement pockets

The unit of measurement shall be the number of 50 kg pockets of cement used to complete the sub-sealing operation. The tendered rate shall include full compensation for supplying all the equipment and incidentals necessary to carry out the sub-sealing operation complete and shall include for all pozzolans, fly ash, water and admixtures used in the grout mixture.

The tendered rate shall also include for the cleaning of the pavement surface of all debris and grout spillage, wooden plugs and the sealing of joints and other openings where the grout may escape. The tendered rate shall also include full compensation for supplying all equipment, materials and incidentals required to drill the holes, cleaning and monitoring the holes and to fill the holes with a suitable cement/fine aggregate mix after the sub-sealing operation has been completed.

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CHAPTER 8 (9 Sections)

- 8.1 PRIME COAT
- 8.2 COVER SPRAYS, FOG SPRAYS AND REJUVENATION SPRAYS
- 8.3 TEXTURE TREATMENT
- 8.4 RUT AND/OR DEPRESSION CORRECTION
- 8.5 STANDARD CRACK SEALING
- 8.6 GEOSYNTHETIC CRACK SEALING
- 8.7 PLANING
- 8.8 PATCHING AND EDGE BREAK REPAIRS
- 8.9 REPAIR OF SURFACE DEFECTS

A8.3.2 DEFINITIONS

Texture treatment - refers to the application of a thin layer of slurry or microsurfacing to obtain a uniform fine texture prior to surfacing or resurfacing.

A8.4.2 DEFINITIONS

Rut correction - refers to filling of ruts in the wheel tracks

Screeding - refers to level correction using coarse slurry, microsurfacing or asphalt where the road surface is uneven and where depressions, humps or small grooves occur as a result of deformation of the pavement layers not due to structural failure of the pavement.

A8.7.2 DEFINITIONS

Planing in the context of this Chapter refers to level correction where the road surface is uneven and where depressions, humps or small grooves occur as a result of deformation of the pavement layers not due to structural failure of the pavement or the removal of surface irregularities through precision milling to a specified depth, to obtain a clean and regular running surface



