SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD

BUILDING SOUTH AFRICA
THROUGH BETTER ROADS

THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LIMITED

CONTRACT No. : NRA N.012-090-2017/1

CONTRACT TITLE: THE PERIODIC MAINTENANCE (RESEAL) OF NATIONAL ROUTE 12 SECTION 9 BETWEEN HOPETOWN (KM 0.15) AND CHALK FARM (KM 30.80)

AS BUILT MATERIALS DATA

DATE OF COMMENCEMENT: (26 SEPTEMBER 2016) **DATE OF COMPLETION: (23 OCTOBER 2017)**

CONSULTING ENGINEERS:

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GLOSDERRY
7702

ADRIAN SKEA

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QMS CONTEXT: REPORT / DOCUMENT CONTROL FORM

PROJECT NAME: THE PERIODIC MAINTENANCE (RESEAL) OF NATIONAL ROUTE 12 SECTION 9 BETWEEN HOPETOWN (KM 0.15) AND CHALK FARM (KM 30.80)			**PROJECT NUMBER:** 14004	
REPORT / DOCUMENT TITLE:	AS-BUILT MATERIALS DATA			
Document Status:	**Draft / Interim / Final:** FINAL **Rev. No.:** 00		**Issue Date:** 13 MARCH 2019	
Prepared for:	**Client's Name:** SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD		**Contact Person:** Elma Lourens **Tel No.:** 021 957 4600 **Email Address:** lourense@nra.co.za	
Prepared at / by:	**Office:** Cape Town		**Division:** Transportation	
Verification Process:	**Name:**	**Capacity:**	**Signature:**	**Date:**
Verification by Author:	ML. Tetsoane	Technologist	pp	13 March 2019
Checked by:	CA.Viviers	Lead Engineer: Contracts		13 March 2019
Authorised by:	AD. Skea	Regional Manager: Western Cape		13 March 2019

Quality Verification:

This report / document has been prepared under the quality controls established by Mariswe's Quality Management System, which meets the requirements of the ISO 9001:2015 standard which has been certified by DEKRA Certification under Certificate Number 20907782/5.

Document Issue Record		
Rev. No.	Description:	Issue Date:
00	Final As-Built Materials Data	13 March 2019

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg No 1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LIMITED

CONTRACT NO.: NRA N.012-090-2017/1

THE PERIODIC MAINTENANCE (RESEAL) OF NATIONAL ROUTE 12 SECTION 9 BETWEEN HOPETOWN (KM 0.15) AND CHALK FARM (KM 30.8)

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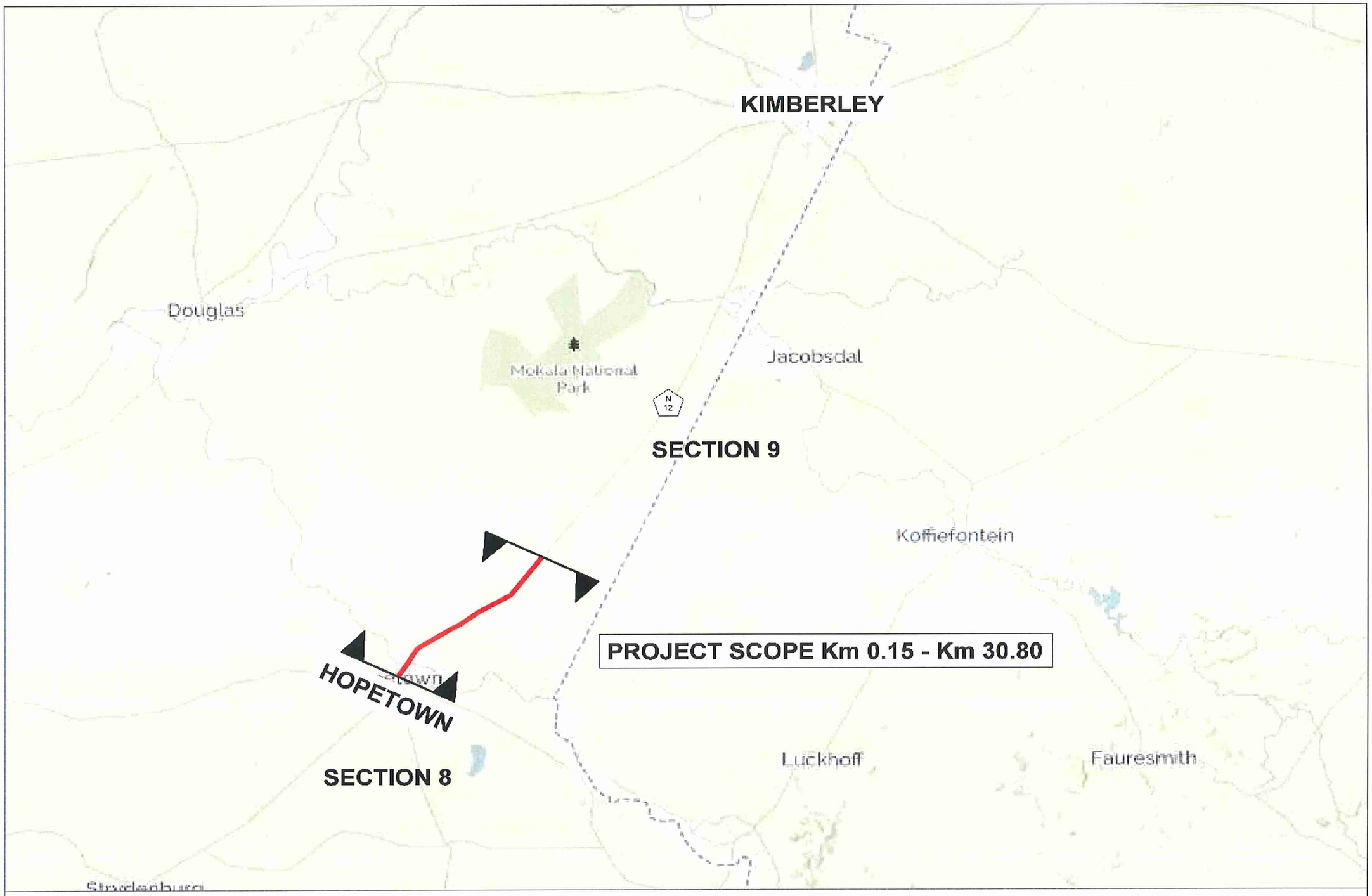
SECTION 1 – GENERAL

