

ANNEXURE A: PROJECT SPECIFICATIONS

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SECTION A: STANDARD AMENDMENTS ISSUED BY COLTO

Notes to tenderer:

1. The Standard Specifications for Road and Bridge Works for State Road Authorities (1998 edition) prepared by the Committee of Land Transport Officials, (COLTO), as amended, shall apply to this contract. The amendments are those issued by COLTO and reproduced in Section A, together with additional amendments as set out in Section B.
2. Where reference is made to the General Conditions of Contract and sub-clauses thereof in the abovementioned Standard Specifications, they refer to the appropriate edition of the 'General Conditions of Contract for Road and Bridge Works for State Road Authorities' issued by COLTO (clause 1115 of the Standard Specifications refers).
3. The General Conditions of Contract applicable to this contract are the Engineering and Construction Contract (NEC3) (June 2005), amended April 2013, Option B: Priced contract with bill of quantities.
4. The terms "Schedule of Quantities", (used throughout the Standard Specifications) and "Bill of Quantities", (used in all other documents forming part of this contract), and "Pricing Schedule" are synonymous.

As at **TBC** no amendments have been issued.

SECTION B: PROJECT SPECIFICATION AMENDMENTS TO THE STANDARD SPECIFICATIONS

Notes to tenderer:

- 1. In certain clauses the Standard Specifications allow a choice to be specified in the project specifications between alternative materials or methods of construction and for additional requirements to be specified to suit a particular contract. Details of such alternatives or additional requirements applicable to this contract are contained in this part of the project specifications. It also contains some additional specifications required for this particular contract.**
- 2. The number of each clause and each payment item in this part of the project specifications consists of the prefix B followed by a number corresponding to the number of the relevant clause or payment item in the standard specifications. The number of a new series, new clause or a new payment item which does not form part of a series, clause or a payment item in the standard specifications, and which is included here, is also prefixed by B followed by a new number. The new numbers follow on the last clause or item number used in the relevant section of the standard specifications.**
- 3. The tenderer shall note that the standard COLTO specification is based on the COLTO General Conditions of Contract. References to specific COLTO General Conditions of Contract clauses will need to be exchanged for the equivalent clause in the Engineering and Construction Contract (NEC3) (June 2005), amended April 2013, Option B: Priced contract with bill of quantities, as amended by the Contract Data to be found in Part C1 of this document. The Employer assumes no responsibility for the Contractor's interpretation of which are the correct relevant clauses.**

SECTION B: PROJECT SPECIFICATIONS

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COLTO SERIES 1000: GENERAL

SECTION B1100: DEFINITIONS AND TERMS

B1115 GENERAL CONDITIONS OF CONTRACT

Replace Clause 1115 with the following:

The General Conditions applicable to this Contract are the Engineering and Construction Contract (NEC3) (June 2005), amended April 2013, Option B: Priced contract with bill of quantities.

Accordingly, all reference in the Standard Specifications to any other General Conditions of Contract (GCC) must be replaced with the relevant clauses in the NEC Option B as amended by the Contract Data in Part C1.2 of the Contract Document. The contractor shall be responsible for interpretation of the equivalent clause.

B1155 WORK IN RESTRICTED AREAS

Add the following:

"Any omission of payitems from the pricing schedule with regard to additional or extra over payment for work in restricted areas should be regarded as deliberate and any additional cost incurred shall be included in the bulk rates tendered. (Refer also to clause B1209(g))".

Add the following clauses:

"B1156 OTHER DEFINITIONS

The COLTO Standard Specifications for Roads and Bridge Works for State Road Authorities (1998 edition) has been written for all contractors, employers and engineers. Similarly, the works and the site are not defined and the general nature of the entities and elements that collectively constitute construction under a contract are characterized by the use of lowercase letters throughout.

These project specifications continue to use lowercase spellings to avoid the appearance of the capitalised and non-capitalised words to describe or prescribe the same elements of work required on this project. However, for the purposes of this contract the following definitions shall apply:

Contractor

The Contractor and the contractor is the same persona referred to in clause 10.1 of the NEC 3 Conditions of Contract, but who will only be formally identified by the completed Form of Acceptance C1.1.2 in this document and which will be bound into the final contract document.

Employer

The Employer and employer is the same persona and is defined in C1.2 Contract Data, and Clause 10.1 of the NEC 3 Conditions of Contract .

Engineer

Any reference to the Engineer/engineer in the Standardised Specifications or these Project Specifications shall mean the Project Manager/NEC3 Supervisor as identified in the Contract Data C1.2 and Clause 10.1 of the NEC 3 Condition of Contract and Works Information and as may be relevant for the specific requirement to perform the functions of the engineer in terms of the Works Information, these Project Specifications or the Standardised Specifications. Any clarification required by the Contractor shall be made in terms of clause 17.1 of the NEC 3 Conditions of Contract.

The Site

Site information which describes the site and its surroundings is included in the Contract Data and Part C4: Site Information.

The working area is defined in the Contract Data (clause 11.2(18)). It is bound by the limits of construction as shown in the drawings or the title of the project and extends to also include the following:

- Areas outside the construction zone areas where accommodation of traffic is placed.
- All borrowpits defined in the applications approved by the relevant Department of Minerals and Energy.
- All haul roads constructed by the contractor for purposes of access.
- Any non-adjacent sites specified in the contract documentation.
- The contractors and his subcontractors camp sites

Works

The Works is described in Part C3-Work Information of this document as defined in clause 11.2(19) of the NEC 3 Conditions of Contract. Providing the Works is defined in clause 11.2(13).

Prime cost

Is a specific type of Provisional Sum for which payment is made on the production of invoices showing the cost price of the implementation or installation of the service required. Services rendered in this manner carry a mark-up for which a rate is offered at tender stage to cover all the tenderer's handling, supervision and liability costs and profit in providing the item or services. No further defined costs or fee markup shall be applied in terms of the NEC 3 contract.

Provisional Sum

Shall mean any amount stated as a provisional sum and shall only be used, in whole or in part, in accordance with the Project Manager's instructions, and the contract price shall be adjusted accordingly. The total sum paid to the Contractor shall include only such amounts, for the work, supplies or services to which the Provisional Sum relates, as the Project Manager shall have instructed. For each Provisional Sum, the Project Manager may instruct:

- (a) work to be executed by the Contractor, including Plant, Materials or services, and valued under Clause 60 and/
- (b) Plant, Materials or services to be purchased by the Contractor, from a Subcontractor or otherwise; and for which there shall be included in the Contract Price:
 - (i) the actual amounts paid (or due to be paid) by the Contractor, and
 - (ii) a sum for overhead charges and profit, calculated as a percentage of these actual amounts by applying the relevant percentage rate (if any) stated in the appropriate Schedule.

The Contractor shall, when required by the Project Manager, produce quotations, invoices, vouchers and accounts or receipts in substantiation.

B1158 SABS SPECIFICATIONS

Where reference is made in this specification or the standard specifications to SABS specifications, the latest published national standard shall be applicable. Use:

[https://www.sabs.co.za/content/uploads/files/SABS%20Catalogue%20February%202012%20\(abridged\).pdf](https://www.sabs.co.za/content/uploads/files/SABS%20Catalogue%20February%202012%20(abridged).pdf)

for the most up-to-date versions of the various standards.

B1159 AGGREGATE SIZE

Where reference is made in this specification or the standard specifications to aggregate size, nominal aggregate size or maximum aggregate size, the aggregate size as listed shall be replaced with the new corresponding aggregate size as indicated in the following table:

Aggregate size	New aggregate size
26,5	28
19	20
13,2	14
9,5	10
6,7	7
4,75	5
2,36	2
1,18	1

B1160 COMPACTION

In December 2017 the THM1 will cease to exist and be replaced by SANS 3001. In preparation for this change-over, SANRAL has already adopted the new test methods and all site Laboratories are required to perform testing according to the SANS 3001 test methods.

Therefore, the standard for compaction efforts should change from Modified AASHTO Density as per TMH1 Test Method to Maximum Dry Density (MDD) as per SANS 3001. Where reference is made to compaction or of Modified AASHTO Density in the tender documentation or the standard specifications or wherever there is conflict between the tender documentation and the standard specifications, the SANS 3001 specification and terminology shall govern."

SECTION B1200: GENERAL REQUIREMENTS AND PROVISIONS

B1202 SERVICES

Add the following first paragraph:

"All reference to services in this clause shall also mean utility services as well as traffic monitoring devices such as Comprehensive Traffic Observation (CTO), Speed Measuring Device (SMD) and Weigh-in-Motion (WIM) stations and Traffic Signal Loops (TSL)."

In the final paragraph, replace "clause 15" in the second line with "clause 31"

In the second paragraph, delete the word "utility" at the end of the second line.

In the final paragraph delete the second and third sentences starting with 'Should' and replace with the following:

All known services on the site have been indicated on the services layout drawings. However, before any work can commence the contractor shall verify the actual position of each service and bring to the attention of the engineer any service that is not recorded. As the contractor is not authorised to remove or replace these facilities he shall:

- i) Give preliminary notice, in writing to the relevant service provider, that the services on the site will require removal or protection prior to works being carried out in the vicinity of each service. The contractor shall advise the service provider of
 - a) The number of services, their locations and
 - b) The proposed dates when work will commence in the vicinity of each service.
- ii) In addition to the above preliminary notice, give the service provider 14 days written notice of the intention to commence work in the vicinity of each service.
- iii) Upon completion of the work in the vicinity of each service, the contractor shall notify the service provider, in writing, that work is complete and the service may be reinstated.

Any delay resulting from the removal/replacement of a service shall not be the subject of a potential claim, unless the contractor can demonstrate that every effort has been made to timeously request and/or apply for the removal/replacement of the said service. In addition, the contractor shall be deemed to have employed the services of the service provider as a subcontractor for purposes of removing and/or replacing the relevant service.

B1204 PROGRAMME OF WORK

a) General requirements

Add the following as a continuation of the first paragraph:

"In drawing up the programme the contractor shall make allowance for all of the requirements stated in clause 31 of the NEC 3 Conditions of Contract, Contract Data, Works Information, Site Information and Annexures (also refer to B1224 below for sequencing of the works)".

b) Programme of work for rehabilitation work

In the first sentence of the second paragraph after ".....in the project specifications, ", insert the following:

"on the quantities contained in the Pricing Schedule (Part C2),"

Insert the following paragraph:

“c) Revising the Programme

The requirements for revising the programme are as contained in clause 32 of the NEC 3 Conditions of Contract.

B1205 WORKMANSHIP AND QUALITY CONTROL

Insert the following heading after the title:

“a) General:

Insert the following as sub-clauses after the first paragraph:

b) Quality Systems

“The contractor shall implement a quality assurance system that incorporates the requirements of ISO 9001 using the guidance provided under ISO 9002 and appoint a quality manager who shall ensure that members of the contractor’s staff comply with the requirements of the quality system. The quality system and the methods used to implement it shall be described in a quality plan produced by the contractor. The quality manager shall be resident on site full time.

The contractor shall submit the quality assurance system he proposes using to the engineer, for his approval, within two weeks of the site handover. The system shall record the lines and levels of responsibility and indicate the method by which testing procedures will be conducted. Once accepted by the engineer the contractor shall not deviate from it unless written notification of proposed changes have similarly been submitted and approved.

The system shall provide for a method statement for each construction activity for which a pay item is provided in the Pricing Schedule. Each method statement shall be submitted to the engineer for his approval two weeks prior to commencement of the activity. Where appropriate the contractor shall make use of the employer’s manuals in preparing his method statements. No construction activity shall commence before the engineer has approved the contractor’s quality assurance system.”

The engineer shall, however, undertake acceptance control tests for the judgement of workmanship and quality, without accepting any responsibilities vested with the contractor in terms of the contract.”

The engineer shall, for the purpose of acceptance control on products and workmanship, assess tests results and measurements in accordance with the provisions of Section 8200 (scheme 1) of the standard specifications.

Where small quantities of work are involved, a lot (Section 8203 (a)) shall mean a full day’s production for a specific item of work subject to acceptance control testing.”

B1206 THE SETTING OUT OF WORK AND PROTECTION OF BEACONS

Replace “clause 14” in the first paragraph with “clause 20.1”

Add the following at the end of the fourth paragraph:

“Road markings, particularly the divergent/convergent lines of ramp interchanges and no overtaking barriers are also elements of the road that require proper setting out. The contractor shall prove to the engineer that critical reference points have been satisfactorily

recorded for later reinstallation before any work commences that will obliterate the existing markings.”

Delete “and of clause 14 of the general conditions of contract” in the sixth paragraph.

Add the following paragraph:

“The contractor shall take care that property beacons, trigonometrical survey beacons or setting-out beacons are not displaced or destroyed without the consent of the engineer. Property beacons and trigonometrical survey beacons that have been displaced or destroyed shall be replaced by a registered land surveyor, who shall certify such replacement.

The cost of replacing all beacons displaced or destroyed during the course of the contract without the consent of the engineer shall be the contractor’s responsibility and included in the tender rates”.

B1207 NOTICES, SIGNS AND ADVERTISEMENTS

Delete the third paragraph and replace with the following:

“All signboards erected in accordance with the drawings shall be removed at the same time as the de-establishment of the contractor’s camp. Payment under subitem 13.01 for the final instalment of 15% of the tendered lump sum shall not be made unless all the advertisements, notices and temporary signs have been removed”.

B1209 PAYMENT

b) Rates to be inclusive

Add the following to the first paragraph:

“VAT shall be excluded from the rates.”

Insert the following after “constructional plant” in lines 6 and 7 of the first paragraph:

“(distinguishing between operational costs and hire costs)”.

c) The meanings of certain phrases in payment clauses

Procuring and furnishing ... (material)

Add the following:

“Payment for procuring and furnishing material from commercial sources shall include all transport costs, irrespective of distance hauled”.

e) Materials on the site

Replace “clause 52” in the first line with “subclauses 70.1 and 70.2”.

Add the following paragraph at the end:

“For the contractor to claim for and receive payment for any materials on or off site, the contractor shall provide proof of ownership of such materials either through direct payment to the supplier/owner or cession of the materials from the legitimate supplier/owner to the contractor”.

Add the following sub-clauses:

g) Work in confined areas

Except where provided for in the specification and the Pricing Schedule no extra payment shall be made nor shall any claim for additional payment be considered for construction in confined areas. The omission of standard payitems from the schedule of quantities shall be taken to be deliberate and any additional costs incurred shall be included in the bulk rate.

h) Split quantities

Wherever in the Pricing Schedule allowance has been made to price items of work for which a product or material is uncertain and quantities split between pricing items, the Employer reserves the right to choose whichever is the most appropriate or combination thereof, regardless of any adverse effect on the Contractor's costs and no claims for additional compensation shall be entertained."

B1210 CERTIFICATE OF PRACTICAL COMPLETION OF THE WORKS

Amend the heading of this clause to read:

"TAKE OVER CERTIFICATE"

Replace the 1st paragraph with the following:

"Notwithstanding that there might be natural or programmed sequencing of sections of the works (see B1224 below) that will result in them being completed in their entirety before other sections, no consideration shall be given to the issuing of the take-over certificate for parts of the works. The use of any completed roadway or parts of the work, whether for unhindered use by the public or for accommodation of traffic while other parts are being constructed, shall not constitute use or occupation by the employer.

In terms of clause 35, the contractor must notify the engineer in writing of his request for a Take Over Certificate. This request shall include the contractor's own list of what it considers to be the outstanding minor works that do not substantially affect the use of the Works. As justification that the issue of a Take Over Certificate is warranted the contractor shall take note that the following sections of the works are to be completed to the satisfaction of the engineer:"

Add the following to sub-clause (e) before the semicolon:

"(including road studs)"

Add the following paragraphs after item (h):

"In addition to the above itemised sections of the works and regardless of the degree of beneficial occupation by the employer, the outstanding works contained in the lists produced by the contractor and the engineer shall be considered for taking-over only if the following criteria have been met:

- (i) The estimated cost to complete the listed outstanding work is less than 1% of the tendered value of work plus the cost of any variation or extra work orders, but excluding CPA and VAT.
- (ii) The written lists of outstanding items of work can be completed within 14 days of the lists having been issued.
- (iii) Any information in the contractor's possession, which is required by the engineer and has been requested in writing, has been supplied.

- (iv) All test results, compliance certificates, as-built surveys and drawings, close out reports and maintenance plans.

If any of the listed criteria (i) through (iv) are not met at the date of the contractor's notice of application, the engineer is to reject the application without providing any corresponding list of outstanding work. If an application is rejected, the contractor shall rectify what has been identified as deficient before submitting a new notice of application." If the contractor fails to obtain the "take over certificate" in terms of clause 35 before the Completion Date, Delay Damages will be applied as per clause X7.1 of the Contract Data.

B1214 CONTRACTOR'S ACTIVITIES IN RESPECT OF PROPERTY OUTSIDE THE ROAD RESERVE AND OF SERVICES MOVED, DAMAGED OR ALTERED

Add the following to the last paragraph of subclause (d):

"These written statements shall be handed to the engineer before the final certificate will be issued. Failing to obtain these written statements from all landowners and authorities concerned, the Defects Date will be extended including all conditions related to such an extension, until such time that all these statements are obtained.

The obtaining of any such written statements will not relieve the contractor of the execution of any of his obligations to the satisfaction of the landowner or authority concerned, and to the approval of the engineer."