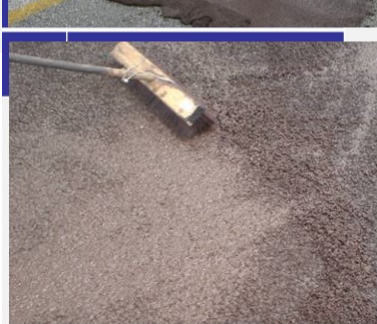
Cationic emulsion spray grade

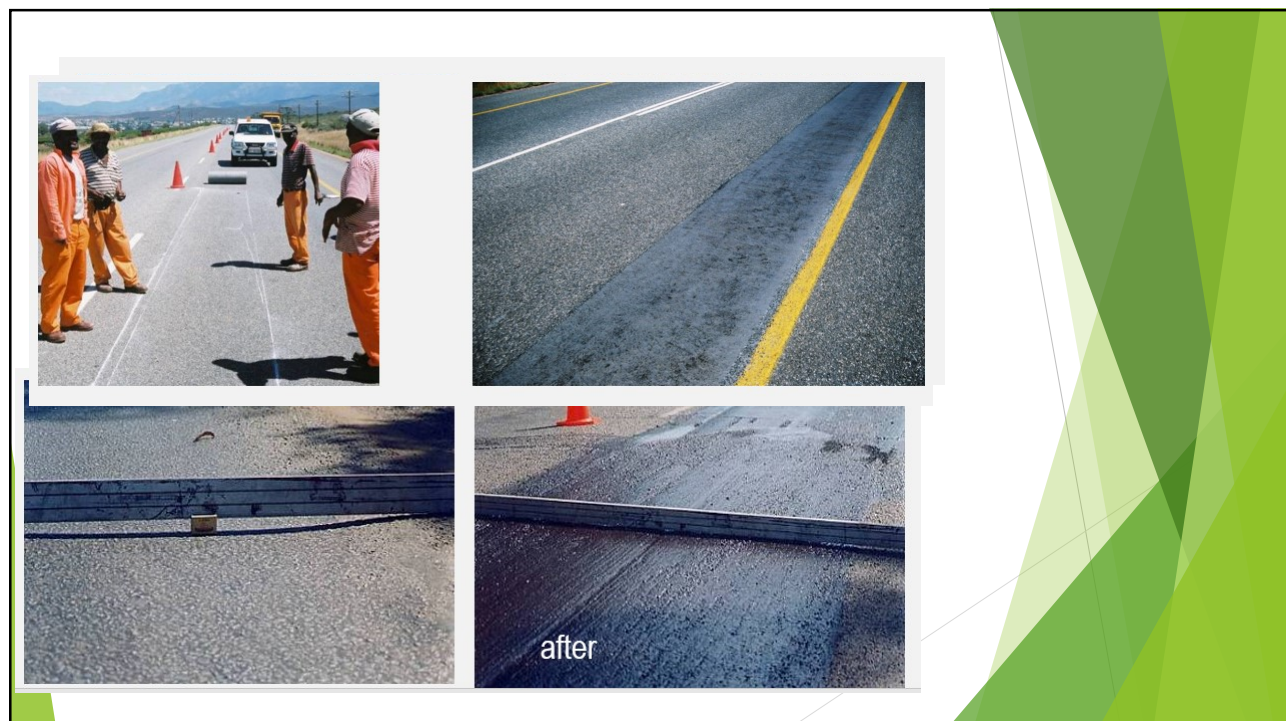


Diluted SC-E1

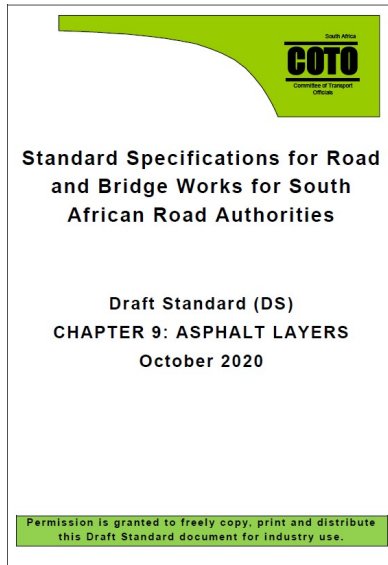


Cationic emulsion spray grade





HIGH LEVEL OVERVIEW OF



CHAPTER 9 (1 Section)

9.1 ASPHALT LAYERS

A9.1.2 DEFINITIONS

Asphalt mix types - a mixture of aggregate, with or without active filler, and an appropriate bituminous binder proportioned in such a manner as to produce a final product conforming to all the relevant mix, and or, performance properties as specified. Asphalt mixes are classified into two fundamental mix types and may incorporate either standard, homogenous modified or non-homogenous (bitumen-rubber) bitumen.

a) **Sand skeletal mixes** - where the loads on the layer are carried by a continuous matrix of the finer aggregate fraction. There is no meaningful contact between the individual coarse aggregate particles and only provide bulk while not compromising the continuity of the finer fraction. Examples include:

- Semi-gap graded asphalt (AS), as further defined in Sabita Manual 35; Design and Use of Asphalt in Road Pavements
- Gap-graded asphalt (AG), as further defined in Sabita Manual 35; Design and Use of Asphalt in Road Pavements
- Fine/medium continuously graded asphalt mixes (AC), as further defined in Sabita Manual 35; Design and Use of Asphalt in Road Pavements
- Bitumen-rubber gap-graded (BRAGG), as further defined in Sabita Manual 19; Guidelines for the design, manufacture and construction of bitumen rubber asphalt wearing courses

b) **Stone skeletal mixes** - where a continuous matrix (skeleton) of coarse aggregates carries the imposed loads. In dense mixes the spaces between the coarse aggregate fractions are filled by the finer aggregate fractions to an extent that assures that the skeleton is not dilated, and contact between the coarser aggregate particles is maintained. In porous mixes, the spaces between the coarse aggregates are void. Examples include:

- Coarse continuously graded (AC), as further defined in Sabita Manual 35; Design and Use of Asphalt in Road Pavements
- Stone mastic (SMA), as further defined in Sabita Manual 35; Design and Use of Asphalt in Road Pavements
- Ultra-thin friction course (UTFC)
- High modulus base (EME), as further defined in Sabita Manual 33; Design Procedure for High Modulus Asphalt (EME)
- Porous (AP), as further defined in Sabita Manual 17; Design of Porous Asphalt Mixes
- Bitumen-rubber gap graded (BRAGG), as further defined in Sabita Manual 19; Guidelines for the Design, Manufacture and Construction of Bitumen-Rubber Asphalt Surfacing.
- Bitumen-rubber open graded (BRAOG), as further defined in Sabita Manual 17; Design of Porous Asphalt Mixes
- Proprietary mixes, such as UTFC, which have been independently certified as fit-for-purpose.

The particular mix type, and or, any additional requirements, shall be as specified in the Contract Documentation

A9.1.3.1 Nominal mix proportions and application rates

a) Mix composition. The mix proportions of bituminous binder, combined aggregates and filler for the various mix types, as well as bond coat and rolled-in chip applications, as listed in Tables A9.1.3-1 to A9.1.3-3 below, are nominal, and shall only be used for tendering purposes. The proportions actually used shall be as determined during the mix design, trial section and assessment requirements as specified in Clause A9.1.3.3. Any approved variation to these nominal mix proportions, and or, application rates shall be subject to an adjustment in payment, calculated in accordance with Clause C1.1.4 of Chapter 1 and relevant to the applicable variation rates tendered for each component as listed under Measurement and Payment

Table A9.1.3-1: Nominal Mix Proportions of Stone Skeletal Mixes for Tender Purposes

MIX TYPE	High Modulus Base (EME)		Continuous graded base and surfacing: conventional and homogenous modified bitumen			Stone Mastic Asphalt (SMA)		Continuous graded surfacing: Bitumen-rubber:		Gap graded surfacing: Bitumen-rubber:		Mixes containing reclaimed asphalt
Nominal maximum particle size (mm)	20	14	20	14	10	14	10	20,0	14,0	20,0	14,0	Refer to Note* 2 below and Contract Documentation
Aggregate (%)	93,0	92,0	94,0	93,5	93,0	92,5	92,0	92,0	91,5	91,5	91,0	
Bitumen (type and grade according to Contract Documentation) (%)	6,0	7,0	5,0	5,5	6,0	6,5	7,0	7,0	7,5	7,5	8,0	
Active filler*1 (%)	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	
Cellulose fibre (%)	N/A	N/A	N/A	N/A	N/A	0,5	0,5	N/A	N/A	N/A	N/A	

*Note 1: Active filler for tender purposes shall be hydrated lime

*Note 2: The nominal proportions for mixes containing reclaimed asphalt shall be as specified in the Contract Documentation dependent on the percentage of reclaimed asphalt or binder replacement limits specified or permitted. If no such amendments are specified, the standard nominal mix proportions tabled above shall apply.