1.1 LOCALITY PLAN



N12 SECTION 9 LOCALITY PLAN

1.2 GENERAL DESCRIPTION OF PROJECT

1.2. GENERAL DESCRIPTION OF THE PROJECT

1.2.1. Project overview

The project section started at km 0.15 on the N12/ R369 Intersection north of Hopetown and ended at km 30.8. The section of N12 located between km 2.58 and km 3.88. i.e. the Orange River Bridge and its approaches, was excluded from the Scope of Works under this Contract. There was construction works underway on this section, which was being carried out under a separate Contract (N012-090-2014/1).

One proclaimed road (Route R385 towards Douglas) intersects with this section of the N12 at km 4.8. There were no interchanges along this section, but numerous private and farm accesses exist.

The section of National Route 12 consists of a two-lane single carriageway rural highway, with surfaced shoulders. The total road width was generally consistent at approximately 11.7 m over the length of the route section under consideration.

There were three rest areas located along the route at the following locations:

- km 9.57 (Southbound)
- km 23.10 (Northbound)
- km 24.50 (Southbound)

1.2.2. N12 Section 9

The road works carried out under this contract comprised of the following:

- Establishment of the camps on site;
- Accommodation of traffic;
- The section of the N12 between km 0.15 and km 2.58 was resealed using approximately 33,000 m^2 of 20 mm Cape Seal (S-E1 modified binder) with two layers of slurry with a modified emulsion binder. An additional 3,2700 m^2 of 14 mm Cape Seal (SC-E1 modified emulsion) was constructed at rest areas and surfaced bellmouths of side roads;
- The section of N12 between km 3.88 and km 30.8 (approximately 306,000 m^2) was re-sealed with a 14 mm single seal using a bitumen-rubber modified binder (S-R1) and a fog spray;
- Localised base patch repairs using bitumen emulsion treated excavated material or new base material (or a combination of the two). The total area required base repair was approximately 3,700 m^2. The surface of these base patch repairs was armoured with a 10 mm single seal (SC-E1 modified emulsion tack coat) and slurry;
- Repaired localised areas with rutting in excess of 7 mm using a modified rut fill slurry;
- Application of texture slurry where required (full-width on some sections, while only on the shoulder and in between wheel tracks on areas with degree 2 and 3 bleeding);
- Repaired localised edge breaks using bitumen emulsion treated base material;
- Sealing localised cracks;
- Lifted approximately 310 m of guardrails to the new standard height;
- Constructed concrete edge beams at accesses;
- Repaired concrete inlet and outlet structures of pipe and box culverts;
- Painted temporary and permanent road markings; and
- Installed road studs both on the center line and adjacent to the edge lines.

The following surfacing seals were used along the route:

- Between km 0.15 and km 2.58: 20 mm Cape Seal (S-E1 modified emulsion tack coat);
- Between km 3.88 and km 30.80: 14 mm single seal (S-R1 modified binder);
- Rest areas and surfaced bellmouths of side accesses: 14 mm Cape Seal (SC-E1 modified emulsion tack coat); and
- Modified slurry on the 14 mm single seal at the intersection with some of the higher trafficked side roads.