Under sub-clause (e) replace the opening paragraph with:

"Should the contractor use land not provided by the Employer for the purpose of his own establishment, engineer's offices and laboratory, or storing of equipment or materials required for construction or disposal, it shall be subject to the following:"

and add the following sub-sub-clauses:

- (vi) That lease agreements are concluded with the owner or owners of such land for the full period that such areas are required. The leases shall provide for possible extensions to match the duration of the contract. The lease agreements shall also provide for the contract being terminated by contractor's default or liquidation and the resulting possibility for them to be taken over by a succeeding contractor.
- (vii) That copies of lease agreements shall be submitted to the engineer prior to signature by the signing parties, and copies lodged with the engineer after signing. Notwithstanding the engineer's approval of the conditions of a lease the contractor shall be solely responsible for adherence to the terms of the agreements.
- (viii) Adherence to the principles of the environmental management plan and legal obligations"

Add the following sub-clause:

"f) Cleaning of public roads

Where material is spilled on public roads during the haul of material, the road shall be cleaned immediately."

B1215 EXTENSION OF TIME RESULTING FROM ABNORMAL RAINFALL

Change the existing heading of clause 1215 to read as above and wherever the expression 'abnormal rainfall' or 'rainy weather' is encountered replace it with 'inclement weather'.

In the first line of the first paragraph change 'clause 45' to read 'subclause 61'.

Make the following changes to Method (ii) (Critical-path method):

In line six of the second paragraph delete 'five-day working week' and replace with '23-day working month', and

Add the following final paragraphs:

"Extension of time resulting from rainfall or other forms of inclement weather shall be calculated according to the requirements of Method (ii) (Critical-path method). The 'n' value of working days, as specified in this clause as being expected delays for which the contractor must make allowance in his programme, have been calculated from the figures given in Table B1215/1 below.

Table B1215/1: Average delays due to inclement weather

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
"n'delays (rain)	6	6	5	2	2	2	2	3	3	6	6	6	49
'n'delays (other)	3	3	2	1	1	1	1	2	3	3	3	3	25

The number of rain-related delays is the average number of days on which (10 mm) of rain or more has been measured by the weather station at (Bluff weather station 0241083_W) over the last (20) years. Other inclement weather delays for which the Contractor must make allowance in his programme have been derived from previous experience of wind and temperature influence on similar construction in the area of the site. Actual extensions of time due to inclement weather shall be agreed between the engineer's and Contractor's representatives on the site. The agreed whole days or parts thereof shall be recorded at the monthly site meetings. Adjustment to the contract period shall only be made at the end of the contract when the Contractor may submit its claim for the agreed extension due as well as any additional payment resulting from the delay.

If approved extensions of time extend the completion date beyond the start of the contractor's holiday in December, the holiday period shall not be considered as working days. Any remaining extension of time at this date shall be calculated from the first statutory working day in January the following year, provided that the Contractor has shown in his programme that he intends to close during the traditional Christmas/New Year break."

B1219 WATER

Add the following:

"Water for use on site other than municipal, shall be subject to the required permit from Department of Water Affairs (DWA). This shall include such extraction points as rivers, dams, streams, and boreholes.

Use Table B1219 below to determine the suitability of water for construction purposes.

TABLE B1219: WATER CLASSIFICATION FOR CONSTRUCTION: TESTING

		Water Quality Classification Code						
		H0	H1	H2	H3	H4	H5	
Property	Unit	Pure water (AR)	Clean water (Rain)	Treated water (Municipal)	Silty (muddy) water with low salt content	Highly mineralised chloride sulphate water (brackish)	Waste brack, sewage, marsh, sea, etc. water	Method
PH*	-	7.0	5.7 – 7.9	4.5 – 6.5	4.5 – 8.5	9.0	-	SABS M113 SM 11 - 1990
Dissolved solids*	ppm	0	1000	1500	3000	-	-	SABS 213 SM213 - 1990
Total hardness*	-	None	None	Temporary	Temporary	Permanent	-	SABS 215 SM 215 – 1971
Suspended matter	ppm	0	2000	2000	5000	-	-	SABS 1049 SM 1049 – 1990
Electrical conductivity	mS/m	0	200	200	500	-	-	SABS 1057 SM 1057 – 1982
Sulphates (SO ₄)	ppm	0	200	300	500	1000	-	SABS 212 SM 212 – 1971
Chlorides (Cl)	ppm	0	500	1000	3000	5000	-	SABS 202 SM 202 – 1983
Alkali Carbonates (CO ₃) & Bicarbonates (HCO ₃)	ppm	0	500	1000	1000	2000	-	SABS 241 – 1999
Sugar	-	Negative	Negative	Negative	Negative	Negative	-	SABS 833
Quality of water required	Untreated layer works	✓	✓	✓	✓	Investigate the effect on the quality of the material		
	Chemically treated layer works	✓	✓	✓	Investigate the effect on the quality of the material			
	Concrete mass	✓	✓	✓	Investigate the effect on the quality of the material			
	Concrete prestressed	✓	✓	References: 1. Concrete Technology – Dr S Fulton (1989) 2. Materials Manual (PAWC)				
	Slurry & emulsion	✓	✓					
	Soil/gravel tests	✓	✓					
	Chemical or control tests	✓	✓					

- A primary property. The quality of the water is that quality where all three of the primary properties are within the limits.
- The tabulated single values are maximum value except in the case of the pH value for pure water, which must be 7.0

B1221 DRAWINGS PROVIDED BY THE CONTRACTOR

Replace this clause with:

“For design responsibility, designs and drawings provided by the contractor, submission requirements and reviewed by the employer, refer to items 2,1 to 2,8 of the Works Information.

No direct payment for designs, preparation and submission of drawings will be made for any contractor design responsibility and all costs shall be included in the rates tendered for the relevant permanent works pay items as provided in the schedule of quantities".

B1224 THE HANDING OVER OF THE ROAD RESERVE

Replace this clause with the following:

"Whilst the contractor will be handed over the entire extents of the working area as indicated on the tender drawings, he will be restricted by the sequencing of works as indicated in the Sequencing Layout Drawing included in the tender drawings and as indicated in the table below.

Regardless of these sequencing requirements, the contractor will be responsible for the ongoing maintenance of the entire extents of the works including the full road reserve width, and surfaced road widths of intersections up to the road reserve (including associated stormwater infrastructure, signage and temporary barriers used to control traffic movements).

Any potholes or other failures which occur in the road surface or damages to stormwater infrastructure shall be repaired by the contractor within 24 hours after first being noted and under direct instruction of the engineer. The contractor shall recover his costs for the execution of maintenance works through the payment items provided under sections 1500, 1600, 1700, 1800, 2200, and 3900 of the bills of quantities".

The contractor shall take over the maintenance responsibility on the date of handover but may liaise with the current maintenance contractor through the engineer by arranging a transition period immediately after the hand-over of the site to allow sufficient time to muster his resources required for routine maintenance of the road. However, the transition period may not extend beyond the contractual access to site date identified in C1.2 Contract Data."

TABLE B1224 - SEQUENCE OF CONSTRUCTION - STAGES 1-6

STAGE	APPROXIMATE LENGTH OF ROADWAY (m)	APPROXIMATE AREA OF ROADWORKS (m ²)	ANTICIPATED DURATION (Months)	TIME FROM BASE MONTH (OCCUPATION OF THE SITE)	TRAFFIC ACCOMMODATION METHODOLOGY	COMMENTS
1	1340	15410	1.5	1.5	Closure EB / WB to act as inbound (2 lanes). Bypass to act as outbound (2 lanes).	Full EB carriageway closure (Bayhead Road / Bypass Route Intersection to Rotterdam Road) - centre median blocked by temporary barriers provided by Employer. Accesses to remain open at all times (construct in half width). Inbound traffic to cross over to outbound at Shell Garage - All outbound traffic will use the Bypass Route in reverse.
2	1360	15470	1.5	3.0	Closure EB / WB to act as inbound (2 lanes). Bypass to act as outbound (2 lanes).	Full EB carriageway closure (Rotterdam Road intersection to Langeberg Road intersection) - centre median blocked by temporary barriers provided by Employer. Accesses to remain open at all times (construct in half width). Inbound traffic to cross over to outbound at Shell Garage - All outbound traffic will use the Bypass Route in reverse.
3	1430	15730	1.0	4.0	Closure WB / EB to act as inbound (2 lanes). Bypass to act as outbound (2 lanes).	Full WB carriageway closure (Langeberg Road intersection to Rotterdam Road intersection) - centre median blocked by temporary barriers provided by Employer. Accesses to remain open at all times (construct in half width). All outbound traffic will use the Bypass Route in reverse.
4	1286	14146	1.0	5.0	Closure WB / EB to act as inbound (2 lanes). Bypass to act as outbound (2 lanes).	Full WB carriageway closure (Rotterdam Road intersection to Shell Garage) - centre median blocked by temporary barriers provided by Employer. Accesses to remain open at all times (construct in half width). All outbound traffic will use the Bypass Route in reverse.
5	330	3630	0.5	5.5	EB - "Half width construction"	Temp. conc. barriers. Of the 4 No. lanes available, always have 2 No. inbound and 1 No. outbound. Bypass no longer required for traffic accommodation.
6	330	3630	0.5	6.0	WB - "Half width construction"	Temp. conc. Barriers on both sides. Of the 4 No. lanes available, always have 2 No. inbound and 1 No. outbound. Bypass no longer required for traffic accommodation.

B1229 SABS CEMENT SPECIFICATIONS

Delete this clause.

Add the following clauses:

“B1230 MATERIALS

(a) General

The contractor, when using materials that are required to comply with any standard specification, shall, if so ordered, furnish the engineer with certificates showing that the materials do comply with this specification.

Where so specified, materials shall bear the official mark of the appropriate authority. Samples ordered or specified shall be delivered to the engineer's office on the site free of charge.

Where materials are specified under trade names tenders must be based on these materials. Alternative materials may be submitted as alternative tenders and the engineer may, after receipt of tenders, approve the use of equivalent materials. The tender must be clearly marked as an alternative tender, failing which the tender may be rejected.

Unless otherwise specified, all proprietary materials shall be used and placed in strict accordance with the relevant manufacturer's current published instructions. Agrément certified products shall be used and placed in accordance with its Agrément certification criteria.

Unless anything to the contrary is specified, all manufactured articles or materials supplied by the contractor for the permanent works shall be unused.

Any materials excavated or present on the site or within the road reserve, or in borrow areas shall not become the property of the contractor but will be at his disposal only in so far as they are approved for use on the contract, unless otherwise indicated in the project specification.

Existing structures on the site shall remain the property of the Employer and except as and to the extent required elsewhere in the contract, shall not be interfered with by the contractor in any way.

Materials to be included in the works shall not be damaged in any way and, should they be damaged on delivery or by the contractor during handling, transportation, storage, installation or testing they shall be replaced by the contractor at his own expense.

All places where materials are being manufactured or obtained for use in the works, and all the processes in their entirety connected therewith shall be open to inspection by the engineer (or other persons authorised by the engineer) at all reasonable times, and the engineer shall be at liberty to suspend any portion of work which is not being executed in conformity with these specifications.

The contractor shall satisfy himself that any quarry selected for use provides the necessary mined material in accordance with the specification.

(b) Banned materials

No tar fluid products shall be used in the construction works.

B1231 MIX DESIGNS

Before commencing with certain construction activities, the contractor shall, except where specified otherwise in the relevant construction sections in the Scope of Works, apply the following procedures with regards to mix designs:

- Taking and submitting samples of the relevant materials.
- Undertake the required mix design(s) or allow the engineer to undertake them.
- Produce, where required, laboratory, production/plant and/or trial mix(es).
- Undertake the required adjustments to the mix design(s) and reproduce required laboratory, production/plant and/or trial mix(es).
- Complete trial section(s) where required.
- Await the engineer's approval of the mix design(s) and trial section(s).

B1232 OWNERSHIP OF REDUNDANT ROADSIDE FURNITURE AND OTHER MATERIALS

Ownership of all redundant roadside furniture and other materials (other than materials identified as waste by the engineer which must be removed and disposed) will become the property of the employer unless otherwise specified by the engineer (this includes all materials recovered from pavement layers and stockpiled for reuse and or spread and compacted at approved stockpile / spoil sites identified by the employer).

B1233 PENALTIES FOR OVERLOADING OF CONSTRUCTION VEHICLES

The contractor shall ensure that trucks used to haul construction materials are not overloaded and the legal axle loads are not exceeded. Before any construction materials can be transported, the contractor must provide the engineer with the certified carrying capacity of each truck intended for the purpose of transporting the construction materials. The contractor shall provide the engineer with a weighbridge ticket before discharging/off-loading the materials.

Any truck that is overloaded shall not be allowed to discharge/off-load its load and shall return to the depot/batching plant for adjustment of the load. In addition a penalty shall be applied for the overload."

For the purposes of the calculation, the so called 5% grace shall not be used. The following example is provided:

Tare Weight of vehicle certified by a calibrated weighbridge = 6 tons
 Maximum carrying capacity certified by a calibrated weighbridge = 8 tons
 Gross vehicle mass = 14 tons
 Actual Load (Weighbridge ticket) = 14.6 tons
 Overload factor = 0.6 tons

Contractors rate tendered under applicable payment item = R350/unit

Penalty = 2 x R350/unit x 0.6 x distance hauled(km)
 = R420.00 x distance hauled (km)"

Penalty payments will be deducted from the front page of interim payment certificates."

B1234 PAYMENT

Add in the following payment items to this section

Item	Unit
B12.01 Protection, removal, realignment and replacement of services	
(a) Utilities	

SECTION B1300: CONTRACTOR'S ESTABLISHMENT ON SITE AND GENERAL OBLIGATIONS

B1302 GENERAL REQUIREMENTS

a) Camps, constructional plant and testing facilities

Insert the following after the first paragraph:

The TNPA Real Estate department will identify vacant land for the Contractor's site establishment. A site layout will need to be submitted to the TNPA Real Estate to secure the land. All submission must be made through the project manager as per the submission processes included in the Works Information.

No services or utilities are provided by TNPA. It is the Contractor's responsibility to ensure that his site camp has the necessary services required to carry out the works and complies with relevant legislation.

The availability of land will be indicated in Part C4: Site Information or be made known to the contractor at commencement.

c) Legal and Contractual Requirements and responsibilities to the public

Add the following:

"Legislation imposes mutual obligations on the employer and contractor in the performance of their duties to society and to the built and natural environment. To assist the contractor in understanding and assessing his obligations, and thus to make allowances for the cost of compliance with this legislation, the following additional specifications are included in the project specifications.

The Works Information and Annexures to the Contract Document contain the Environmental Management Plan (EMPr) and specifications for this project. their provisions regulate the contractor's construction methods to ensure responsible conduct and treatment of the environment relevant to the project. Payment subitem 13.01(f) makes allowance for the contractor to price for environmental compliance duties as well as the duties of the contractor's Designated/dedicated Environmental Officer.

The Works Information and Annexures to the Contract Document contain the the specifications that regulate the contractor's construction methods so far as to ensure health and safety of his employees and of the public. New payitem has been made available under this section to allow the contractor to make separate provision for the cost of health and safety measures during the construction process."

Add the following subclause:

d) Monthly reporting

When submitting any information required and interim certificates for payment, the contractor shall use the employer's standard forms and formats. No payment can be made before the contractor is registered as a vendor on the employer's system.

The contractor shall submit payment certificates for all work rendered in the employer's financial year within that specific year.

The contractor shall submit and update on a monthly basis all the appendices to the site meeting minutes and a cash flow forecast for the works.

The contractor shall complete monthly reports in the format as required by the employer in the Works Information. This information shall also be reported on monthly for all sub-contractors employed.

The above information shall form part of supporting documentation required for making interim payments in terms of the Conditions of Contract.

Allowance has been made for these requirements in the Pricing Schedule under pay item B13.01(f) Monthly Reporting. Failure to comply may result in payments being withheld.

Add the following subclause:

e) Security on site

The contractor is solely responsible for the safety and security of all of his resources (personnel, plant, materials and any incidental items) on site for the duration of the contract. This includes all security measures that may be required within the works area.

The contractor will be responsible for liaison and co-ordination with all relevant stakeholders to ensure the security and safety of all resources utilised on site are not compromised. The contractor's attention is drawing to sections 3 and 6 of the Works Information for further detail.

Allowance has been made for these requirements in the Pricing Schedule under pay item B13.01(g) Security on site. Eventhough this item is measured per month, it includes all costs associated with securing the site. No additional payment for any security related costs will be entertained. Failure to comply may result in payments being withheld.

B1303 PAYMENT

Item	Unit
-------------	-------------

B13.01 The contractor's general obligations

Add the following pay subitems:

- | | |
|---|--------|
| “(d) Health and safety obligation | month |
| “(e) Environmental obligation | month |
| “(f) Monthly reporting cost | month |
| “(g) Security on site | month” |

Add the following sub-sub-clauses defining 'the contractor's general obligations':

Delete the third paragraph commencing “Should the final value of the work.....”

Replace “clause 49” in the fourth, eighth and tenth paragraphs with “clauses X2 and X1, if applicable”.

Delete the eleventh paragraph commencing “The tendered rate per month for subitem B13.01(c) and replace with:

"The tendered rate per month for subitem B13.01(c) represents full compensation for that part of the contractor's general obligations that are mainly a function of construction time. The tendered sum will be paid monthly, pro rata for parts of a month, from the Commencement Date (as defined in the Conditions of Contract) until the end of the period for completion of the works, plus any extension thereof as provided in clause 61 of the conditions of contract.