Table A9.1.3-2: Nominal Mix Proportions of Sand Skeletal Mixes for Tender Purposes

MIX TYPE	Continuous graded base and surfacing: standard and homogenous modified bitumen			Gap and semi-gap mixes using standard and homogenous modified bitumen		Mixes containing reclaimed asphalt
Nominal maximum particle size (mm)	20	14	10	14	10	Refer to Note* 2 below and Contract Documentation
Aggregate (%)	94,0	93,5	93,0	92,5	92,0	
Bitumen (type and grade according to Contract Documentation) (%)	5,0	5,5	6,0	6,5	7,0	
Active filler*1 (%)	1,0	1,0	1,0	1,0	1,0	

*Note 1: Active filler for tender purposes shall be hydrated lime

*Note 2: The nominal proportions for mixes containing reclaimed asphalt shall be as specified in the Contract Documentation dependent on the percentage of reclaimed asphalt specified or permitted. If no such amendments are specified, the standard nominal mix proportions tabled above shall apply.

- b) Bond coat and rolled-in chippings. The nominal application rates for tender purposes for asphalt bond coats and rolled-in chippings shall be as tabled below.

Table A9.1.3-3: Nominal application rates for bond coats and rolled-in chippings

Product	Nominal application rate	Bitumen %	Filler*1 (%)
Bond coat			
(a) Pavement	0,55 l/m ²		
(b) Bridge decks	0,40 l/m ²		
Rolled in chippings			
20 mm	8 Kg/m ²	1,5	1,0
14 mm	6 Kg/m ²	1,7	1,0
10 mm	4 Kg/m ²	2,0	1,0

*Note 1: Active filler for tender purposes shall be hydrated lime

The nominal rates for tender purposes for the bond coat are based on 30 % stable grade emulsion. Nominal application rates for other bond coat products shall be as specified in the Contract Documentation.

The actual application rate for rolled-in chippings shall be as determined and approved by the Engineer based on the relative density of the aggregate and the target texture depth to be achieved.

- b) Bond coat and rolled-in chippings. The nominal application rates for tender purposes for asphalt bond coats and rolled-in chippings shall be as tabled below.

Table A9.1.3-3: Nominal application rates for bond coats and rolled-in chippings

Product	Nominal application rate	Bitumen %	Filler*1 (%)
Bond coat			
(a) Pavement	0,55 l/m ²		
(b) Bridge decks	0,40 l/m ²		
Rolled in chippings			
20 mm	8 Kg/m ²	1,5	1,0
14 mm	6 Kg/m ²	1,7	1,0
10 mm	4 Kg/m ²	2,0	1,0

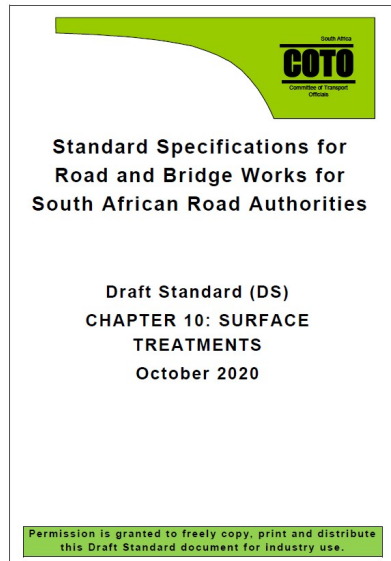
*Note 1: Active filler for tender purposes shall be hydrated lime

The nominal rates for tender purposes for the bond coat are based on 30 % stable grade emulsion. Nominal application rates for other bond coat products shall be as specified in the Contract Documentation.

The actual application rate for rolled-in chippings shall be as determined and approved by the Engineer based on the relative density of the aggregate and the target texture depth to be achieved.

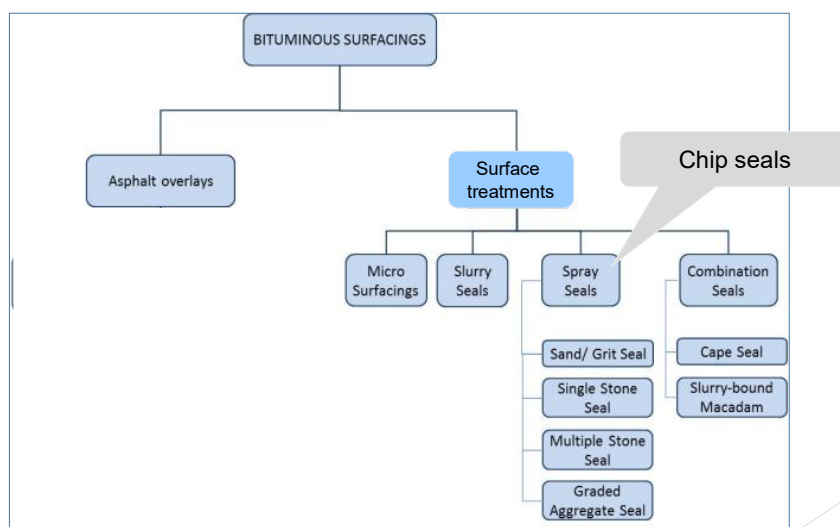


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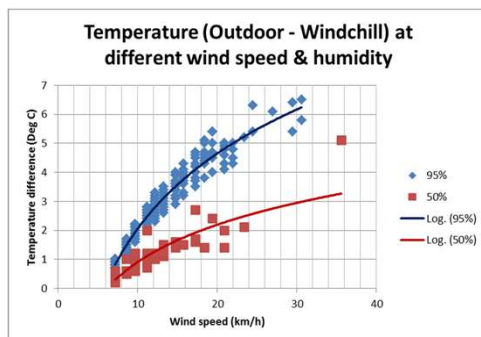
CHAPTER 10 (1 Section)

10.1 GENERAL REQUIREMENTS FOR SURFACE TREATMENTS



A10.1.3 General requirements

- Requirements pertaining to all seal types
- Weather limitations
- Areas inaccessible to mechanical equipment
- Protection of kerbs, channels, etc
- Moisture content
- Pretreatment
- Demarcation of working area
- Dust control
- Spray Joints
- Traffic limitations
- Opening to traffic
- Trial sections
- Maintenance
- Nominal rates of application for tender purposes
- Single seals
- Precoating fluid



A10.1.5 Materials

- Conventional Bituminous Binders for seal work
- Polymer Modified Bituminous Binders for seal work
- Bituminous binders for cover sprays
- Bituminous binders for slurry seals
- Bituminous binders for microsurfacing overlays
- Water for diluting emulsions
- Precoating fluid
- Cutting back of bitumen in the distributor or dedicated plant on site
- Heating and storing of bituminous binders
- Single sized aggregate
- Aggregate for blinding single seals
- Aggregate for Sand and Grit seals
- Aggregate for Graded Aggregate seals
- Precoating of Hydrophilic aggregates
- Aggregate management
- Geotextile membranes for seal work
- Dry material for slurry seals
- Aggregate for Microsurfacing

Aggregate specifications

► Grade class

Traffic (AADT)	Less than 300	300 - 3000	More than 3000
Relevant Aggregate Grade	3	2	1

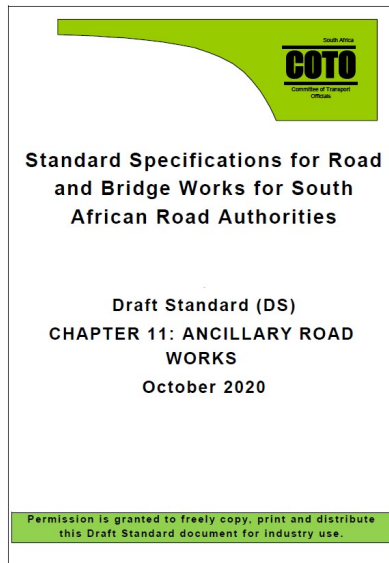
► Hardness

Relevant Aggregate Grade	3	2	1
Dry 10 % FACT [kN] (min)	130	180	210
Wet 10 % FACT [kN] (min)	100	135	160

► PSV

Relevant Aggregate Grade	3	2	1
Aggregate position in seal			
Exposed aggregate	48	49	50
Underlying aggregate	45	47	48

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CHAPTER 11 (9 Sections)

- 11.1 PITCHING, STONEWORK, CAST IN SITU CONCRETE FOR PROTECTION AGAINST EROSION
- 11.2 NON-STRUCTURAL GABIONS
- 11.3 GUIDE BLOCKS AND KILOMETRE MARKERS
- 11.4 ROAD RESTRAINT SYSTEMS
- 11.5 FENCING
- 11.6 ROAD SIGNS
- 11.7 ROAD MARKINGS AND ROAD STUDS
- 11.8 LANDSCAPING AND PLANTING PLANTS
- 11.9 FINISHING THE ROAD AND ROAD RESERVE AND TREATING OLD ROADS

A11.4.4 DESIGN BY CONTRACTOR / PERFORMANCE BASED SYSTEMS

Performance based vehicle restraint systems provided by the Contractor shall be required where specified on the drawings or Contract Documentation, both as temporary and permanent applications, as specified for containment level and working width and shall conform to the product class specification criteria and containment levels as per the latest version of EN 1317 or NCHRP350/MASH based on the risk profile determined at the specific location(s) by the Engineer. Included into the Contractors submission shall be the requirements and procedures to maintain EN 1317 and/or AASHTO MASH compliance in the event of repairs due to damage during the construction period and post construction. The specific materials and construction requirements for repair and maintenance activities shall be provided to the Engineer together with the manufactures' specifications.

Where offered and accepted or specified to be used, steel posts or other steel elements being part of an approved vehicle restraint system as tested and complying with EN 1317 and/or AASHTO MASH shall be galvanized in compliance with the requirements of SANS 121.

Where such vehicle restraint systems are placed on concrete retaining walls or concrete structures, the steel posts attachment to the concrete shall be required to be an element of a system shall be specified as also complying with EN 1317.