Payment for time related costs arising from extensions of time granted by the Employer, where the Contractor is fairly entitled to such compensation in terms of subclause 61 of the Conditions of Contract, will be calculated by taking account only of pay items for which the unit of measurement is "month". All pay items for which the unit of measurement is "month" are deemed to be based on 23 working days per month."

Add the following at the end of the second last paragraph of the payment clause:

"... Such limitations to payments shall occur whenever the contractor falls behind by more than 2 month(s) on his initial approved programme, in which case the application of this payment item shall be the same as for 13.01(b) (i.e. the total price offered for 13.01(c) is treated as a lump sum). Normal application continues once the contractor's progress has returned to within the time set for the limitation."

Add the following paragraphs:

"Should the combined total tendered for subitems (a), (b), and (c) exceed 15% of the total of Prices, the tenderer shall state his reasons in writing for tendering in this manner. If the tenderer should require additional compensation for his obligations under section 1300 (over and above the total tendered for item B13.01) by including such additional compensation in the tendered rates and/or lump sum of items in the Activity Schedule, these items and the value of such additional compensation shall also be indicated in writing.

Payment of the rate per month for subitems B13.01(d), (e), (f) and (g) shall include full compensation for all the contractor's obligations relevant to health and safety legislation, environmental compliance, monthly reporting and security on site (as per the Contract Data, applicable clauses of the NEC 3 Conditions of Contract, Works Information, Site Information, and Annexures).

The tendered rates for subitems 13.01(d), (e), (f) and (g) shall apply in the same manner as pay subitem B13.01(c) but shall not form part of the calculation of the restrictions imposed by Condition of Tender F.3.8(c) and Form to tender B1: Contractor's Establishment on Site.

All payitems for which the unit of measurement is "month" are deemed to be based on 23 working days per month and shall become applicable only for use in calculations of approved extensions of time in terms of the Conditions of Contract:"

SECTION B1500: ACCOMMODATION OF TRAFFIC

B1501 SCOPE

Add the following:

"It is a requirement of this specification that traffic is accommodated taking into account the provisions of the latest edition of the South African Road Traffic Signs Manual (SARTSM). The latest version for use in the accommodation of traffic is Volume 2, Chapter 13 of the May 2012 edition. Copies of this publication are available from Government Printers – Publications – General Enquiries Tel: +27 12 748 6052. All of the SARTSM Manuals can be found online on the Department of Transport's website at the following link: https://www.transport.gov.za/?page_id=1042.

This section also covers the provision of additional information signs for motorists and the release of any notices to the media and public."

B1502 GENERAL REQUIREMENTS

Insert the following:

"The whole of the site will be handed over to the contractor at the beginning of the contract. The sequence in which various parts of the site may be occupied by the contractor for the execution of the different items of work shall be subject to the requirements of the contract documents regarding, inter alia, working hours and the number, spacing and length of the work areas which may be occupied at any particular time (refer to Works Information – Part C3, Site Information - Part 4 and these Project Specifications).

The contractor shall programme his work taking due cognizance of restrictive conditions indicated in Clause B1204 and B1224. The contractor's tendered rates shall include full compensation for all possible additional costs which may arise from the above and no claims for extra payment as a result of this *modus operandi* will be considered. The contractor shall in particular note that no additional compensation shall be made for work that could be considered as half-width construction."

a) Safety

Replace the full stop at the end of the first paragraph and continue with the following:

"... flow of traffic, including the prohibition of his, and his subcontractor's, construction plant from disregarding the accommodation of traffic control facilities. Failure to comply with this requirement shall be taken as a penalty event in terms of B1502(l)."

Add the following paragraphs:

"The contractor shall be responsible for maintaining the existing road surface both within the works area and the advance warning and termination areas in a safe and trafficable condition for the duration of the contract.

The contractor shall within 7 (seven) working days after receipt of a 3rd party claim acknowledge receipt to the claimant. The engineer shall be copied on all correspondence regarding 3rd party claims. The contractor shall at the monthly site meeting report on the status and outcome of the 3rd party claims.

The contractor shall be fully responsible for all the traffic accommodation on site, including for work undertaken by sub-contractors, e.g. at bridges etc.

Traffic shall be accommodated as indicated on the sequencing drawings and detailed in the table in B1224.

The contractor may amend the agreed traffic accommodation scheme but only with the approval of the engineer in consultation with the provincial and municipal traffic authorities. No additional costs or additional inconvenience shall be borne by the employer for any such amendments.

During the non-working hours, or when construction is not taking place on a certain section of road all obstructions to the traffic shall be removed and all signs no longer applicable to the situation shall be removed to an approved safe location or effectively covered.

No equipment or vehicles shall be stored or parked in the median or on the road side during non-working hours except if protected or demarcated and only if approved by the engineer.

When requested by the engineer, the contractor shall provide lane closures for the purpose of road inspection. This must be done in advance of the actual programmed time for the work."

f) Approval of temporary deviations

Add the following:

"If, after any temporary deviation has been constructed, any changes are considered necessary or desirable, the proposal shall be submitted to the engineer for his approval."

i) Traffic Safety Officer

Add the following to the end of the second paragraph:

"The contractor shall submit a CV of the candidate to the engineer for approval before the candidate is appointed as the traffic safety officer. "

Insert the following as the opening phrase to sub-sub-clause (i):

"make himself available to discuss road safety and traffic accommodation matters whenever required by the engineer and shall be responsible..."

Delete sub-sub-clauses (ii) and (iii) and replace with the following:

"(ii) Record on neat and dimensioned sketches and submit to the engineer the position and sign reference number, where applicable, of each signal, sign, barricade, delineator, cone, amber flicker light, guardrail and permanent or temporary painted road marking feature. The position of each shall be adequately referenced from surveyed points on the site of the works which correspond with the chainages for the road on the construction drawings.

These records shall also show the date and time at which the recorded traffic accommodation features are certified correct by the traffic safety officer and shall be signed by the traffic safety officer before being submitted to the engineer.

The records shall similarly account for whatever changes are made in the field. Such changes shall record the position of flagmen and stop/go control men and their associated traffic accommodation equipment wherever they are used.

(iii) Personally inspect the position and condition of each traffic accommodation feature on the whole site of works twice per workshift, whether daytime or nightwork, and at least twice a day/night during non-working hours, to record all irregularities discovered and the remedial action taken, and to sign off as correct and submit to the engineer such record sheets by middle of the next working shift. The above inspections must at least take place before the commencement of

peak traffic periods. The traffic safety officer shall keep a duplicate book for this specific purpose.

The traffic safety officer shall also submit with this report the daily labour returns of flagmen, stop/go, traffic signal control personnel employed and the traffic data recorded at each traffic control point."

Add the following sub-sub-clauses:

- (ix) The traffic safety officer shall be equipped with a cellular telephone and shall have a traffic safety vehicle and sufficient labour at his disposal 24 hours a day, including all prescribed non-working days, and shall not be utilised for other duties. He shall be directly answerable to the contractor's construction manager. The traffic safety officer shall have his own vehicle to carry out inspections and at least one assistant to accompany him full time. Furthermore the traffic safety vehicle shall be a truck with a capacity of at least 3 tons and shall be equipped with a high visibility rear panel in accordance with the requirements of the SARTSM as well as a truck mounted impact attenuator complying with TL-2 criteria when tested in accordance with NCHRP 350 or N1 criteria when tested in accordance with EN 1317. (Certification of compliance must be on site at all times). The attenuator shall be used when the vehicle is utilized to close traffic lanes or when attending to stationary or broken down vehicles or accident scenes. The words TRAFFIC CONTROL shall be written on a warning sign in highly legible letters, not less than 150 mm high, and the sign shall be mounted on both the traffic safety officer's vehicle and the traffic safety vehicle at least 1,5 m above ground level. The proposed sign and letter dimensions shall be submitted to the engineer for his approval.

The vehicles shall also be equipped with flashing amber LED lights or with flashing amber LED light bars of an approved design. The warning light shall be switched on at all times and the sign shall be displayed when the vehicle is used on site.

The traffic safety officer shall have a direct line of communication at all times with the police and traffic officers responsible for the area within limits of the contract.

- (x) Ensure that all obstructions related to the contractor's activities be removed at the end of each work shift where applicable as instructed by the engineer and that the roads are safe for the travelling public.
- (xi) The traffic safety officer shall, in addition to the duties listed in paragraph 1502 (i), also be responsible to arrange for the removal of stationary or broken down vehicles off the roadway in conjunction with the employer and traffic authorities and implementing actions requested by the traffic authorities with regard to the work to be carried out and be responsible for the erection and maintenance of all traffic signs necessary for the accommodation of traffic.
- (xii) In the event of an accident the traffic officer shall record in a written report the details of the accident, record the position of all temporary road signs, barricades, delineators, flagmen and any other devices used for traffic accommodation. In addition the report shall include a neat dimensional sketch, photographs, identifiable permanent features, and any other relevant information.
- (xiii) At least two separate traffic safety officers and teams shall be employed when construction is carried out during the day and night (night work falls outside of the normal working hours and special permission for such work will need to be applied for by the contractor and provided in writing by the employer. The employer has no obligation to provide such approval. Such approval is at the sole discretion of the engineer)."

Add the following sub-clauses:

“j) Crossing the median or carriageway centreline

No vehicle or item of equipment shall be allowed to cross the median of a dual carriageway road or the centreline of a single carriageway unless the traffic accommodation and signage specifically allows for this and is approved by the engineer as safe.

k) Site personnel and visitors

The contractor shall ensure that all his personnel, personnel of all sub-contractors and suppliers (excluding those who are permanently office bound), are equipped with reflective safety jackets and hard hats and that these are worn at all times when working on or near to the travelled way. Any person found not wearing a reflective jacket or hard hat under these circumstances shall be removed from the site until such time as he is in possession of and wearing a reflective jacket and hard hat. Reflective safety jackets and hard hats shall be kept in good condition and any jackets or hard hats that are, in the opinion of the engineer, ineffective shall be immediately replaced by the contractor. When office bound personnel or any other people visit the site, the contractor shall ensure that they are provided with the above required protective equipment prior to visiting the works for whatever reason”.

l) Penalty events

Whenever the following events occur, the contractor shall be subjected to penalty conditions as stated below.

(i) Non-compliance with accommodation of traffic specifications

Failure or refusal on the part of the contractor to take the necessary steps to ensure the safety and convenience of the travelling public, accommodation of traffic, plant and personnel in accordance with these specifications or as required by statutory authorities or ordered by the engineer, shall be sufficient cause for the engineer to apply penalties as follows:

A fixed penalty of R20 000,00 per occurrence shall be deducted for each and every occurrence of non-compliance with any of the requirements of section 1500 of the standard specifications and section B1500 of the project specifications.

In addition a time-related penalty of R5000,00 per hour over and above the fixed penalty shall be deducted for non-compliance to rectify any defects in the accommodation of traffic within the allowable time after the engineer has given an instruction to this effect. The engineer's instruction shall state the allowable time, which shall be the time in hours for reinstatement of the defects. Should the contractor fail to adhere to this instruction, the time-related penalty shall be applied from the time the instruction was given until the defect has been rectified to the satisfaction of the engineer. The duration of breach is not restricted by working hours and is applicable for all time that the breach is in effect.

(ii) Late occupation of stage sequences (B1224)

The contractor shall be charged an occupation penalty if he continues to occupy intersection ramps, crossroads and/or carriageway lanes beyond programmed completion dates for each stage sequence indicated in Table B1224. The penalty shall be deducted from payments due on the relevant interim payment certificates at R50 000 per day and remain enforce until such time that the Stage is complete and open to traffic to the satisfaction of the engineer.

m) Liaison with relevant Authorities

The contractor shall liaise on a daily basis with the engineer regarding expected works and lane closures for the next day, inclusive of all work shifts, in order for the engineer to inform Port Operators to take into account the accommodation of traffic impacts on Port Operations. The daily report shall be submitted to the engineer not later than 10h00.

For exceptional traffic accommodation impacts, such as lane closures in peak hours, short term contra flow conditions, lane closures over weekend peak periods etc., the contractor shall apply to the engineer fourteen days prior to the event.

The contractor shall inform the engineer about all traffic related incidents, as soon as he becomes aware of the incident.

Where required the contractor shall be responsible for acquiring the services of a municipal traffic officer and traffic vehicle (equipped with a blue light) to assist in the accommodation of traffic. The traffic officer and vehicle will be required when lanes are to be closed and/or where directed by the Engineer.

The road under construction forms part of an abnormal load route. As such, the contractor shall liaise with the employer and relevant provincial abnormal load office that issues permits to ensure that permits are not issued when construction restrictions do not allow passage of the abnormal load.

In instances where abnormal loads fall into high Class load cases (in terms of width and length), the contractor may be required to close traffic in one direction for a short period of time (where only single lane direction is in operation) and adopt contraflow to permit the abnormal load through the works.

No additional payment will be made as a result of the contractor planning and co-ordinating with the relevant authorities and accommodating abnormal loads through the works.

n) Other requirements

The following other requirements must be adhered to for the entire contract period:

- i) The Port operations and the travelling public shall have the right of way on public roads and the contractor shall make use of approved methods to control the movement of his equipment and vehicles so as not to constitute a hazard on the road.
- ii) The contractor's tendered rates for the relevant items in the schedule of quantities shall include full compensation for all possible additional costs which may arise from the above and no claims for extra payment due to inconvenience as a result of the modus operandi will be considered."

B1503 TEMPORARY TRAFFIC-CONTROL FACILITIES

Replace the first sentence of the first paragraph with the following:

"The contractor shall provide, erect and maintain the necessary traffic-control devices, road signs, channelisation devices, barricades, warning devices and road markings (hereinafter referred to as traffic-control devices) in accordance with these special provisions and as shown on the drawings and in the SARTSM and remove them when no longer required. It shall be incumbent upon the contractor to see to it that the abovementioned traffic-control devices are present where required at all times and are functioning properly."

Replace the last sentence of the second paragraph with the following:

"Traffic-control facilities no longer required at the site of a deviation or a lane closure shall be moved for re-use. Traffic-control facilities lost or damaged by the contractor shall be replaced at his own cost. Where it can be proved that loss of or damage to such facilities is beyond the contractor's control and not the result of his actions or omissions, the engineer may order the facilities to be replaced and paid for at scheduled rates."

Replace the third paragraph with the following:

"The type of construction, spacing and placement of traffic-control devices shall be in accordance with the SARTSM. The recommended arrangements of the traffic control devices illustrated and/or drawings issued by the engineer shall not be departed from without prior approval of the engineer. The arrangements expected to be most commonly used in the contract are given on the tender drawings.

The details shown for spacing and placement of traffic-control facilities may however, be revised at the discretion of the engineer where deemed necessary to accommodate local site geometry and traffic conditions."

a) Traffic control devices

Amend the first paragraph:

"Traffic-control devices include the use of flagmen, portable STOP and GO signs, traffic signals, traffic control towers, whichever may be the most suitable method under the prevailing circumstances. Traffic watch towers and traffic signals shall be erected only if so specified in the project specifications or upon an instruction in writing, by the engineer".

Add the following at the end of the last paragraph:

At each traffic control point, plastic moveable barriers, fitted with STOP signs to both sides, shall be provided to prevent vehicles from utilising the closed road lanes. These barriers shall be moved to open and close the relevant lanes for road users.

Records of opening and closing of closures and traffic counts shall be kept and submitted daily to the traffic safety officer.

b) Road signs and barricades

Add the following:

"The contractor shall be responsible for the protection and maintenance of all signs and shall at his own cost replace any that have been damaged, lost, or stolen.

All temporary road signs required to remain in position for some time shall be pole mounted as shown on the drawings. All temporary road signs required to be moved more often shall be mounted on portable supports for the easy moving of signs to temporary positions. The only permitted method of ballasting the sign supports shall consist of durable sandbags filled with sand of adequate mass to prevent signs from being blown over by wind. The cost of the sandbags shall be included in the tendered rates for the various types of temporary road signs.

The covering of permanent road signs, if applicable, shall be by utilizing a suitable and durable covering that shall be pulled over the sign in the form of a hood and fastened to the signposts. Plastic bags or other materials and fastened by means of adhesive tape shall not be permitted. The cost of covering of permanent road signs shall be included in the tendered rates of items B15.01 and B15.10."

c) Channelisation devices and barricades

Add the following:

"The use of drums as channelisation devices shall not be permitted. Drums may however be used to set up barriers as provided for in sub-clause 1503(d).

Delineators shall:

- (i) comply with the manufacturing and reflective requirements of the SARTSM and the blades shall be reversible with dimensions as indicated on the drawings;
- (ii) have smooth and round edges and be mounted on a post and base. All components shall be of durable plastic material;
- (iii) have the lower edge of the reflective part of the delineator mounted not lower than 250mm above the road surface;
- (iv) be capable of withstanding the movement of passing vehicles and gusting winds up to 60km/h in typical working conditions without falling over. To achieve this, the base shall be at least 0,18m² and ballasted by its own weight or with sandbags filled with sand;
- (v) together with its mounting be designed such that it will collapse in a safe manner under traffic impact.

Traffic cones manufactured in a fluorescent red-orange or red plastic material may be used only at short term lane deviations during daylight. Cones shall not be used on their own, but shall be interspersed with delineators at a ratio not exceeding 3:1. Cones used on all deviations shall be 750mm high. Lane closures which continue into the night time shall be demarcated by delineators only.

On section of road where the centreline has been obliterated, delineators shall be provided on both road edges at minimum 200m spacing on straight sections and at least 3 (three) visible on all curves."

d) Barriers

Add the following:

"Barriers for preventing vehicles from leaving the permitted lanes shall be movable barriers with an approved safety shape design (e.g. New Jersey, F-shape). Temporary movable barriers will be provided free issue by the Employer and placed between the existing road and the construction areas as and when required (generally in high risk areas where half width construction is undertaken).

When using temporary concrete barriers, the contractor must take cognisance of his liabilities relating to the installation of temporary works to provide protection to the permanent Works and safety to his personnel. Particularly pertinent is the working width rating of a barrier system; the displacement width of the system shall not exceed the available safe width to the nearest edge of the construction. All moveable barriers shall be installed in accordance with the manufacturer's instructions or generally accepted best practice and shall be submitted to the engineer for review and comment.

e) Warning devices

Add the following:

"All construction vehicles and plant used on the works shall be equipped with flashing amber LED lights or with flashing amber LED light bars and warning boards as specified. All vehicles and plant before being allowed onto the site shall obtain a clearance permit from the engineer.

(i) Vehicle mounted flashing lights

Flashing lights shall be amber LED lights or amber LED light bars of an approved design and shall be mounted in such a way as to be highly visible from all directions. The lights on construction vehicles shall not be switched on while vehicles are being operated on unrestricted sections of a public road but shall be switched on while construction vehicles are operating within the accommodation of traffic area, as the vehicles decelerate to enter a construction area, and as the vehicles accelerate to the general speed when entering the road from a construction area. Lights on plant shall operate continuously while the plant is working alongside sections of road open to public traffic within the work areas.

All LDVs and cars operating on site shall also be equipped with flashing amber lights which shall be placed so as to be highly visible from all directions and operated continuously while the vehicles are manoeuvring in or out of traffic or are travelling or parked alongside roads open to public traffic within the work areas.

Flashing lights and the "construction vehicle" signs on the contractor's vehicles and plant shall not be paid for separately but shall be included in the rates covering the use of the vehicles.

The contractor shall apply and maintain lights together with temporary mounting brackets, to the approval of the engineer. Vehicles and plant that do not comply with these requirements shall be removed from the site.

(ii) Sign mounted flashing lights

Two amber flashing lights shall be vertically mounted on top of the traffic signs at each end of each traffic accommodation section as shown on the drawings. The lights shall be operated during the hours of darkness.

(iii) Flashing Illuminated Arrow Board

The arrow board shall be made up of light sources mounted on a backing board. A single shaft arrow will be required that can be used for both left and right directions. The light sources must be of LED type to improve visibility if used also during day time. The arrow board shall be used at lane drops as described B1502.

f) Road Markings

Add the following new paragraphs:

"Temporary road marking shall be reinstated before the road is opened to full width traffic. Temporary road marking shall consist of heavy pre-marking, and/or retro-reflective road marking paint, and/or temporary road studs, as directed by the engineer.

Temporary road studs shall be installed at double the spacing and shall be fixed to the road surface with the bitumen rubber crack sealant to allow for easy removal by application of gentle heat.

Temporary road marking lines for demarcation of temporary traffic lanes, on the final road surface shall not be allowed, except if approved by the engineer. Should temporary road marking lines be approved, it shall consist of one of the following as directed by the Engineer:

- (i) Construction grade tape for temporary road marking which can be removed by applying gentle heat. The tape shall be foil backed, adhesive, reflective tape. The tape shall be capable of being easily removed from the road surface by the application of gentle heat.
- (ii) Removable road marking paint."

Add the following sub-clauses:

"g) Other traffic control measures ordered by the engineer

The engineer may instruct the contractor to provide any other road sign, reflective tape, etc. not measured in standard payitems. Such road signs shall conform to the requirements of the SARTSM, or specification provided by the engineer. Similarly, in order to ensure that the travelling public is kept fully informed and warned on matters relating to the accommodation of traffic, construction sign posting and the effect of the construction on the free flow of traffic through the site, the engineer may arrange for advertising in the press and/or for other forms of publicity.

h) Flagmen

Flagmen shall be provided where shown on the drawings or required by the specification. During the daytime, at least two flagmen shall be provided at each traffic control point in addition to the STOP/GO sign operator, one flagman at the first speed reduction sign and a second roving flagman at least a 100m behind the last vehicle in the queue to indicate to the traffic to stop. At night time (if nightwork is undertaken under approval of the Project Manager) all flagmen shall be equipped with a suitably visible strobe, and a torch at each traffic control point as well as the traffic light operator. Where the shoulder of the road is closed to traffic, flagmen shall be provided at the leading ends of closures during daytime. These flagmen shall be provided at the first speed reduction sign to warn the traffic about the closure. No flagmen shall be on duty for a period of more than 10 hours per day.

Flagmen shall be adequately trained in the standard flagging techniques as described in the SARTSM (refer to figure 13.23 of detail 13.23.1) and be provided with conspicuous clothing such as safety jackets utilizing retro-reflective and/or fluorescent panels in red, yellow and/or white.

Flagmen shall have in their possession, at all times, certification that they have attended and passed an accredited course in flagging techniques before being allowed onto the construction site.

Flags shall be made from bright red or red-orange material and shall be square with a minimum side length of 600mm. The flag shall be attached to a staff at least 1,0m in length.

In terms of lateral clearance and safety, flagmen shall stand on the shoulder of the lane of traffic that is being controlled and under no circumstances shall flagmen be permitted to stand within the traffic lane. In order to obtain maximum visual impact for the travelling public, flagmen shall stand-alone."

B1504 WIDTH AND LENGTH OF TEMPORARY DEVIATIONS

Add the following:

As detailed in B1224 and in the sequencing tender drawings, the existing Bypass Road will be utilised for the outbound traffic movements for Stages 1-4.

Half width construction will be limited to the section of Bayhead Road from South Coast Road intersection to the Bypass Road intersection with Bayhead Road and all of the remaining intersections along Bayhead Road (up to and including the intersection with Langeboeg Road).

When construction in half widths, 2 No. inbound lanes and 1 No. outbound lane must be open at all times.

B1510 EXISTING ROADS USED AS DIVERSIONS

Add the following:

"The contractor shall indemnify the employer against all proceedings, claims, actions, damages and costs which may arise from or be related to damage to vehicles or property or injury to persons as a result of loose stones or aggregates on the road surface or as a result of bituminous applications during the construction of the works.

The contractor shall arrange his activities so that construction traffic and equipment do not unnecessarily obstruct public traffic or force it to a complete standstill. The flow of public traffic shall always take precedence and the contractor shall not stop or delay public traffic to make way for construction traffic. For further clarity refer to item C4.6 of the Site Information and traffic management related matter in the Works Information".

B1513 ACCOMMODATION OF TRAFFIC WHERE THE ROAD IS CONSTRUCTED IN HALF-WIDTHS

Replace the first four paragraphs of this clause with the following (the remaining paragraphs remain):

"As per B1224 and Table B1224 the contractor will be required to construct the works in stages to best mitigate the impact of the contract on Port Operations.

Access to a full carriageway width (either inbound or outbound) for stages 1-4 will not constitute half width construction for the purposes of this contract. Half width construction will only apply to those sections of the work where the contractor has to accommodate traffic on the same carriageway in both directions. This will be restricted to intersections through stages 1-4 and the section of Bayhead Road constructed under stages 5 & 6.

The number of intersections permitted to be worked on at any one time from stages 1-4 shall be 2".

B1517 MEASUREMENT AND PAYMENT

Insert the following paragraph after the heading:

"The contractor's tendered rates for the relevant items in the schedule of quantities shall include full compensation for all possible additional costs which may arise from the above and no claims for extra payment due to inconvenience as a result of the modus operandi will be considered."

Amend item 15.01 to read as follows:

"Item	Unit
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B15.01 Accommodating traffic and maintaining temporary deviations:	
---	--

(a) On Bayhead Road and adjoining roads	kilometre (km)
---	----------------

Replace the first paragraph with the following:

"The unit of measurement shall be the kilometre, measured along the centre lines of the road, the ramps from the noses and the cross roads where construction work is carried out. Accommodation of traffic shall be measured once only, that is no separate payments shall be made for lane and shoulder rehabilitation, asphalt overlay, side drains, etc. Only the net distance of the road shall be measured and overlapping distances during staged construction shall not be measured. A distinction shall be made between accommodation of traffic on the through road and accommodation of traffic on the ramps and cross roads of intersections.

In the second paragraph, replace the comma after "deviations" at the start of the third line with a full stop and delete the remainder of this first sentence. Also delete the whole of the second sentence, which refers to compensation for the traffic safety officer.

In the third paragraph second sentence, insert a full stop after "use" and delete the remainder of the sentence."

Item	Unit
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B15.03 Temporary traffic control facilities

(a) Flagmen

Replace the 1st paragraph of the payment description to the following:

"The unit of measurement shall be a full day and night worked by flagmen. A man-day shall be deemed to comprise of a number of shifts within a twenty four hour period. Shifts of 12 hours and less shall be measured as half of a man-day."

Amend sub-item (h) to read as follows:

(h) Delineators (TW 401 and TW402)	
(i) Single (size indicated)	number (No)
(ii) Double sided blade (size indicated)	number (No)

Amend sub-item (l) to read as follows:

(l) Moveable barriers	
(i) Plastic - F-Type fitted with STOP signs on both sides	number (m)

Add the following sub-item:

"n) Other traffic control measures ordered by the engineer	
(i) Provision of other traffic control measures	provisional (Prov) sum
(ii) Handling costs and profit in respect of	
sub-item B15.03(n)(i)	percentage (%)

Expenditure under this payment item, (e.g. media releases or other signs to deliver information to the public) shall be made in accordance with B1156 of these project specifications and the NEC 3 Conditions of Contract for the supply and installation of any additional signs or other traffic control measure ordered by the engineer in accordance with clause B1503(g).

The tendered percentage is a percentage of the actual amount spent under subitem B15.03(n)(i), which shall include full compensation for the handling costs of the contractor, and the profit in connection with providing other signs and traffic control measures ordered by the engineer. No further defined costs or fee markup shall be applied in terms of the NEC 3 contract".

Add the following at the end of the last paragraph of the payment description:

“However, allowance has been made in sub-item (h) Delineators for double the quantity of delineators required to execute the works. Payment under this item will be made up to the maximum quantity scheduled.”

Add the following sub-items:

- (o) Temporary information signs (TIN series).....square meter (m²)
- (p) Extra over subitems B15.03 (e), (f), (g) for using
Diamond Grade high visibility material.....square meter (m²)
- (q) Covering of Signs.....square metre (m²)

The unit of measure for sub item (o) shall be the square meter of Temporary Information signs provides as measured and agreed with the engineer.

The unit of measure for subitem (p) shall be the square meter of Diamond Grade retro-reflective material used instead of the normal requirement for the temporary road signs. The tendered rate shall allow for any additional costs for the refacing of the sign with the specified quality material.”

The unit of measure for subitem (q) shall be the square meter of of sign covered. The tendered rate shall include full compensation for the cost of the supply on site of a suitable cover as per South African Road Traffic Signs Manual (SARTSM) Chapter 13, the covering of the sign, the maintaining of the cover at all times during all weather conditions, its replacement should the cover be irreparably damaged, stolen, blown away or otherwise removed and the subsequent removal of the cover when no longer required

Delete payment items 15.08 and 15.09 as maintenance of the road and/or bypasses are paid under B15/39.02 and B15/42.20.

Item	Unit
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B15.04 Relocation of traffic control facilities:

Replace the first paragraph with the following:

“Except for the movement of concrete barriers supplied by the Employer, no payment for this item shall be made under this contract. All costs related to relocation of traffic control facilities shall be deemed to be included in the other pay items in this section.”

For moveable concrete barriers provided by the Employer, the tendered rate to move them to an initial and new positions shall include full compensation for dismantling, storing if necessary, transporting, re-erecting and inspecting the barriers to ensure ongoing integrity (including for replacement of any damaged sections, connections and adding new reflector plates), and for all labour, equipment, constructional plant and incidentals necessary to execute the work complete as specified or shown on the drawings.

Moving concrete barriers to initial and new positions..... meter (m)

Add the following payitems:

Item **Unit**

B15.14 Amber flashing lights mounted on signs number (No)

The unit of measurement shall be the number of sets provided.

The tendered rate shall include full compensation to provide, erect, operate and maintain a set of 2 (two) amber flashing lights per sign at each end of the traffic accommodation sections. It shall also include the provision of power to operate the lights, replacing bulbs as required and keeping the lenses clean and visible.

Item **Unit**

B15.15 Provision of traffic safety equipment for visitors

- (a) Safety jackets number (No)
- (b) Hard hats number (No)

The unit of measurement shall be the number of each item provided as specified, and approved by the engineer.

The tendered rates for the various safety items shall include full compensation for provision thereof and maintenance in good working order.

Item **Unit**

B15.16 Provision of traffic safety

- (a) Traffic safety officer month

The unit of measurement shall be the month (or part thereof) that the specified duties of the traffic safety officer are performed, irrespective of the number of traffic safety officers employed in any 24 hour day.

The tendered rate shall include full compensation for the cost of the traffic safety officer(s) to conduct the duties as specified in sub-clause B1502(i) and includes the provision of his own vehicle, fuel, vehicle maintenance and insurance and the cost of the cellular telephone and all other incidentals related to the performance of his duties.

- (b) Traffic safety vehicle(s) month

The unit of measurement shall be the month (or part thereof) that the safety vehicle is on site and in continuous use in the performance of traffic safety.

The rate tendered shall include the provision of the traffic safety vehicle, fuel, vehicle maintenance and insurance costs, drivers, labourers and all other incidentals related to the performance of the traffic safety duties.

Item **Unit**

B15.17 Accommodation of traffic as and when required by the engineer hours per lane kilometre (hr/lane-km)

The unit of measurement shall be the number of hours (or any portion of an hour) per lane kilometre that special accommodation of traffic is required by the Engineer.

The tendered rate shall include full compensation for providing all plant, equipment, tools, transport, labour, supervision, flagmen, road signs, lights, barricades and all other incidentals necessary for the proper and safe handling of traffic as specified when required by the engineer."

Item **Unit**

B15.18 Flashing Illuminated Arrow Board number (No)

The unit of measurement shall be the number of flashing arrow boards provided and completely erected.

The tendered rate shall include will compensation for providing, erecting, maintaining, relocating and re-erecting the flashing illuminated arrow board around the boundaries of the site, including the power supply for functioning of the lights. The lights shall be of the new LED type lights and shall be available for the entire period of the contract.

Item **Unit**

B15.19 Variable Message Signs mounted on trailers number.month (No.month)

The unit of measurement shall be the number of signs provided for the time in months that the Variable Message Sign (VMS) is operative on site.

The tendered rate shall include full compensation for the provision of the VMS mounted on the trailer, the operation and maintenance thereof including frequent day and night inspections, protection against and repairs due to vandalism.

Add the following:

B15.20 Penalties

- (a) Fixed penalty per occurrence number (No)
- (b) Time related penalty hour (hr)
- (c) Late occupation of stage sequences.....day

For B15.20 (a) and (b) refer to B1502 (I)(i). For B15.20 (c) refer to B1502 (I)(ii).

Add the following:

"B1518 ACCOMMODATION OF PEDESTRIAN TRAFFIC

The contractor shall pay specific attention to the accommodation of pedestrian traffic along the cross roads / intersections where the safety of pedestrians could be compromised as a result of the works.

Where pedestrians have to cross the site, the contractor shall ensure that the pedestrians are safeguarded and shall be able to cross the site without being endangered. The pedestrians should not be able to enter areas where works are taking place.

Should a walkway be required, it shall have a clear opening of at least 1,2 m wide and 2,1 m high and shall be uniformly illuminated at all times. The surface of the walkway shall be free from obstructions and shall be clearly signposted to guide the pedestrians towards the walkway. If steps are required to reach the level of the walkway, these shall comply with the OHS act and have proper handrails. No ramps shall be steeper than 1 in 8.

Payment for compliance to this requirement shall be deemed to be included in the rates tendered for accommodation of traffic."

SECTION B1600: OVERHAUL

B1602 DEFINITIONS

(a) Overhaul material

(iii) *Replace this paragraph with:*

“Spoil and recovered materials (RAP from milling operations under 3800 and existing pavement layers recovered from patching under 3900) resulting from the authorised excavations of the existing pavement layers, cleaning of road reserves, demolitioning / removal of all materials as described in B1702.

All materials spoiled as described under B1702 will be to an approved commercial source. All materials from existing layerworks will be either spoiled, spread and compacted or stockpiled for re-use at a site within the Port designated by the engineer”.

Insert the following as a final paragraph

“Material procured from commercial sources shall not be regarded as overhaul material.”

SECTION B1700: CLEARING AND GRUBBING

B1701 SCOPE

Add the following as a final paragraph:

“Clearing and grubbing for the construction of site offices shall not be measured separately and shall be deemed to be included in the rates tendered for item B13.01.”

B1702 DESCRIPTION OF WORK

(e) Cleaning out of hydraulic structures

Insert at the beginning of the paragraph:

Hydraulic structures include all stormwater structures, pipes and culverts regardless of their terminology.”

Insert new sub-clauses:

“(f) Cleaning of kerbs, channels, drains, roadway, medium, sidewalks and the like

After the instruction for cleaning kerbs, channels, drains, roadway, medium, sidewalks and the like has been executed the contractor shall be responsible for maintaining these elements in a clean condition for the duration of the contract”.