Item	Description	Unit
C11.4.2	Performance based vehicle restraint systems	
C11.4.2.1	Complete longitudinal barrier system to EN 1317 or AASHTO MASH or NCHRP350 as alternative where no MASH product is available:	
(a)	Guardrail system (state criteria including containment level & working width)	metre (m)
(b)	Cable barrier system (state criteria including containment level & working width)	metre (m)
(c)	Concrete barrier system (state criteria including containment level & working width)	metre (m)
(d)	Etc for other types, permanent and temporary	metre (m)
C11.4.2.2	Terminal sections for the following to EN 1317 or AASHTO MASH or NCHRP350 as alternative where no MASH product is available:	
(a)	End treatments (State criteria EN or MASH and containment level)	number (No)
(b)	Crash cushions (State criteria EN or MASH and containment level)	number (No)

- | | |
|--|-------------|
| (c) Transitions (State criteria EN or MASH and containment level, etc.)) | number (No) |
| (d) Other types (State criteria EN or MASH and containment level, etc.) | number (No) |
| C11.4.2.3 Relocation of temporary systems (Type, EN or MASH, or NCHRP350 as alternative where no MASH product is available, containment level and working width indicated) | metre (m) |

The unit of measurement for C11.4.2.1 shall be the metre of specified vehicle restraint system (complying with EN 1317) as fully erected, excluding length of terminal sections but including curved guardrails.

The unit of measurement for C11.4.2.2 shall be the number of complete end treatments of each type fully supplied and installed compliant with EN1317 or AASHTO MASH or NCHRP350 as alternative where no MASH product is available as relevant.

The tendered rate for item C11.4.2.3 shall be metre of temporary vehicle restraint system removed and relocated to a different position, regardless of the distance relocated. The tendered rates shall include full compensation for furnishing all materials and labour for erecting or removing (where applicable) and galvanizing the guardrails, complete with posts, spacer blocks, bolts, nuts, washers and reinforcing plates as may be required, and excavating or making holes in all classes of material, concrete, backfilling and removing any surplus material. It shall also include full compensation for incidentals in respect of supplying and erecting guardrails, end treatments, crash cushions, etc. as applicable.

Where end treatments are specified not to comply with EN 1317 or AASHTO MASH or NCHRP350 as alternative where no MASH product is available, but as indicated on drawings or specified by the Engineer, measurement and payment shall be made under item C11.4.1.2 or C11.4.9.

Reflective plates and drilling and blasting of holes will be paid for separately.

Drilling and blasting will be paid for separately under item C11.4.11.

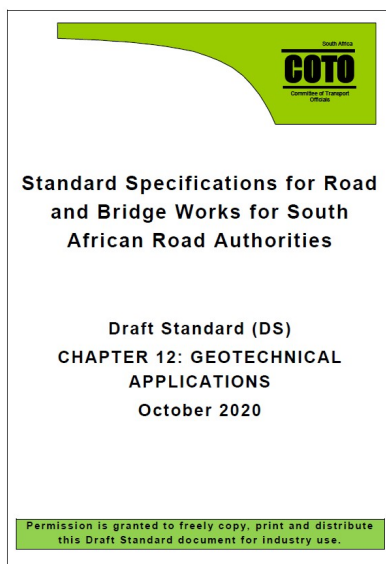
D11.4.3.1 Performance based Vehicle Restraint Systems

Suppliers of Performance Based Systems will be required to obtain, from the foreign testing facility where the product was tested, a Type Approval Report and submit it to a SANAS accredited Certification Body for independent verification at the cost of the supplier. Once verified, the Certification Body will conduct auditing of the product being manufactured, to ensure that it is the same product as described in the Type Approval Report, which will verify the testing report provided to the Engineer.

The manufacturer of the RRS will be required to issue a limited material defects warranty for a period of not less than 12 months.

The entity that is tasked with the installation of the RRS system must be a certified installer and certify that the system has been installed in accordance with the manufacturers installation guidelines in order to comply with the crash testing conditions.

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CHAPTER 12 (12 Sections)

- 12.1 PILING
- 12.2 GROUND ANCHORS
- 12.3 GROUND IMPROVEMENT
- 12.4 LATERAL SUPPORT
- 12.5 SHOTCRETE
- 12.6 MECHANICALLY STABILISED EARTH AND GABIONS
- 12.7 TRENCHLESS METHODS
- 12.8 GROUND DRAINAGE
- 12.9 SLOPE PROTECTION METHODS