“(g) Mechanical cleaning of hydraulic structures, pipes and portal culverts

Mechanical cleaning shall include for jetting, flushing and extraction of materials using mechanical equipment.

B1704 MEASUREMENT AND PAYMENT

Item	Unit
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Add the following payment items

B17.07 Cleaning of kerbs, channels, drains, roadway, medium, sidewalks and the like.....	cubic metre (m³)
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The unit of measurement shall be the cubic metre of material removed from kerbs, channels, drains, roadway, medium, sidewalks and the like regardless of the nature of the material. Material to include all materials identified by the engineer as waste (damaged and broken concrete elements, steel, timber, plastic, composite materials, dirt, silt, vegetation, general rubbish, industrial waste etc.). This item does not include guardrails which is measured under section 5400.

The tendered rates shall include full compensation for all work necessary for removing all undesirable materials from the road reserve, transporting and disposing of these materials at a legally registered and certified dump site approved by the engineer as well as any additional costs necessary for gaining access to such elements as specified in this section. Payment for this item will only be made once during the contract. It is the responsibility of the contractor to maintain the cleanliness of the road reserve during the duration of the contract. The contractor must make sufficient allowance in these rates to cater for this requirement.

Should any concrete elements identified as waste by the engineer require specific demolition prior to being removed (due to their size or whether they are cast in), these will be paid for under item 22.12 (a) or (b) and will not be duplicated under this payment item. It will be the sole discretion of the engineer to determine whether such items require demolition prior to removal.



B17.08 Mechanical cleaning of hydraulic structures, pipes and portal culverts
.....metre
(m³)

The unit of measurement shall be the cubic metre of material removed from pipes / culverts (regardless of the dimension/s) from structure to structure along the length of the pipe/culvert. The tendered rate shall include full compensation for all work necessary for removing all undesirable materials from structures, transporting and disposing of these materials, as well as additional costs necessary for gaining access to such structures, all as specified in this project specification. Payment under this item will only be made once. It is the contractor's responsibility to ensure that all structures cleaned under this item remain clear for the duration of the contract.

Structures, pipes and culverts cleaned by hand or any other means shall be paid for under 21.18 (a) or (b) or 17.05 (a) to (d) as relevant. No duplication of quantities or cost shall be entertained.

SECTION B1800: DAYWORKS

B1801 SCOPE

This section covers the listing of daywork items for use by the engineer to facilitate payment to the contractor under clause 60 of the NEC 3 Conditions of Contract for work of a minor or incidental nature which cannot be quantified in specific units in the Pricing Schedule, or work ordered by the engineer during the construction period which was not foreseen at tender stage and for which no applicable rate exists in the Pricing Schedule. If the engineer chooses to use this method for facilitating payment for works of a minor or incidental nature, the CE progress through clause 60 of defined costs plus a fee will not apply to such works and works will be merely measured under this section of the pricing schedule. The determination for the use of daywork items will be at the sole discretion of the engineer.

B1802 ORDERING OF DAYWORK

No daywork shall be undertaken unless written authorisation has been obtained from the engineer.

B1803 MEASUREMENT AND PAYMENT

Item	Unit
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B18.01 Personnel

(a) Unskilled labour	hour (h)
(b) Semi-skilled labour	hour (h)
(c) Skilled labour	hour (h)
(d) Ganger	hour (h)

Item	Unit
-------------	-------------

B18.02 Equipment

(a) Tipper truck (10m ³)	hour (h)
(b) Tractor-loader-backhoe (4x4 TLB)	hour (h)
(c) 20-ton excavator	hour (h)
(d) 140G grader	hour (h)
(e) Watercart (18 000 litre)	hour (h)
(f) Bitumen distributor truck	hour (h)
(g) 27-ton pneumatic roller	hour (h)
(h) Bomag 75 pedestrian vibrating roller	hour (h)
(i) 1500mm wide milling machine	hour (h)
(j) Compressor and jackhammers (9cfm)	day
(k) Generator and angle grider	day

Item	Unit
-------------	-------------

B18.03 Materials

(a) Procurement of materials	provisional (Prov) sum
(b) Contractor's handling costs, profit and all other charges in respect of sub-item B1803(a)	percentage (%)

Item	Unit
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B18.04 Transport

(a) LDV	kilometre (km)
(b) Flatbed truck (6 ton)	kilometre (km)
(c) Crane truck (8 ton)	kilometre (km)

The unit of measurement for items B18.01 and B18.02 shall be the hour for the item of equipment or personnel. Non-working hours for transport breakdown, lack of operator of any other reason shall not be measured. The time shall be taken from the time that the personnel and/or equipment depart until return.

Measurement shall only be for work instructed and directed by the engineer, where the engineer considers no other appropriate rate is applicable in the Pricing Schedule. Prior to the commencement of any work by the personnel described under item B18.01 the contractor must obtain written consent from the engineer regarding their classification in terms of "unskilled", "semi-skilled" and "skilled" personnel.

The tendered rates for labour under B18.01 shall include full compensation to cover overhead charges and profit, leave pay, bonuses, subsistence, allowances, Employer's contributions, additional payment for overtime where applicable, insurances, housing, site supervision, use of small hand tools and appliances, non -mechanical plant and equipment and consumable stores, for all administrative, supervisory, operative and contingent costs, relating to the supply of personnel.

The tendered rates for plant for item B18.02 shall be an all-inclusive charge (including fuel – i.e. "wet" rate) for the use of the vehicle and driver or plant/equipment and operator and shall apply only to vehicles plant and equipment nominated in writing by the engineer, for all administrative, supervisory, operative and contingent cost and profit relating to the running of the plant.

The unit of measurement for subitem B18.03(a) shall be the amounts actually paid for the procurement of materials to be purchased and shall be made in accordance with the provision of the NEC 3 Conditions of Contract. Only the actual quantities of materials used, as verified by the engineer, shall be paid for.

The percentage tendered for subitem B18.03(b) shall be the percentage of the amounts actually paid for the procurement of materials as ordered under subitem B18.03(a) and shall be in full and final compensation in respect of the contractor's handling costs, profit and all other charges in connection with the procurement and supply of the materials to the point of usage.

The unit of measurement for item B18.04 shall be the kilometre distance that the vehicle travelled for transporting personnel and/or plant. All travelling shall be approved by the engineer.

The tendered rate for item B18.04 shall include full compensation for the cost of the vehicle including fuel, maintenance depreciation and running costs and insurance.

The abovementioned tendered rates shall be full compensation for the various items as specified and no further markups of profit shall be paid.

COLTO SERIES 2000: DRAINAGE

SECTION B2100: DRAINS

B2101 SCOPE

Amend the first paragraph to read:

“This section covers all work both rehabilitative and new work in connection with the excavation and construction of open drains, subsoil drainage and banks and dykes at the locations and to the sizes, shapes, grades and dimensions as shown on the drawings or as directed by the engineers, and the test flushing of subsoil drains.”

B2104 SUBSOIL DRAINAGE

a) Materials

(i) Pipes

Amend this sub-clause by adding the following to the end of the third paragraph:

“(category-heavy duty) or SABS 1601 (stiffness class 350)

The pipes to be used shall be either slotted u PVC pipes or perforated HDP pressure pipes, 100mm ID.”

Pipes must be stored in a shaded area without exposure to direct sunlight.

(ii) Natural permeable material

Add the following to the 3rd paragraph:

“The crushed stone shall be coarse (20mm nominal) and shall be washed clean of all fines”

(iii) Synthetic-fibre filter fabric

Under item (4) Selection, of this sub-clause, replace the 1st paragraph with the following:

“The filter-fabric used for subsoil drains shall be grade 2 and shall satisfy the criteria for this grade of geotextile as given in Table 2104/2.”

Add the following item:

(5) Testing

General:

The tests to be carried out on geo-textiles relate to the material and the method of manufacture and are mainly to ascertain that the correct grade of geo-textile is supplied, and that the material is equivalent in quality to that selected and specified for use in the works. The contractor will be required, on the request of the engineer, to submit a certificate by an approved laboratory to prove compliance with specified tests as stated in B8114 without additional cost to the employer.

b) Construction of subsoil drainage systems

Add the following sub-clause:

“(v) Proving of pipes in subsoil drainage systems

On completion of the pipe laying and prior to backfilling, all pipe joints shall be surveyed as proof of their installation to line and level. After backfilling the pipes shall be proved by pulling through a cylindrical cleaning brush followed by a wooden mandrill $\pm 400\text{mm}$ long and 5mm in diameter less than the bore of the pipe. Proving of pipes shall not be paid for separately and the cost thereof shall be deemed to be included in the rate tendered for laying the pipe.”

B2107 MEASUREMENT AND PAYMENT

Item	Unit
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B21.04 Impermeable backfilling to subsoil drainage systems

Add the following sub-items:

(b) G5 material stabilised with 4% stabilising agent cubic metre (m³)”

Amend pay items B21.06 to read as follows:

“B21.06 Natural permeable material in subsoil drainage systems (washed crushed stone)

Item	Unit
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B21.12 Concrete outlet structures, manhole boxes, Junction boxes, and cleaning eyes for subsoil drainage systems number (No)”

Add the following:

“The tendered rate shall also include full compensation for procuring and finishing the galvanised woven wire mesh, cutting, waste, installing the wire mesh at outlets and keeping the wire mesh in the pipe openings clean for the duration of the contract period.”

Add the following payment items:

“Item	Unit
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B21.20 Exposing of existing subsoil drains cubic metre (m³)

The unit of measurement shall be the cubic metre of material removed by hand to expose the drain.

The tendered rate shall include full compensation for all labour and tools required for removing the material. The re-instatement of the drain shall be paid for under the relevant items for constructing a new drain.

SECTION B2200: PREFABRICATED CULVERTS

B2201 SCOPE

Replace this clause:

“This contract is a rehabilitation contract, as such this section covers the repair / replacement of damaged stormwater pipes, inlets, manholes, outlets, and other appurtenant structures. This may involve minor and major repairs and or modifications or complete reconstruction of some structures”.

B2212 INLET AND OUTLET STRUCTURES, CATCHPITS AND MANHOLES

Replace this clause:

“Inlet, manhole, outlet and related stormwater structures shall be repaired / modified and or replaced in accordance with the details shown on the drawings and as directed by the engineer on site after inspection. Details of modifications / remedial works for each structure will be covered under a site instruction from the engineer and paid for under the relevant pay items for structure elements in the bills of quantities. Any instruction covered under this scope of works will not constitute a compensation event in terms of clause 60 and is considered to be normal works measured under the relevant items in the bills of quantities”.

B2213 REMOVAL OF EXISTING WORK

Amend the second paragraph:

“The contractor’s attention is directed to the provisions of section 1700 that specifies which elements and structures have to be removed as part of the clearing and grubbing operations, the removal of which will therefore not be measured and paid for under this section.

Where any structure requires modification / remedial actions under this section and where the contractor will be required to carry out partial demolition to prepare the structure to be modified / remedied, this demolition work will be carried out and paid for under this section. In addition, the provisions of 2214 adequately cover joining new work to old. Removal shall not be limited to plain and reinforced concrete, but shall also include brickwork, plaster, pre-cast concrete elements and steel sections”.

B2218 MEASUREMENT AND PAYMENT

Item	Unit
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22.12 Removing existing concrete:

Replace this payment clause with:

B22.12 Removing existing structure elements:

- | | |
|-------------------------------|-------------------------------|
| (a) Plain concrete | cubic metre (m ³) |
| (b) Reinforced concrete | cubic metre (m ³) |
| (c) Brickwork | cubic metre (m ³) |
| (d) Plaster..... | cubic metre (m ³) |
| (e) Precast concrete..... | cubic metre (m ³) |

The unit of measurement shall be the cubic meter of structural element removed regardless of the method or removal.

The tendered rates shall include full compensation for all demolition and for loading, transporting and disposing of the products of demolition, including a free haul of 1,0km.

Payment shall distinguish between the various elements in (a) to (e) above. For item (b), reinforced concrete shall be defined as concrete containing at least 0.2% of steel reinforcement measured by volume. Item (b) does not cover reinforced pre-cast concrete products. This is measured under item (e) regardless of whether the precast concrete product is reinforced or not.

The rates shall also include full compensation for preparing the base of the removed structural element where such interface is to receive adjoining work under remedial / modifications of structures.

B22.21 Accessories:

Amend as follows:

- (a) Manhole covers including frames
 - (i) Type 2A non-ventilated ductile iron manhole frame and lid (Class D400) ...number (No.)
 - (ii) Type 2A non-ventilated ductile iron manhole frame with con. infill lid (Class D400) number (No.)
 - (iii) Type 2B ventilated ductile iron manhole frame and lid (Class D400). number (No.)
- (b) Inlet grids including frames
 - (i) Conc. frame and steel grid for Type 3 Grid Inlet complete as per drawing...number (No.)
- (d) Precast concrete inlet support beams (heavy duty) number (No.)
- (e) Precast concrete frame and lid (1200x1200 heavy duty)..... number (No.)
- (f) Precast concrete lid to be placed on (1200x1200 heavy duty frame) number (No.)
- (g) Precast concrete splay (1200x1200 heavy duty – left or right) number (No.)

The unit of measurement shall be the number of each type of accessory as described in (a) to (g) above.

The tendered rates shall include full compensation for the casting / manufacturing / procuring, furnishing and installation of each of these accessories complete including all plant, labour and incidental materials required to ensure their successful installation as well as all works required to make good and tie into existing adjacent elements / roadway / sidewalk / median and the like (including line, level and position). No additional payment will be made for any incidental work required for their installation.

Add the following payitems:

“Item	Unit
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B22.29 Repairs to existing concrete elements using high strength non-shrinkage grout

The unit of measurement shall be the per kilogram of high strength non-shrinkage grout (30MPa after 1 day and a bond strength of 13MPa after 28 days) used to repair the existing concrete element as directed by the engineer.

The tendered rate shall include full compensation for all plant, labour, materials required in preparatory works on the existing concrete to receive the grout, application of bond coat as per manufacturer's specifications, the application of the grout, forming the shape of the repair to the finished shape, line and level to tie into existing, finishing off with a class U2 finish and curing the repair work as per the manufacturer's specifications.

B22.30 Raising or lowering of existing manholes and grid inlets in the roadway

- (a) Type 2A manholes..... number (No.)
- (b) Type 2B manholes..... number (No.)
- (c) Grid inlets (up to a maximum dimension of 780x780mm)..... number (No.)

The unit of measurement shall be the number of each type of manhole and grid inlet to be raised or lowered as described in (a) to (c) above.

The tendered rates shall include full compensation for removing the existing accessories, securing, storing, adding or removing brickwork to raise or lower the accessories to tie into final roadway levels at the same grade as the roadway (in longsection and cross section). The rate shall include all plant, labour and incidental materials required to ensure their successful installation as well as all works required to make good and tie into the final roadway. No additional payment will be made for any incidental work required for their installation.

Any adjustments to heights or side inlets or manholes outside of the roadway will be paid for under the relevant items in B22.12, 22.18, 22.19 and B22.21. The items included in B22.30 are specifically for accessories in the roadway.

B22.31 Installation of precast concrete sleepers provided by the employer....number (No.)

The unit of measurement shall be the number of protection sleeper setups complete as per the detail drawing (i.e. 2 No. sleepers constitutes a setup).

The tendered rates shall include full compensation for collecting the sleepers from stores / stockpile, excavating for the two sleepers, installing the the sleepers, backfilling and compacting and painting the sleepers all as detailed on the drawings. The rate shall include all plant, labour and materials required to ensure their successful installation as well as all works required to make good and tie into the final sidewalk. No additional payment will be made for any incidental work required for their installation. Overhaul for the collection of the sleeper will be paid for under section 1600.

B22.32 Placement of precast concrete sleepers provided by the employer....number (No.)

The unit of measurement shall be the number of precast concrete sleepers placed in positions identified by the NEC 3 supervisor on site (generally sidewalks and centre medians) to prevent heavy vehicles from accessing these areas to park or stage.

The tendered rates shall include full compensation for collecting the sleepers from stores / stockpile, offloading them and placing then in position as instructed.

The rate shall include all plant, labour and materials required to ensure their successful placement as well as all works required to make good and tie into final levels. No additional payment will be made for any incidental work required for their installation. Overhaul for the collection of the sleeper will be paid for under section 1600.

**SERIES 3000: EARTHWORKS AND PAVEMENT LAYERS OF GRAVEL OR
CRUSHED STONE**

SECTION B3300: MASS EARTHWORKS

B3301 SCOPE

Add the following after the second paragraph:

"This section also covers the work necessary for reinstating the gravel shoulders / centre medians where specified."

B3307 FILLS

Add the following:

k) Reinstatement of gravel shoulders / centre medians

(i) Construction

Shoulder / centre median reinstatement shall be carried out where the gravel shoulder / centre median is 50mm or more lower than the surfaced edge of the road / back of kerb and at busbays and stopping places where a drop off of more than 50mm exists or where directed by the Engineer.

Reconstruction of gravel consists of the following methods of placing and compaction:

1. Ripping, watering, placing and compacting of in situ shoulder material with or without adding extra material from a borrow pit. In the event of extra material having to be added, an extra over payment item is allowed in Schedule of Quantities as well as for stabilising in situ or imported material (for tendering purpose the nominal rate of application cement shall be 60kg per cubic metre of stabilised material).
2. Construction of full depth gravel shoulder with material imported from borrows or shavings originating from milling out existing asphalt layers.

The shoulders and other areas shall be reinstated to the same level as the existing surfaced edge and with a minimum slope of 3% to shed water away from the road. Reinstatement shall be constructed at least to the same crossfall as the road. At busbays and stopping places the shoulders shall be built up with a maximum width of 2.0m from the edge surfacing and 6m for the centre median. No additional payment shall be made for the reconstruction of gravel shoulders and centre median to restricted widths and lengths.

(ii) Compaction

The reinstated gravel shoulder and centre median shall be compacted to 93% modified AASHTO density.

When it is specified or instructed by the Engineer that the layer shall be tested with a Dynamic Cone Penetrometer (DCP) the average penetration recorded after 5 blows shall not exceed 50mm.

Material shall not be compacted in layers exceeding a thickness of 150mm, measured in the loose.

(iii) Blading

The Engineer may order the blading of existing gravel shoulders / centre medians using a motor-grader. The purpose of blading shall be to improve the condition and shape of existing shoulders / centre median without adding extra material. Prior to the blading of shoulders, the in-situ material shall be watered at a nominal rate of 5 litres per m² and allowed to properly infiltrate the layer until no free water is ponding on the surface. The bladed shoulder material shall be compacted with pneumatic tyre roller of 27 ton mass for at least two passes.

B3311 QUALITY OF MATERIALS AND WORKMANSHIP

Add the following:

Any surplus material resulting from the shoulder / centre median reinstatement work shall be removed completely and transported to spoil as per item B17.07 in the bill of quantities.

B3312 MEASUREMENT AND PAYMENT

Add the following items:

“Item	Unit
B33.20 Reinstating gravel shoulders and centre median	
(a) Ripping, watering, mixing, placing and compacting existing shoulders to 93% of modified AASHTO density.....	cubic meter (m ³)
(b) Extra over item B33.20 (a) for adding recovered pavement layers or better material from stockpile.....	cubic meter (m ³)
(c) Blading	kilometers (km)

The unit of measurement for sub-item B33.20 (a) shall be the cubic metre of material to be reworked for the reinstatement of gravel shoulders and or centre median.

The tendered rate shall include full compensation for ripping the existing shoulder material, breaking down, watering, mixing of the material including any extra material added, and compacting the material.

The unit of measurement for sub-item B33.20 (b) shall be the cubic metre of material added to the existing gravel shoulder to make any shortfall of material for reconstruction of shoulders.

The tendered rate shall include full compensation for loading, transporting, placing and spreading the material over the existing shoulders and or centre median. Overhaul will be paid for under section 1600.

The unit of measurement of sub-item B33.20 (c) shall be the distance bladed over the full width of the shoulder measured in kilometres along the centre line of the road.

The tendered rate shall include full compensation for the watering, blading and compacting of existing gravel shoulders as specified and to the number of passes as directed by the Engineer. The tendered rate shall also include for the neat trimming and removal of gravel material silt onto the existing road surfacing during blading operations.”

SECTION B3800: BREAKING UP EXISTING PAVEMENT LAYERS

B3804 PLANT AND EQUIPMENT

a) Milling equipment

Add the following:

“No payment shall be made for moving the milling machine onto or within the site, regardless of the stage sequencing indicated in B1224 or any changes to this sequence.”

B3805 CONSTRUCTION

b) Milling

(vi) General

Add the following:

“The exposed floor of the excavation shall be lightly sprayed with water to identify cracks. The engineer shall be given the opportunity to inspect the milled surface for cracks and loose patches and any cracks or loose patches shall be repaired in accordance with the relevant sections of the specification.

The floor of the milled excavation shall, before the application of the tack coat, be cleaned of all loose material by brooming, blowing with compressed air or vacuuming or any other method that will produce an exposed surface that is closely-knit, firm and stable, free of nests of segregated materials, laminations or corrugations.

Where milling is to be done at existing structures, care shall be exercised to avoid damage to concrete elements, expansion joints, nosings to expansion joints, manholes, catch pits etc. Damage caused to any element forming part of the permanent works shall be repaired at the contractor’s cost.

Milled excavations shall not be left open to traffic unless longitudinal and transverse joints have been treated. Where the difference in level between the floor of the milled excavation and the existing road surface exceeds 25mm, joints shall be treated as follows:

Transverse steps shall be tapered off at a slope of 1 vertical to 20 horizontal (1:20) and longitudinal joints exposed to traffic shall be tapered to a slope of 1 vertical to 5 horizontal (1:5). An alternative method using a compacted asphalt wedge of the same dimensions is acceptable.”

B3807 MEASUREMENT AND PAYMENT

Item	Unit
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B38.02	Milling out existing bituminous and crushed stone material with an average milling depth:
---------------	--

Change the description of the following payment sub item to read the following:

“(a) Up to 60mm.....	cubic metre (m ³)”
“(b) Exceeding 60mm.....	cubic metre (m ³)”

Insert as a new fourth paragraph the following:

“The rates shall also include for transverse saw-cutting at the start and end of sections prior to the commencement of the milling operations.”

Item		Unit
-------------	--	-------------

B38.04	Excavating and spoiling material from an existing pavement and/or the underlying fill:	
---------------	---	--

(a) Non-cemented material.....cubic metre (m³)

Amend the second paragraph:

The tendered rate shall include full compensation for excavating the material from the existing pavement and/or fill, irrespective of the layer thickness, for loading, transporting for a free-haul distance of 1,0km, off-loading, and placing, spreading, levelling the material to ensure that the area is free draining as directed by the engineer, and compacting the material to 90% Mod AASHTO density.

Payment will not distinguish between material with or without bituminous material.

B38.07	Extra over items 38.02 and 38.03 for tapering the milled excavation, edges or ends:..... cubic metre (m³)	
---------------	---	--

Delete "to the satisfaction of the engineer" at the end of the first sentence of the second paragraph.

Item		Unit
-------------	--	-------------

B38.14	Providing the milling machine on site	
---------------	--	--

Replace the first paragraph with the following:

"No payment for this item shall be made under this contract. All costs related to the provision of a milling machine on site shall be deemed to be included in the other pay items in this section."

Item		Unit
-------------	--	-------------

B38.15	Moving the milling machine on the site	
---------------	---	--

Replace the first paragraph with the following:

"No payment for this item shall be made under this contract. All costs related to the moving of the milling machine on site shall be deemed to be included in the other pay items in this section."

SECTION B3900: PATCHING AND REPAIRING EDGE BREAKS

B3901 SCOPE

B3907 MEASUREMENT AND PAYMENT

Change the description of the payment item to read as follows:

Item

Unit

B39.02 Excavation in existing pavements for patching in all classes of material, irrespective of depth:

Make the following correction to sub item (c):

Change the unit of measurement from "square metre" to "cubic metre".

Item

Unit

B39.04 Compacting the floors of excavations for patching:

In the the second paragraph of the pay item description:

Remove the words "as specified" and replace with "to a minimum of 97% of Mod. AASHTO density or 2.2mm penetration per blow as measured with the Dynamic Cone Penetrometer (DCP instrument)":

Add the following clause:

"B3908 CONSTRUCTION TOLERANCES, FINISH REQUIREMENTS AND RESTRICTIONS

The final riding surface on any particular point on patches or between the patch and existing surface shall not deviate more than 5mm from the bottom of a 3m long straight edge."

COLTO SERIES 4000: ASPHALT PAVEMENTS AND SEALS

SECTION B4100: PRIME COAT

B4102 MATERIALS

b) Aggregate for blinding

Add the following sentence:

"Blinding of the primed surface with aggregate shall only be permitted to facilitate vehicular access to adjoining properties"

B4104 WEATHER AND OTHER LIMITATIONS

Replace paragraph (g) with the following:

"(g) When at any position within the layer the moisture content of a granular base layer is more than 50% of the optimum moisture content determined according to SANS 3001-GR30 (replacing TMH 1, Method A7). In the event of rain after priming, the base shall be allowed to dry out to meet the above moisture content requirement prior to surfacing."

B4106 APPLICATION OF THE PRIME COAT

Replace paragraph (c) with the following:

"The type of prime and application rate best suited for the base shall be determined during construction. The Contractor shall provide about 20ℓ of each prime and apply it at different application rates with a brush on the base. Then engineer will then instruct the type of prime and application rate to be used. No payment shall be made for tests to determine the type of prime.

Unless directed otherwise by the engineer or indicated on the drawings, the edges of the primed surface shall be 150mm wider than the edges of the surfacing."

Add the following sub-clause:

"(j) Application in areas treated by reworking and construction of a new base shall be primed using a mechanical distributor complying with sub-clause 4103(a). The edges of the previously constructed or existing surfacing shall be adequately protected by approved means to ensure that an overlap of prime not exceeding 50mm is sprayed onto the previously constructed or existing surfacing."

B4108 TOLERANCES

Replace the first paragraph with the following:

"The actual spray rates measured at spraying temperature shall not deviate by more than 8.0% from that ordered by the engineer. The engineer may, at his discretion, conditionally accept application rates falling outside this tolerance at reduced payment in accordance with Table B4108/1.

TABLE B4108/1: PAYMENT REDUCTION FACTORS FOR CONDITIONALLY ACCEPTED PRIME COAT

Deviation specified spray rate at spraying temperature. (%)	Payment reduction factor of tendered rate.
±8,0	1.00
±9,0	0.97
±10,0	0.95
±11,0	0.90
±12,0	0.85
±13,0	0.80

Any deviation outside these limits shall not be paid for, however, the engineer shall have the right to instruct the contractor to make up any deficiency, or blind excessive prime without additional payment. Where so instructed, the material for blinding shall consist of approved, but shall consist of screened 5mm nominal single size aggregate. The use of crusher dust for blinding shall not be permitted. If under-spraying occurs, and it is accepted by the engineer, only the actual quantities applied shall be paid for."

B4109 TESTING

Add the following:

"No payment will be made if this condition is not adhered to. The contractor shall provide, at his cost, representative samples of every batch of prime delivered onto site."

B4110 MEASUREMENT AND PAYMENT

Item **Unit**

B41.01 Prime coat

Add the following payment sub item:

"(f) Colprime E or similar approved.....litre(l)

SECTION B4200: ASPHALT BASE AND SURFACING

B4202 MATERIALS

a) Bituminous binders

(i) Conventional binders

Add the following:

"The binders to be used shall be as follows:

- (a) Continuously graded base / surfacing course: 50/70 penetration grade bitumen

(iii) Homogeneous modified binders

Replace the last sentence with:

"The modified binder to be used on this project shall be A-E2."

The homogeneous modified binder shall be manufactured according to the guidelines contained in "Technical Guideline: The use of Modified Bituminous Binders in Road Construction (TG 1-2015): Asphalt Academy". The base bitumen shall conform to SANS 4001-BT1:2012, or a blend of SANS 4001BT1:2012 grades. The type as well as percentage of modifier is not prescribed, however the contractor shall indicate in the Pricing Schedule what polymer he shall be using. The properties of the homogeneous modified binder shall comply with the relevant requirements for binder class A-E2 as listed in table B4202/12."

TABLE B4202/12: PROPERTIES OF POLYMER-MODIFIED BINDER FOR HOTMIX ASPHALT

Property	Unit	Test Method	Class		
Before ageing			A-E1	A-E2	A-P1
Softening point ²	°C	MB-17	55-65	65-85	63-73
Elastic recovery @ 15°C	%	MB-4	> 50	> 60	30 - 50
Dynamic viscosity @ 165°C	Pa.s	MB-18	0,6	0,6	0,55
Storage stability @ 180°C ¹	°C	MB-6	5	5	5
Flash point	°C	ASTM D92	> 230	> 230	> 230
After ageing (RTFOT)					
Mass change	%	MB-3	1,0	1,0	1,0
Softening point (min)	°C	MB-17	53	63	61
Elastic recovery @ 15°C	%	MB-4	> 40	> 50	

TABLE B4202/15: TEMPERATURE/TIME LIMITS FOR POLYMER MODIFIED BINDERS

¹ Certain base bitumens, when used in the production of modified binders, are prone to cause segregation of the modified binder. The Storage Stability test result should be interpreted as an indicator of the compatibility of the base bitumen and the modifier used. In cases where compliance limits are not met, proposals of site agitation procedures of the binder to prevent segregation shall be submitted to the client for consideration. In all cases, whenever there is any reason to believe that the composition of the base bitumen has changed, the test shall be repeated to ensure compliance or to determine the need for measures to prevent segregation.

Binder Class	Short Term Handling/ Transportation		Storage ¹		Spraying/Asphalt Mixing/Application		
	Max Temp (°C)	Max Holding Time (hrs)	Max Temp (°C)	Max Holding Time ² (hrs)	Max Temp (°C)	Min Temp (°C)	Max Holding Time (hrs)
A-E1 (SBR)	180	24	160	240	190	175	8
A-E1 (SBS)	180	24	160	240	180	160	12
A-E2 ³	180	24	160	240	180	170	12
A-P1	180	24	150	240	170	150	24

¹ When storing product for 48 – 240 hours, it is recommended that the tank has agitation circulation.

² If the recommended maximum holding time has been exceeded, the binder should be resampled and tested to ensure compliance with the specification.

³ A-E2 temperature to be confirmed by practitioners and historical data.

b) Aggregates

Add the following paragraph to the introductory description:

"Asphalt mixes shall be manufactured using different individual single size coarse aggregates fractions and crushed fine aggregates blended to conform to the specified grading requirements. The use of natural sands shall only be permitted if approved by the engineer and shall be limited to a maximum of 5% for continuously graded mixes. All aggregate in excess of 5mm shall consist of individual nominal single sized aggregate. For stone mastic asphalt mixes all aggregate fractions in excess of 2mm shall consist of individual single size fractions. The Contractor shall note that commercial suppliers may not be able to supply all the required single size aggregates, in which instance arrangements will have to be made for additional on site screening. No additional payment shall be made for screening aggregate. The use of run of crusher type materials shall not be permitted."

(v) Absorption

Add the following sentence:

"In addition, the total binder absorption of the combined coarse and fine aggregate blend shall not exceed 0,5%"

(viii) Grading

Delete the second paragraph commencing with "The target grading..." and add the following paragraphs

The grading limits for the combined aggregate grading for the asphalt surfacing shall be as specified in table 4202/7: Continuously graded medium grade.

The grading limits for the combined aggregate grading for the stone mastic asphalt shall be as specified in table B4202/10. In addition to the specified grading limits, the percentage by mass of aggregate smaller than 0,005mm, when determined in accordance with SANS 3001: Method GR3, shall be less than 1,0 of the combined aggregates excluding the active filler added in the approved mix. The engineer may request a reconsideration of blends to achieve any grading within the relevant envelope in order to improve certain mix properties.

Add the following new sub-item:

“(xi) Moisture content

The moisture content of aggregates, sampled from the cold feed belt, shall not exceed the following limits at the time that it is introduced into the mix:

- Coarse aggregate 2%
- Fine aggregate..... 4%

c) **Fillers**

Delete the second last sentence of the first paragraph and replace with:

“In no instance shall more than 2% by mass of active filler be used in the mixes.”

Add the following after the last paragraph:

“For tender purposes the active filler shall be hydrated lime”

h) **General**

Add the following after the second paragraph:

“Sufficient aggregate for a minimum of 3 days production shall be separately stockpiled and tested for conformance and uniformity prior to use. The test results shall be presented to the engineer”

B4203 COMPOSITION OF ASPHALT BASE AND SURFACING MIXTURES

In the first paragraph, third last line, after “or active filler content” add:

“or aggregate content”

Replace the fifth paragraph with the following:

“The design of the asphalt base / surfacing mix shall be in accordance with “Design and Use of Asphalt in Road Pavements SABITA MANUAL 35 / TRH 8 (February 2019)”. for the following design parameters:

- Mix type = Sand Skeleton
- Traffic Classification - E
- Traffic Speed - 20-80 km/hr
- Design Mix Level III
- NMPS = 14 (for 60mm thick asphalt)
- NMPS = 20 (for 80mm thick asphalt)
- Binder Classification / Selection - PG58E-22
- Penetration Grade = 50/70
- Modifier to be used (SBS) AE-2
- Total Nominal Target Binder Content = 4.5%
- Nominal Filler - 1%
- RA - Max. 10%
- Compaction:
 - o Minimum: (97% - % design voids) of MVD
 - o Maximum: 96% of MVD

Testing requirements: as per Table 39: Level II and Level III design: Permissible deviations from certified values at the paving stage as well as testing frequency

B4204 PLANT AND EQUIPMENT

(f) **Vehicles**

Replace the second paragraph with the following:

“To minimize temperature loss all vehicles used for transporting asphalt to the site shall be fitted with thermal asphalt covers (canvas covers not acceptable) irrespective of the prevailing climatic conditions or distance of transport.”

Add the following subclause:

“(h) Transfer of mix to paver

Asphalt shall be transferred from the haul trucks to the paver by means of a materials storage and transfer vehicle and no material shall be transferred directly from the haul vehicle into the paver.

The material storage and transfer vehicle must be able to store and transfer hot-mixed asphalt material from a truck to a paver to ensure continuous paving. It must contain an anti-segregation auger which remixes materials just before they are delivered to the asphalt paver.”

B4205 GENERAL LIMITATIONS AND REQUIREMENTS AND THE STOCKPILING OF MIXED MATERIAL

b) Moisture

Amend the last paragraph as follows:

Insert “and/or primed base” after “surfacing” in the third line of the first sentence.