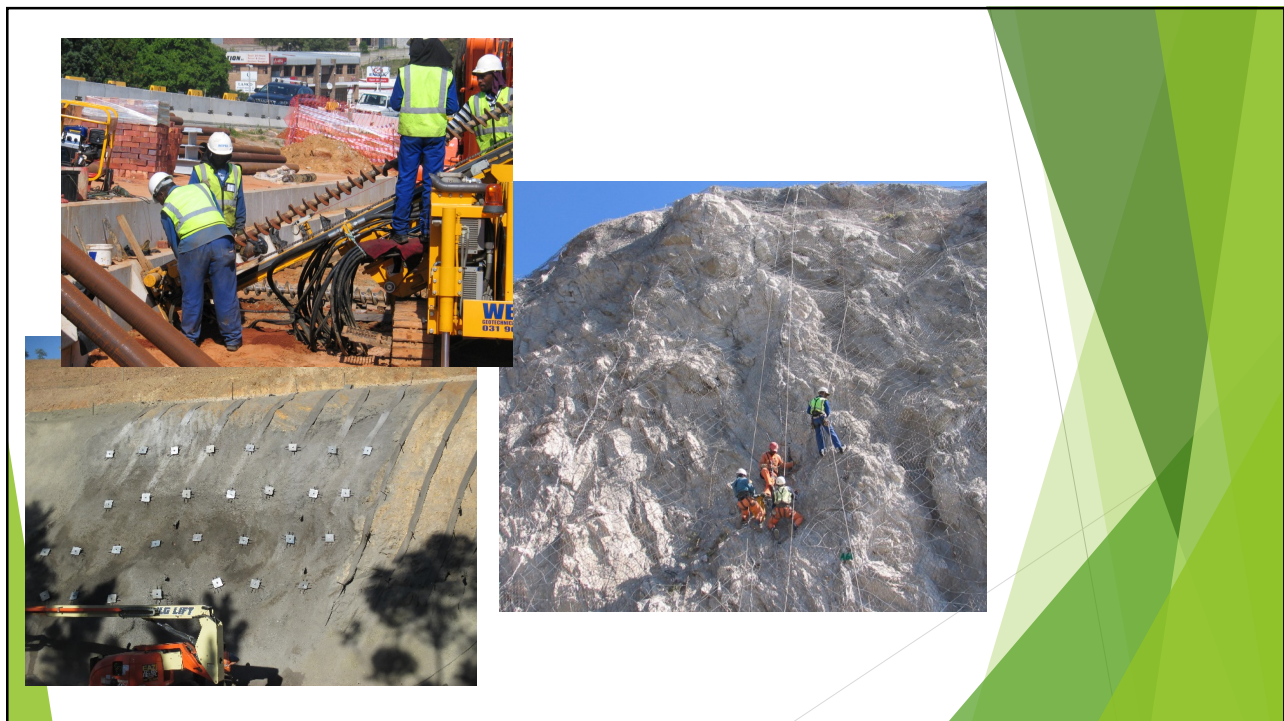
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CHAPTER 12 (12 Sections)

- 12.10 HARD EXCAVATION BY BLASTING
- 12.11 GEOSYNTHETICS
- 12.12 CONSTRUCTION DEWATERING





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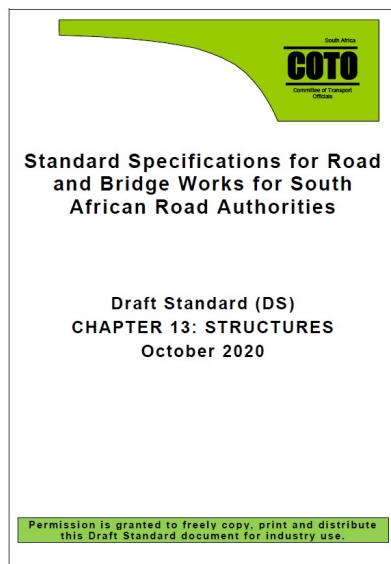
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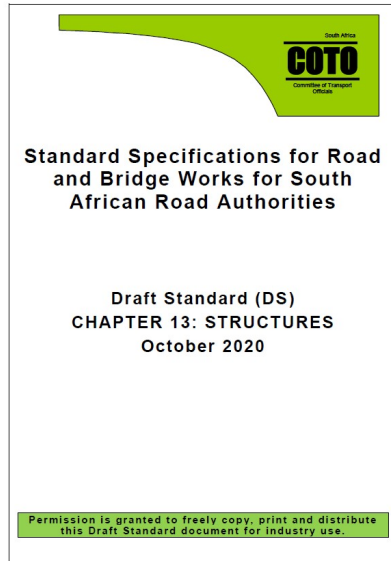
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CHAPTER 13 (14 Sections)

- 13.1 FOUNDATIONS
- 13.2 FALSEWORK, FORMWORK AND CONCRETE FINISH
- 13.3 STEEL REINFORCEMENT
- 13.4 CONCRETE
- 13.5 PRESTRESSING
- 13.6 BEARINGS
- 13.7 JOINTS
- 13.8 ANCILLARY STRUCTURAL ELEMENTS
- 13.9 STRUCTURAL STEELWORK FOR MINOR STRUCTURES

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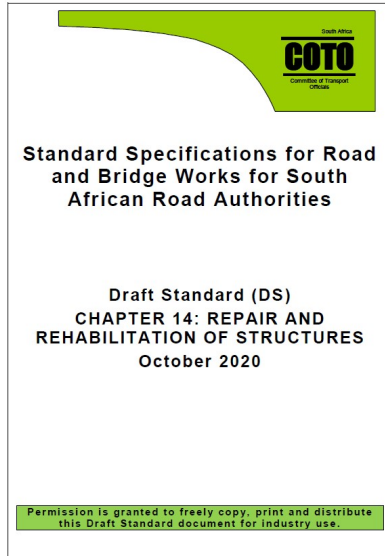
CHAPTER 13 (14 Sections)

- 13.10 PAINTING OF MINOR STRUCTURES
- 13.11 STRUCTURAL STEELWORK FOR MAJOR STRUCTURES
- 13.12 STRUCTURAL STEEL PROTECTIVE TREATMENT OF MAJOR STRUCTURES
- 13.13 INCREMENTAL LAUNCHING OF BRIDGE DECKS
- 13.14 SPECIALIST STRUCTURES

A13.1.5.7 Plum concrete

Plum concrete shall consist of either mass concrete with plums in which rock plums are placed into wet concrete protruding into the concrete layer or prepacked concrete in which the rock plums are placed and the concrete placed over and around the plums. Mass concrete or prepacked concrete shall comply with the requirements of Section A13.4 and have a characteristic strength of at least 25 MPa. The water to cementitious binder ratio shall be designed to maintain the flow ability of concrete and to fill all interstices between the rock plums. The rock size used for plums shall be between 200 and 300 mm and they shall meet the requirements for rock as specified in Clause A13.1.5.3. The proportion of plums shall not exceed 60 % of total volume of plum concrete. The plums shall be laid in layers using mortar or flowable concrete to fill all interstices. Plums shall extend above each layer to prevent slip planes between layers. Concrete slush and laitance shall be wire-brushed off proud rock surfaces at day joints between layers. All plum concrete shall be maintained wet for curing purposes for at least 7 days.

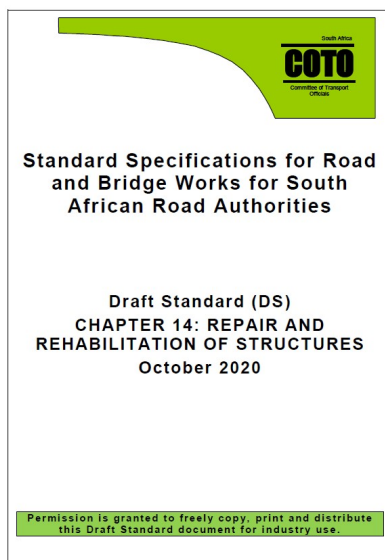
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CHAPTER 14 (11 Sections)

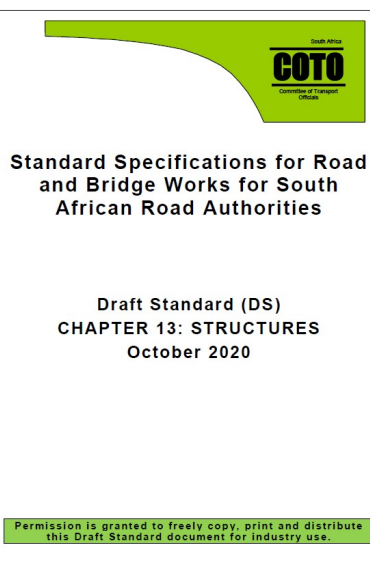
- 14.1 ACCESS FOR BRIDGE REHABILITATION
- 14.2 CORROSION SURVEY METHODS AND TESTING OF NEAR SURFACE CONCRETE PROPERTIES
- 14.3 DEMOLITION AND REMOVAL OF STRUCTURAL CONCRETE AND STEELWORK
- 14.4 SURFACE AND STRUCTURAL REPAIR OF CONCRETE MEMBERS
- 14.5 ANCHORING OF REINFORCEMENT, GROUTING AND CRACK INJECTION
- 14.6 SPRAYED CONCRETE FOR STRUCTURES
- 14.7 PROTECTIVE COATINGS AND TREATMENTS FOR CONCRETE

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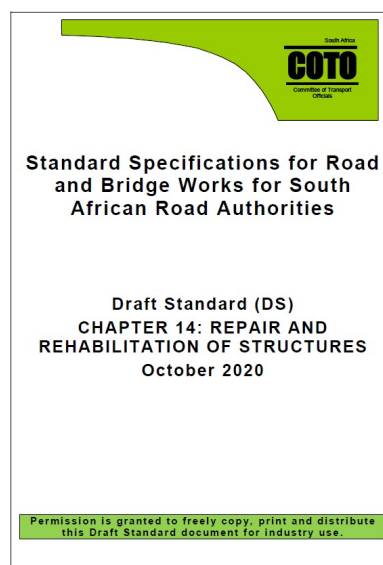


CHAPTER 14 (11 Sections)

- 14.8 EXTERNAL BONDING OF STEEL AND CARBON FIBRE
- 14.9 REPAIR AND REPLACEMENT OF ANCILLARY STRUCTURAL ELEMENTS
- 14.10 JACKING OF BRIDGE STRUCTURES
- 14.11 REPAIR OF STEEL ELEMENTS

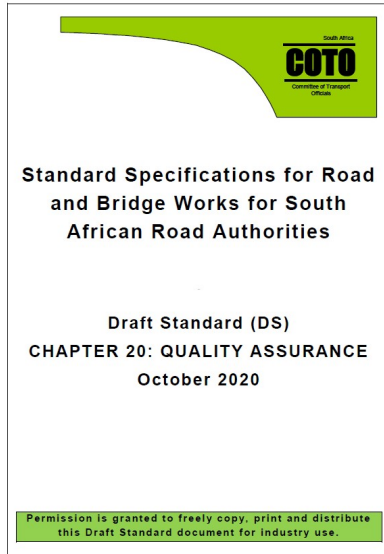


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CHAPTER 20 (1 Section)

20.1 TESTING MATERIALS AND JUDGEMENT OF WORKMANSHIP

Table A20.1.3-1: Schedule showing quantities and times for submitting the materials for approval and mix designs