Replace the last sentence with “In such case the base shall be allowed to dry out to meet the above moisture content requirement prior to placing the surface layer.”

c) Surface Requirements

(iii) Tack Coat

Add the following paragraph:

“Hand spraying shall only be permitted on areas approved by the engineer. The binder distributor shall be capable to apply the binder evenly over the full area. The equipment shall comply with clause 4103. Tack coat shall be applied to all transverse and longitudinal joints by hand utilizing a paint brush.”

B4206 PRODUCING AND TRANSPORTING THE MIXTURE

b) Production of the mixture

(ii) Using drum-type mixer plants

Add the following:

“Pre-blending of aggregate fractions shall not be permitted and the contractor shall ensure that sufficient cold-feed bins are installed to accommodate each individual aggregate fraction, including the filler.”

c) Transporting the mixture

Delete the second sentence in this paragraph.

Add the following sub-clause:

“f) Approval of asphalt mixture

Before any asphalt is placed on the road, the engineer shall approve the mix design. The approval process shall be as follows:

The contractor shall prepare and submit a laboratory design mix with test results at four different bitumen contents. The design mix shall be submitted on the prescribed form D3 of TMH 10: “Instruction for the Completion of As-Built Materials Data Sheets” with all the necessary test results completed. In addition, the proposed asphalt mixture shall be subjected to gyratory testing. All the expenses in preparing and submitting the laboratory design mix shall be to the contractor’s cost.

Samples of all aggregate and bitumen shall be submitted with the laboratory design mix to enable the engineer to carry out check design testing as necessary. The above design and aggregate shall be submitted to the engineer at least six weeks before it is intended to commence with any asphalt production.

After approval is obtained for the laboratory design mix, a plant mix at varying binder contents of approximately 5 to 10 tons each shall be produced. The purpose of the plant mix is for the contractor to prove that the laboratory design mix can be produced successfully. The engineer shall conduct the necessary testing on the plant mix. The plant mix shall not be placed on the road. During the production of the plant mix, the engineer shall be afforded the opportunity to inspect the asphalt plant.

After the plant mix is approved, permission shall be given for laying a trial section at varying binder contents in accordance with the requirements of section 4211 of the specifications. The engineer may require that the mix be further assessed by means of CSIR Wheel Tracking or MMLS testing, the cost of which will be borne by the Employer. Mass production of asphalt shall only commence after approval of the trial section, which should be given within a maximum of ten days.

The engineer may instruct the contractor at any time to halt his paving process and to review the whole or part of the above process should a change of aggregate properties occur, the specified asphalt requirements not being met and/or a consistent asphalt mixture not be produced.”

B4208 JOINTS

Add the following to this clause:

“Where the difference in level between the new work and the existing road surface exceeds 25mm, joints shall be treated as follows:

Transverse steps at the end of a day’s work shall be tapered off at a slope of 1 vertical to 20 horizontal (1:20) to tie in with the existing surface. The tapered section shall be removed before surfacing is recommenced and a joint formed in accordance with clause 4208 of the specification.

Longitudinal joints exposed to traffic shall be provided with a taper of compacted asphalt material over the full length of the exposed joint. The width of the taper shall be at least 5 times the difference in level between the old and new work.

All costs involved in the provision and removal of these temporary ramps shall be deemed to have been included in the rates tendered for the relevant asphalt payitem.”

B4211 LAYING OF TRIAL SECTION

Add the following to the end of the first paragraph:

“As the purpose is not to calibrate any equipment, etc., the contractor shall calibrate the equipment and refine the mix design at his own cost.”

B4213 CONSTRUCTION TOLERANCES AND FINISH REQUIREMENTS

(c) Gradings

Replace Table 4213/1 with:

TABLE B4213/1: AGGREGATE GRADING TOLERANCES

Size of aggregate passing Sieve size (mm)	Permissible deviation from target grading (%)
28	± 5
20	± 5
14	± 5
10	± 5
7	± 5
5	± 4
2	± 4
1	± 4
0,600	± 4
0,300	± 3
0,150	± 2
0,075	± 1*

* When statistical methods are applied the permissible deviation for the 0,075 fraction is ± 2%.

B4214 QUALITY OF MATERIAL AND WORKMANSHIP

b) Coring of asphalt layers

Add the following:

"A suitable coring machine shall be available on a daily basis when asphalt paving is taking place. Cores shall only be drilled, when the road temperature is 20°C or less. Core holes shall be filled with hot mix asphalt and compacted, all within 24 hours of the core being drilled. Coring shall be carried out within 48 hours after the paving has been completed and supplied to the engineer. The test results of cores shall be submitted to the engineer within 24 hours after coring."

c) Routine inspection and tests

Add the following paragraphs:

"The contractor shall keep accurate records of:

- (i) The position where every truckload of asphalt is paved (chainage, lane, time and date).
- (ii) The temperatures of the asphalt in the trucks both at the mixing plant and at the paving equipment immediately prior to discharging the load.
- (iii) The truck and load number from which control samples are taken. All samples taken shall be appropriately numbered.

Test results and measurements will be assessed in accordance with the provisions of section 8200."

Add the following sub-clause:

d) Special tests

n-Heptane-Xylene Equivalent (Spot test) (AASHTO-T102)



If the engineer suspects that bitumen or asphalt has been overheated, he may order that the bitumen, or the bitumen recovered from the asphalt, be subjected to the Spot Test. Recovery of binder for use in the Spot Test shall be carried out according to an approved method.

Any bitumen having an n-Heptane-Xylene equivalent in excess of 36, or in excess of the manufacturers test result on the dispatched stock, shall be considered to have been overheated and shall be deemed to be rejected unless proven otherwise."

B4215 MEASUREMENT AND PAYMENT

"Item	Unit
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B42.09 Asphalt surfacing on bridge decks	
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Add to the second paragraph:

"Tack used for bridge decks shall comprise a latex modified binder specifically used for bonding between concrete and asphalt surfaces and shall be applied as specified by the manufacturer. The contractor will be required to submit to the engineer for approval the product he intends to use prior to carrying out asphalt work on any of the bridge decks".

COLTO SERIES 5000: ANCILLARY ROADWORKS

SECTION B5400: GUARDRAILS

B5405 REMOVING, RENOVATING AND RE-ERECTING GUARDRAILS

a) Removing the guardrails

In the 3rd line of the 1st paragraph, after "150mm layers," delete the full stop and add "of suitable material (than less than G7 quality material)."

B5406 MEASUREMENT AND PAYMENT

Item	Unit
B54.07 Removing existing guardrails	metre (m)

Add the following:

"The tendered rate shall also include for the backfill of the holes with suitable G7 quality material."

SECTION B5600: ROAD SIGNS

B5609 MEASUREMENT AND PAYMENT

Add new payment item:

Item	Unit
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B56.10 Dismantling existing road signs and disposing off site.....	m²
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The tendered rate shall be per square meter and shall include full compensation for dismantling each road sign complete including excavation, removal of supports, backfilling and making good, and disposing of all sign elements off site at an approved dump site regardless of the size of each sign.

SECTION B5700: ROAD MARKINGS

B5701 SCOPE

Replace “South African Road Traffic Signs Manual” in the second paragraph with:

“SADC Road Traffic Signs Manual”

Replace the words “ordinary road marking paint” with “solvent borne road marking paint”.

Replace “BS 3262” with “EN 1436”.

Replace “Hot melt plastic road marking” with “thermoplastic road marking”.

B5702 MATERIALS

Insert the following before subclause (a) Paint:

“The selection of the appropriate road marking paint and materials for permanent road markings to ensure conformance with the requirements of this specification rests with the contractor. Such paint and material shall have technical characteristics (brightness, luminance, skid resistance, durability) equal to or greater than road marking paint and materials specified in subclauses 5702(a), (b) and B5702(c).

Where plastic road-marking material (hot-melt plastic (also known as thermoplastic) and two-component (also known as cold plastic)) is used, the contractor shall obtain an approved guarantee from the manufacturer that the paint complies with the specification. This shall be submitted to the Engineer on request.”

Replace sub-subclause B5702(a)(i) with the following:

“(i) Road marking paint

Road marking paint shall be Type 1 as specified in SANS 731-1. Only paint, manufactured in a SANS approved and accredited facility shall be accepted. The no-pick-up time of road-marking paint shall comply with the Class 1 requirement in accordance with SANS 731-1.

The paint shall be delivered at the site in sealed containers marked in accordance with SANS 731-1.

The viscosity of the paint shall be such that it can be applied without being thinned down.”

Replace sub-subclause B5702(a)(iii) with the following:

“(iii) Thermoplastic road marking material

Thermoplastic road marking material shall comply with the requirements of EN 1436, and EN 1423: 1998 for drop-on glass beads for road marking and anti-skid aggregates and mixtures thereof. Blending of thermoplastic road marking material and glass beads shall comply with EN 1424: 1998.

The binder shall be an elasticized synthetic resin and the material shall be reflectorized by mixing in 25% by mass Class A glass beads in accordance with EN 1424: 1998. An additional topping of glass beads shall be applied to the hot surface of the material for instant retro-reflectivity.

The white road marking material shall contain 6% by mass minimum titanium dioxide content and shall have a skid resistance of 45 S.R.T. – units or higher. SABS Method

1248: 1995 shall be used for determination of traffic wear index; indication of durability.

The following minimum luminance values are required for the completed product:

- 250 mcd/m².lux & 120 mcd/m².lux for white & yellow lines respectively, at 30 days after application.
- 200 mcd/m².lux & 100 mcd/m².lux for white & yellow lines respectively, at 6 months after application.

Determination of coefficient of retro-reflected luminance by means of portable retro-reflectometer shall be carried out using SANS 6261: 2008. Application of the permanent roadmarking will thus have to be performed within the first 6 months of the 12 month defects liability period to allow for the second measurement to fall within the contract dates. Should the application of the permanent road-marking fall outside the first half of the defects liability period for whatever reason, the settlement of the retention money will be delayed until the second measurement of luminance can be performed at the stipulated time and the required adjustment can be made to the tendered rate (if required).

Two-component cold plastic road marking material shall be used for symbols, arrows and letters (hand painted markings) unless otherwise instructed by the Engineer."

Add the following sub-subclause:

"(v) Cold plastic road marking material

Cold plastic road marking material shall be used for symbols, arrows and letters (hand painted markings) and shall consist of a solvent-free reactive acrylic resin, stuffing, beads and pigment to which a hardener shall be added. Application is carried out using a trowel. Material applied by paint brush shall not be used.

Cold plastic road marking material shall be reflectorized by mixing in 25% by mass (or 400g/m²) Class A glass beads in accordance with EN 1424: 1998. An additional topping of glass beads is applied to the wet surface of the material after application and will comply with EN 1423: 1997."

b) Roadstuds

Replace the clause with the following:

"Permanent and temporary road studs shall comply with the requirements of the European Standard for road studs IS EN 1463.

The road studs to be used on this contract shall be "RSA-2"

Road studs for the areas of application shall be supplied and installed in accordance with the requirements set out in Table B5702/1 with reference to IS EN 1463.

TABLE B5702/1

Classification	Area of Application			
	RSA-1	RSA-2	RSA-3	RSA-T
Description	Bi-directional	Bi-directional	Circular Cats-Eye	Bi-directional
Material	Galvanized Cast Iron	Plastic	Glass	Plastic
Design	Type A	Type A	Type A	Type A
Use	Type P	Type P	Type P	Type T
Reflector	Type 1	Type 1	Type 1	Type 2
Reflectivity	R1	R1	R1	Not Specified
Installation System	Anchored	Bonded	Embedded	Self Adhesive or Bonded
Height above Road	H3	H3	H3	H1
Dimensions (min-footprint)	100mmx80mm	100mmx100mm	100mm dia	100mmx100mm
Colours	W – R - Y	W – R - Y	W	W – R - Y
Road Trials	S1	S1	S1	Not Applicable

Add the following sub-item:

“c) Retro-reflective beads

Retro-reflective glass beads shall be applied to the wet paint, thermoplastic and cold plastic.

The beads shall comply with Class A beads in accordance with EN 1424: 1998, with the following requirements or as approved by the Engineer:

- colour : crystal clear
- roundness : > 80%
- size range of : 14 – 200 US Mesh (75 – 1400 Microns)
- refractive index : > 1.5
- specific gravity : ± 2.5
- granulometry :

CUMULATIVE RETAINED MASS		
SIEVE	MINIMUM	MAXIMUM
1700	0	2
1400	0	10
1180	5	30
850	40	80
600	70	100
425	80	100
355	90	100
212	95	100
PAN	100	100

The beads shall be delivered to the site in sealed bags, marked with the name of the manufacturer, the batch number and an inspection seal of SANS, confirming that the beads form part of a lot tested by SANS and comply with the requirements of

EN 1424: 1998. Alternatively, the Contractor shall at all times have a SANS certificate on the site, identifying the batches to which the inspection seals apply and certifying that they have been tested by SANS, and comply with the requirement of EN 1424: 1998.”

B5704 MECHANICAL EQUIPMENT FOR PAINTING

Add the following sentence at the end of the first paragraph:

”The road-marking machine shall be fitted with a device to guide the operator to the centre of the line to be painted. This device shall be used at all times of operation.”

B5705 SURFACE PREPARATION

Add the following at the end of the second paragraph:

”The onus is on the contractor to ensure that the surface on which the road markings are to be applied is sufficiently clean and dry to ensure that the quality of the road markings will not be adversely affected. The contractor is also responsible for protecting road studs from being painted over, and the subsequent cleaning thereof if such over-painting did occur.”

B5706 SETTING OUT THE ROAD MARKINGS

Insert the following before the first paragraph:

”Where road markings are to be replaced after any construction activity, it is essential that all existing road marking be accurately surveyed and referenced before commencement of such construction activities which will obliterate the existing road markings. The position of barrier lines shall be re-assessed on site by the engineer before the contractor commences with the road marking.”

B5707 APPLYING THE PAINT

Insert the following before the first paragraph:

”The Contractor’s establishment on site and general obligation shall be deemed to fully include the establishment of the road-marking team, irrespective of the number of times the road-marking team is required to be on site or is required to move within the site.

Provision is also made under item B57.07 for de-establishment and re-establishment in the contract or defects notification period if such action is required by delays not attributable to the contractor and/or ordered by the Engineer.”

Replace the sixth paragraph with the following:

”Solvent borne road marking paint shall be applied at a nominal rate of 0,42l/m² or as directed by the Engineer. Thermoplastic road marking shall be applied at a nominal rate of 2,5 kg/m² to achieve a minimum thickness of 1,25mm to 1,5mm or as directed by the Engineer. The two-component road marking material shall be applied by hand by means of a trowel. The desired symbol or line shall be marked with a tape or a template on the road surface. Thereafter apply the required volume of material and spread uniformly over the entire area. When dry/set, remove the tape or template. A spreading rate of 4,5kg/m² is estimated to achieve a 2,0mm material thickness.

In order to ensure proper coverage on all types of surfaces the Engineer may order an increase in the above nominal application rates. Payment for these variations in application rates shall be made under item 57.04.

A daily log-sheet, provided by the Employer, shall be completed and signed by the Contractor and the Engineer’s representative, recording the quantities of paint and glass beads used on that day and shall be available for inspection at all times. The completed

and signed log-sheet for the period covered by a payment certificate shall be attached to the payment certificate.”

Replace the last paragraph with the following:

“Solvent-based road marking as specified by the Engineer shall be carried out within 14 days of opening the road full width to traffic after the completion of the surfacing.

If in the in the opinion of the Engineer, conditions are unsafe, the centre-line shall be painted immediately after 2,0 km of continuous road has received a new asphalt layer, or 4,0 km of continuous road has received a new seal surfacing.”

B5708 APPLYING THE RETRO-REFLECTIVE BEADS

In the first paragraph, replace the nominal application rate of 0,8kg/litre with “400gm/m²”.

Replace the second paragraph with the following:

“The thermoplastic road marking material and two-component road marking material shall contain insitu glass beads of minimum content of 25% in order to obtain night visibility (reflectivity). The contractor shall immediately apply additional glass beads at 400g/m² to obtain immediate reflectivity. The beads shall be sprayed onto the road marking layer by means of a pressure sprayer. Where letter, symbol, traverse line and island road marking is undertaken by hand, the glass beads may be applied by hand if approved by the Engineer. Prior to any hand application work, the contractor shall first request approval from the Engineer.”

Add the following:

“Beads shall be applied in accordance with EN 1424.”

B5710 TOLERANCES

Add the following paragraphs to subclause (c) Alignment of markings:

“When an unbroken line and a broken line are painted alongside each other, the beginning and the end of the unbroken line shall coincide with the beginning of one broken line and the end of another broken line. When existing lines are repainted, the new markings shall not deviate more than 100mm in the longitudinal direction nor 10 mm in the transverse direction from the existing marking.

The alignment of the road studs shall not deviate from the true alignment by more than 10mm and shall be positioned so that the reflective faces are within 5° of a right angle to the centre line of the road.”

Add the following subclause:

“e) Testing

(1) Plant

Before painting any permanent road markings, the Contractor shall satisfy himself and the Engineer, by painting test lines on a section of pavement other than the section required to be marked:

- (i) that the painting machine is in good working order and properly adjusted;
- (ii) that the operator is fully experienced; and
- (iii) that the machine sprays at the specified rate of paint application.

The Contractor shall bear the cost of all materials and workmanship required for the above plant tests.