Material submitted	Proposed use	Submission for quality approval only		Submission for quality approval and mix design	
		Minimum time to be allowed for testing and approval	Minimum quantity to be submitted	Minimum time to be allowed for testing, approval and mix design	Minimum quantity to be submitted
Crushed stone	Coarse aggregate for concrete	2 weeks	50 kg of each type and size of aggregate	8 weeks for structures and concrete pavements	150 kg of each size of aggregate for each class of concrete
	Bituminous seals	2 weeks *1	50 kg of each type and size of aggregate	2 weeks	50 kg of each size of aggregate
	Asphalt mix design Marshall Method	2 weeks *1	50 kg of each type and size of aggregate	8 weeks *2	100 kg of each size of aggregate as well as proposed binder *2
	Asphalt mix design Level 1	4 weeks *1	50 kg of each type and size of aggregate	10 weeks *2	100 kg of each size of aggregate as well as proposed binder *2
	Asphalt mix design Level 2	6 weeks *1	50 kg of each type and size of aggregate	12 weeks *2	100 kg of each size of aggregate as well as proposed binder
	Asphalt mix design Level 3	8 weeks *1	50 kg of each type and size of aggregate	16 weeks *2	100 kg of each size of aggregate as well as proposed binder *2
	Crushed-stone base or subbase	3 weeks	50 kg	8 weeks (stabilisation)	200 kg

Fine aggregate	Fine aggregate for concrete	2 weeks	50 kg of each type and size of aggregate	10 weeks	150 kg of each type proposed for use for each class of concrete
	Asphalt mix design Marshall Method	2 weeks *1	50 kg of each type and size of aggregate	8 weeks *2	150 kg of each type proposed for use *2
	Asphalt mix design Level 1	4 weeks *1	75 kg of each type and size of aggregate	10 weeks *2	150 kg of each size of aggregate as well as proposed binder *2
	Asphalt mix design Level 2	6 weeks	50 kg of each type and size of aggregate	12 weeks *2	150 kg of each size of aggregate as well as proposed binder *2
	Asphalt mix design Level 3	8 weeks	50 kg of each type and size of aggregate	16 weeks *2	150 kg of each size of aggregate as well as proposed binder *2
	Slurry or sand seal	2 weeks	50 kg of each type proposed for use	6 weeks	50 kg of each type proposed for use as well as proposed binder
Gravel	Subbase and/or base	4 weeks	200 kg of each type	8 weeks (stabilisation)	200 kg as well as stabilising agent
Binders	Asphalt	2 weeks	5 t	4 weeks	10 t
	Surface treatments	2 weeks	5 t	4 weeks	10 t
	Bituminous stabilised materials	2 weeks	5 t	4 weeks	10 t

Material submitted	Proposed use	Submission for quality approval only		Submission for quality approval and mix design	
		Minimum time to be allowed for testing and approval	Minimum quantity to be submitted	Minimum time to be allowed for testing, approval and mix design	Minimum quantity to be submitted
Bituminous stabilised materials	Bituminous stabilised mixes	2 weeks	50 kg of each type of aggregate and reclaimed asphalt (RA)	4 weeks	100 kg of each type of aggregate and RA
Other materials e.g. paint, cement, additives, Concrete, Additives, etc.	As specified	As prescribed by the Engineer			

A20.1.5 UNPUBLISHED TEST METHODS**A20.1.5.1 Testing hardened and sprayed concrete**

- a) Determining the compressive strength
- b) Drilling and testing cores for compressive strength
- c) Concrete durability index testing
- d) Oxygen Permeability (OP)
- e) Chloride Conductivity (CC)
- f) Water Sorptivity (WS)
- g) Energy absorption capacity
- h) Testing the cover over reinforcement

A20.1.5.2 Tests on road elements

- a) and b)

A20.1.5.3 Testing Bitumen and Asphalt

- a) to c)

A20.1.5.4 Testing relating to chemical stabilisation

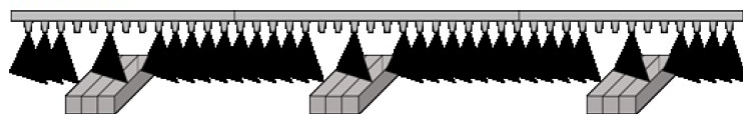
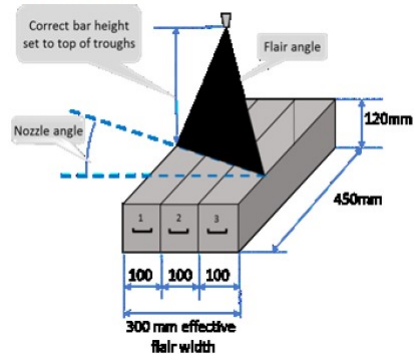
- a) to c)

A20.1.5.5 Tests on pavements

- a) to e)

A20.1.5.6 Tests on structural elements

- a) to d)

A20.1.5.7 Determining the effect of sand on the water demand of a concrete mix**A20.1.5.8 Accelerated test method for determining the potential alkali reactivity of aggregates****A20.1.5.9 Binder distributors: Field spray flair transverse distribution test***Figure A20.1.5-6**Figure A20.1.5-7*

A20.1.5 UNPUBLISHED TEST METHODS

- A20.1.5.10 Testing Geosynthetics and Geotextiles
- A20.1.5.11 Testing the binder drainage properties of Asphalt mixes using the Schellenberg Method
- A20.1.5.12 Operation of the rapid compaction control device (RCCD)
- A20.1.5.13 Testing the saturated volume of fine aggregate for slurry
- A20.1.5.14 X-RD (X-ray diffraction) test
- A20.1.5.15 Nomogram for determining the rate of water evaporation
- A20.1.5.16 Curing concrete to attain accelerated strength development (55 °/20 hours)