In addition, the Contractor shall conduct random paint thickness tests and dip/spread tests as required by the Engineer."

B5711 GENERAL

Insert the following into the last sentence of the last paragraph between "black paint" and "or chemical paint remover":

" , bituminous emulsion, slurry"

Add the following to the last paragraph:

"Where black paint is used, it shall be matt."

Add the following clause:

"The Contractor shall provide temporary traffic control facilities in accordance with Section 1500 of the COLTO's standard specifications for road and bridge works to ensure traffic safety where work is being executed.

Property and/or road signs damaged by the Contractor, his personnel, his agents or sub-contractors shall be repaired or restored to their condition prior to the damage at his own cost."

B5712 FAULTY WORKMANSHIP OR MATERIAL

Add the following paragraphs to this item:

"The Contractor shall rectify in an acceptable manner and at his own costs; all marking that do not comply with the specified requirements.

While work is in progress, tests shall be carried out on materials and/or the quality of work to ensure compliance with the specified requirements. The sampling methods are specified in SANS 731-1. The sampling methods described in TMH5 shall be followed where applicable."

B5713 PROTECTION

Add the following paragraph

"Traffic cones shall not be smaller than 750mm in height and shall be placed on the road not further than 48m apart. Cones shall not be removed before the paint on the road has hardened to such an extent that it will not be damaged by traffic and the adhesive of the road studs has hardened to such an extent that the studs will not turn or become loose. All marks on the road caused by traffic driving over wet paint shall be removed by the Contractor at his own cost."

B5714 MEASUREMENT AND PAYMENT

Amend the heading for payitem B57.03 as follows:

"

Item	Unit
B57.03 Thermo-plastic road-marking paint.....	kilometre (km)"

Add the following after the third paragraph:

"Full payment of the tendered rate will be applicable upon completion of the application of the road-marking paint. However, should the coefficient of retro-reflected luminance fall below the required minimum levels as specified in paragraph B5702 above, payment will be reduced on the following sliding scale :

White lines:

- Below 250 mcd/m2.lux at 30 days : minus 10 % of the tendered rate
- Below 200 down to 180 mcd/m2.lux at 6 months : minus 10% of the reduced rate
- Below 180 down to 160 mcd/m2.lux at 6 months : minus 20% of the reduced rate
- Below 160 down to 140 mcd/m2.lux at 6 months : minus 30% of the reduced rate

Yellow lines:

- Below 120 down at 30 days: minus 20 % of the tendered rate
- Below 100 down to 80 mcd/m2.lux at 6 months: minus 20% of the reduced rate

The reduction in the tendered rate applicable for failing to meet the specified minimum luminance level at the 30 days and 6 months measurement dates shall be applied accumulative in the certificate immediately following the date of measurement."

Amend payitem 57.05 by replacing the payitem heading with the following:

"Item	Unit
B57.05 Roadstuds surface type RSA-2 (installation and maintenance) .. number (No)"	

Add the following after the first sentence of the second paragraph of payitem 57.05:

"No additional payment will be made should temporary or permanent road studs be replaced if lost or broken during the construction period or during the Defects Notification Period."

Item	Unit
B57.06 Setting out and pre-marking the lines (excluding traffic island markings, lettering and symbols)	kilometre (km)

Add the following:

"Referencing of existing barrier lines and other road marking lines prior to milling and other operations, shall be included in the tendered rate for setting out and pre-marking."

Amend payitem 57.07 by replacing the payitem heading with the following:

"Item	Unit
B57.07 Re-establishing the painting unit	lump sum"
(a) During the contract period	lump sum
(b) During the defects notification period, including accommodation of traffic	lump sum"

In the 4th line of the 1st paragraph delete the word "maintenance" and replace with "defects notification"

The Contractor's establishment on site and general obligation shall be deemed to fully include the establishment of the road-marking team, irrespective of the number of times the road-marking team is required to be on site or is required to move within the site.



Provision is made under payment item B57.07 (a) for de-establishment and re-establishment in the contract or maintenance period if such action is required by delays not attributable to the contractor and/or ordered by the Engineer.

The tendered rate shall include full compensation for re-establishing the complete painting unit on the site and the subsequent removal of all special equipment, personnel, etc., for painting the road-traffic markings during the construction period.

The tendered rate for payment item B57.07(b) shall include full compensation for re-establishing the complete painting unit on the site, traffic accommodation and the subsequent removal of such including all special equipment, personnel, etc., as may be required for re-painting the road markings at the end of the maintenance period.

Add the following payitems:

Item	Unit
B57.10 Cold plastic road marking material	
(a) White lettering and symbols	square metre (m ²)
(b) Yellow lettering and symbols	square metre (m ²)
(c) Transverse lines, painted island and arrestor bed markings (any colour)	square metre (m ²)

The unit of measurement for applying the roadmarking material for the lettering, symbols, transverse lines, islands and arrestor bed markings shall be the square metre, and the quantity to be paid for shall be the actual surface area of the lettering, symbols, transverse lines, islands and arrestor bed markings, completed in accordance with the instructions of the Engineer.

The tendered rate per square metre for applying the road marking material shall include full compensation for procuring and furnishing all material, including the retro-reflective beads and all necessary equipment, and for applying, protecting and maintenance as specified, including the setting out of lettering, symbols, transverse lines, islands and arrestor bed markings.

SECTION B5900: FINISHING THE ROAD AND ROAD RESERVE AND TREATING OLD ROADS

B5901 SCOPE

In the first line of the second paragraph, insert the following after 'this section'

"...distinguishes between new construction and renewal construction. When construction is new, as in the case of new alignments for example, then this section "

B5902 FINISHING THE ROAD AND ROAD RESERVE

Retain the existing paragraphs as sub-clause:

"a) New construction"

Replace the sixth paragraph with:

"All materials resulting from the finishing operations shall be disposed of at approved spoil sites."

Add the following:

"b) Renewal construction

After completing construction work within the site, the contractor shall ensure that all construction generated or related material that may have been swept, windrowed, stockpiled, stored or spread beyond the road surface is removed. This shall be done before any other rehabilitation work is undertaken, including shaping, topsoiling and grassing. Should, during the removal of construction generated or related material, existing vegetation or topsoil be disturbed or destroyed, the contractor shall, at his own cost, re-instate the road reserve to its original state. This shall include ripping, should the construction material have compacted the existing surface.

Culvert inlets and outlets, culvert barrels, and open drains shall be cleared of debris, soil, silt and other material generated from the construction activities.

The surfacing shall be cleared of all dirt, mud and foreign objects. Dragging, pushing or scraping material across the finished surfacing shall not be permitted.

All junctions, intersections, islands, kerbing and other elements making up the completed works shall be neatly finished off.

The contractor shall ensure that all undesirable plants have been removed from the road reserve and borrow pit areas.

All materials resulting from the finishing operations shall be disposed of at approved spoil sites."

COLTO SERIES 8000: SUNDRIES

SECTION B8100: TESTING MATERIALS AND WORKMANSHIP

B8102: TESTING METHODS

Insert the following as a new first paragraph:

“Where reference is made to TMH test methods in this specification or the standard specifications, it shall be replaced with the relevant current published SANS test method.”

B8103: THE COSTS OF TESTING

(a) Process Control

Rename the heading as “Materials Quality Control” and replace the contents with the following:

“Testing shall be undertaken by a combined laboratory facility for process control (where the process control testing can be utilised as acceptance control), acceptance control and correlation testing subject to the following requirements laid down by the Employer:

- (i) The contractor accepts the test results of the combined laboratory. Should there be any doubts with regard to certain test results, this will be settled by an independent laboratory mutually agreed upon. The cost in such cases will be to the account of the party at fault. The contractor shall apply in writing, quoting this clause, as to which specific tests are in doubt, providing test reference numbers and details as to the reasons why the test result is in doubt.
- (ii) The contractor accepts that the engineer will be in charge of the combined laboratory.
- (iii) The contractor will be allowed to place a permanent representative in the combined laboratory to observe the laboratory operations. The cost of such representation cannot be claimed as a payment contribution towards payment item B81.04 but will be for the account of the contractor. The contractor shall indicate in writing within 14 days of the commencement date if such representation will be required or declined.

The total cost of the combined laboratory for the 6 month contract period has been estimated at R1,320,000.00.

The estimated cost per month to establish and operate the combined laboratory for the contract period as listed above, allows for the following items:

- (i) Establishment of laboratory buildings
- (ii) Salaries and labour for all laboratory staff members
- (iii) Housing for all laboratory staff members
- (iv) Transport requirements (based on distance) for staff and material testing
- (v) Provision of laboratory equipment (as required for the contract)

A pay item for the monthly contribution from the contractor's interim payment certificates has been provided under payment item B81.04.”

B8105 TESTING OF AGGREGATES

Add the following sub-clause:

“g) Determination of Ethylene Glycol Durability Index

The Ethylene Glycol Durability Index shall be determined as follows:

(i) Apparatus

Suitable pans or basins

Ethylene Glycol solution

Stirring rod

(ii) Method

Obtain three or more representative samples from the source to be evaluated.

If not already crushed, crush the material in order to obtain sufficient minus 20mm plus 14mm sized aggregate in order to totally cover the bottom of the basin or pan with a single layer of stone. Add sufficient ethylene glycol to each basin ensuring that every aggregate particle is completely submerged.

After soaking for 24 hours, gently stir the aggregate and allow to settle. Observe and record the response of the aggregate to the ethylene glycol according to the criteria listed in (iii) below. Continue the above cycle at intervals of 24 hours for a further 4 days, in each case recording the observed response. After 5 days allow the samples to remain submerged in the solution and observe and record the disintegration response after a total period of 15, 30 and 60 days have elapsed.

(iii) Classification of response

After each cycle, classify and record the response of the aggregate as follows:

DISINTEGRATION CLASS

Class 1: No obvious effects, or only very minor spalling of sand sized particles or very small flakes.

Class 2: Splitting of rock, accompanied by any other disintegrative effects.

Class 3: Fracturing (spheroidal and/ or internal) without extensive spalling or distortion.

Class 4: Fracturing (spheroidal and/or internal) with extensive spalling or distortion.

Class 5: Complete disintegration.

TIME CLASS

The time factor in the above disintegrative process is classified according to the time taken for the most serious effect of the expansive stresses to occur i.e.

Class 4: 0 - 5 days

Class 3: 6 - 15 days

Class 2: 16 - 30 days

Class 1: 31 - 60 days

Class 0: Over 60 days

(iv) Determination of Glycol Durability Index

The Ethylene Durability Index is determined by adding the class number as assigned for the specific disintegrative response observed to the class number as assigned for the period for this response to occur. A durability index ranging

from 1 (no response) to 9 (rapid and complete disintegration) is thus determined."

B8108 DETERMINING THE TOTAL APPROXIMATE DRY BULK RELATIVE DENSITY AND THE APPARENT DENSITY

Add the following at the end of this clause:

"For materials where the total water absorption, when determined according to SANS 3001-AG20 (replacing TMH1 Method B14) and SANS 3001-AG21 (replacing TMH1 Method B15), is in excess of 1,5%, the Apparent Density shall be calculated in accordance to the following formula:

$$\frac{(b - a)}{(d - a) + \{ (w - 1.0)/100 \times (b - a) \} - (c - b)}$$

This formula shall be used as an alternative to note (b) regarding soaking period, when so instructed by the engineer."

B8110 TESTS RELATING TO CHEMICAL STABILISATION

Add the following sub-clause:

"d) The Wet-Dry Durability Test for cement and/or lime-treated materials using the hand-brush method (SANRAL METHOD)

1. Scope

This method covers the procedure for determining the soil-cement losses obtained by repeated wetting, drying and hand brushing of hardened soil-cement specimens (see 5.4).

2. Apparatus

- 2.1 A moisture curing room capable of maintaining a relative humidity of 95 to 100 percent and a temperature of 22 to 25°C, or suitable plastic bags capable of holding specimens and carriers in an air tight condition in a water bath as described in 2.2 below.
- 2.2 A suitable water bath with thermostatic control capable of maintaining a temperature of 22 to 25°C.
- 2.3 A balance to weigh up to 10kg, accurate to 0.5g.
- 2.4 A drying oven capable of maintaining temperatures of 71 ± 3°C and 110 ± 5°C.
- 2.5 A wire scratch brush made of 50mm by 1.6mm flat 26 gauge wire bristles assembled in 50 groups of 10 bristles and mounted to form five longitudinal rows and 10 transverse rows on a 200 by 65mm wooden block.

3. Method

3.1 *Preparation of specimens*

Prepare specimens in accordance with the procedure described in the Appendix to method A19 in the TMH 1 with the following exceptions:

Use the material passing the 37.5mm sieve and discard the material remaining on the sieve.

Use the apparatus and compaction method as described in SANS 3001-GR30 (replacing TMH 1 method A7) (100% Modified AASHTO at predetermined OMC).

3.2 *Curing of specimens*

Rapid cure the specimens (see 5.6). Alternatively, and where instructed by the engineer, the specimens may be cured for seven days at a relative humidity of 95% to 100% and a temperature of 22°C to 25°C in a suitable curing room or in plastic bags and a suitable water bath.

3.3 *Wetting, drying and brushing*

After curing, remove the specimens from the curing room or plastic bags, allow to cool and submerge them in water at room temperature for a period of five hours. Remove the specimens from the water and place them in an oven at 71°C for 42 hours.

Remove the specimens from the oven. Give each specimen two firm strokes over the full surface area with the wire scratch brush. The brush must be held parallel to the long axis of the specimen or parallel to the ends as required to cover all areas of the specimen. Apply these strokes to the full height and width of each specimen with a firm stroke corresponding to approximately 13.5 kN force (see note 5.5).

3.4 *Determination of soil-cement losses*

After 12 cycles, dry the specimens to constant mass at 100°C and determine the oven dry mass of the specimens. The data collected will permit the calculation of the soil-cement losses of the specimens after the prescribed 12-cycle test.

4. Calculations

- 4.1 Calculate the soil-cement loss of the specimens as a percentage of the original oven-dry mass of the specimens as follows:

$$L = \frac{W - N}{W} \times 100$$

Where

L = soil-cement loss (%)

W = original calculated oven-dry mass (g) (calculated according to paragraph 3.5 in the Appendix to method A19 in the TMH 1).

N = final oven-dry mass (g).

- 4.2 The percentage loss shall be calculated and reported to the nearest 0.1 percent. The results are normally required for stabilisation design purposes and should be reported graphically against relevant cement contents.

5. Notes

- 5.1 Mass determinations of the specimens before and after brushing are usually made at the end of each cycle during research or special investigations.

5.2 Care is required when assessing results obtained on very coarse graded materials as "plucking" out of the aggregate pieces during the brushing process could result in very high losses of material, which may however not be truly indicative of its potential erosion resistance.

5.3 If it not possible to run the cycle continuously because of Sundays or holidays, or for any other reason, the specimens should be held in the oven during the layover period.

5.4 The test was originally developed to determine wet-dry durability of cement-treated material. It can, however, be used with equal success on material tested with other chemical stabilizers, for example lime, or mixes of lime and milled blast furnace slag, or cement and milled blast furnace slag.

5.5 The pressure of the brushing stroke is determined as follows:

Clamp a specimen in a vertical position on the edge of a platform scale and zero the scale. Apply vertical brushing strokes to the specimen and note the force necessary to register approximately 1.36kg.

5.6 Rapid curing:

Seal each specimen airtight in a suitable container or plastic bag. Carefully place the briquettes on suitable holders or in pans and place in the oven at the relevant temperature and period given below:

Stabilizing agent	Temp (°C)	Time (Hours)
Cement	70 – 75	24 ±0.5
PBFC	70 - 75	24 ±0.5
Lime	60 ±2	45 ±1
Lime/FA	60 ±2	45 ±1
Lime/MBFS	60 ±2	45 ±1

B8114 GEOTEXTILE AND GEOTEXTILE–SOIL COMPATIBILITY TESTS

Add the following new sub-clause:

"c) Other Tests:

- i. Thickness (mm):
The thickness of the material shall be specified by the contractor (or supplier). Thickness and compressibility tests shall be carried out in accordance with Code of Practice SABS 0221:1988. The Testing of Geo-textile, to check that the material supplied conforms to the thickness specified by the contractor.
- ii. Mass per unit area (g/m²):
Testing shall be carried out in accordance with Code of Practice SABS 0221.
- iii. Tensile strength (kN/m):
Testing shall be carried out in accordance with Code of Practice SABS 0221.
- iv. Penetration load (kN):
Testing shall be carried out in accordance with Code of Practice SABS 0221.
- v. Puncture resistance (mm):
Testing shall be done in accordance with test procedures laid down by CSIR, Pretoria.
- vi. Permeability (l/s/m²):
Testing shall be carried out in accordance with Code of Practice SABS 0221."

B8117 MEASUREMENT AND PAYMENT

Add the following payment items before the “Note:”

“B81.04 Financial contribution for the combined laboratory month

The unit of measurement shall be the month.

The negative rate tendered per month shall cover the contractor’s contribution towards the establishment and operation of the combined laboratory over the contract period including any approved extension of time and shall be deducted from the contractor’s payment certificates.

The contractor’s tendered contribution for the establishment and operation of the combined laboratory shall be deducted monthly from the payment certificates over the contract period, including approved extension of time. However, excluded from the tendered contribution shall be the costs of all other special tests requested by the engineer.”

Add the following payment items

“B81.05 Additional testing by the engineer Prov Sum

The unit of measurement shall be provisional sum.