1.3 WEATHER DATA

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SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg No. 1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by/date: **Maureen Tetsoane**

Checked by/date: **31-Oct-17**

Approved by/date: **Ian Weston**

WEATHER DATA

Contract : **NRA N.012-090-2017/1**

Route : **N12**

Section : **9**

Carriageway : **Single**

From km **0.15**

To km **30.8**

Form **WD 1** (03/2015)

Sheet no. **1** of **2**

DAILY TEMPERATURES : 2016

MONTH	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC	
DATE	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
1																			9	23	15	35	16	33
2																			5	20	15	34	13	32
3																			4	21	19	35	17	39
4																			5	24	19	32	21	35
5																			7	28	17	29	18	34
6																			11	26	13	27	19	37
7																			7	23	10	33	18	36
8																			9	26	15	34	19	37
9																			6	19	17	32	16	33
10																			7	26	14	33	14	31
11																			13	29	12	29	13	33
12																			7	24	13	31	18	36
13																			7	27	10	25	17	35
14																			9	32	7	28	18	35
15																			15	33	10	33	18	35
16																			11	23	15	35	17	35
17																			6	25	13	29	18	38
18																			8	24	9	26	21	40
19																			9	27	10	29	22	39
20																			13	30	13	33	19	37
21																			14	32	19	31	18	36
22																			12	31	15	32	16	34
23																			10	30	18	32	16	35
24																			12	31	12	30	13	28
25																			13	33	13	32	11	35
26																	13	30	15	35	14	32	19	32
27																	8	24	19	38	17	37	18	32
28																	8	23	16	37	20	39	18	34
29																	8	25	18	33	15	35	14	34
30																	8	21	12	33	17	37	19	36
31																			11	34			21	36
Total																								

DAILY RAINFALL : 2016

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
									0	0	0
									0	0	0
									0	0	0

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Prepared by/date: **Maureen Tetsoane**

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WEATHER DATA

Contract : **NRA N.012-090-2017/1**

Route : **N12**

Section : **9**

Carriageway : **Single**

From km **0.15**

To km **30.8**

Form **WD 1** (03/2015)

Sheet no. **2** of **2**

DAILY TEMPERATURES : 2017

MONTH	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC	
DATE	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
1	19	39	17	36	17	32	17	32	12	25	7	22	3	21	10	21	2	22	15	28	19	35		
2	18	35	18	33	16	28	16	33	14	25	9	23	4	20	7	22	2	25	13	28	19	37		
3	15	27	16	30	16	31	16	33	13	25	9	23	2	18	5	23	6	28	17	30				
4	14	29	16	27	15	31	17	34	12	25	7	21	2	22	10	24	9	28	8	18				
5	17	23	16	30	15	33	19	33	14	26	4	22	4	24	5	17	11	27	7	20				
6	15	30	16	30	14	35	12	27	123	26	7	23	6	25	1	19	13	25	8	26				
7	18	29	16	31	17	35	14	21	9	25	4	18	6	24	2	21	9	27	11	28				
8	15	32	17	32	17	28	13	24	13	22	-1	10	5	21	1	23	8	29	9	25				
9	18	32	19	36	15	28	14	27	11	255	-2	18	6	20	6	25	8	30	6	15				
10	17	28	19	33	10	32	15	25	12	21	7	18	2	18	5	25	12	32	6	18				
11	19	28	18	28	15	33	15	24	11	22	6	16	2	20	6	24	12	31	5	24				
12	17	29	18	30	18	33	12	27	6	15	3	19	2	23	4	23	13	32	8	27				
13	18	32	17	32	16	30	11	22	4	16	6	21	3	21	3	20	17	33	6	28				
14	17	33	16	32	18	28	6	21	4	21	4	22	0	18	1	24	11	29	12	32				
15	18	35	19	29	15	30	3	18	4	23	4	18	2	19	6	24	14	32	8	27				
16	14	29	19	32	10	33	3	23	5	23	-1	21	-2	8	1	11	10	22	8	22				
17	11	30	20	33	16	33	7	25	7	23	4	26	-7	17	-1	10	7	23	4	21				
18	17	34	21	32	19	31	7	26	8	24	1	21	0	20	0	15	7	27	5	29				
19	20	35	17	24	14	32	8	27	8	25	10	21	0	20	-1	19	9	29	11	25				
20	15	32	14	25	17	32	7	27	8	26	2	16	3	22	7	20	10	29	7	26				
21	14	33	14	25	18	32	8	27	8	25	1	21	4	23	8	25	15	32	9	28				
22	19	36	12	26	16	28	9	28	8	24	2	20	3	23	3	14	14	30	12	32				
23	21	33	14	27	18	25	10	28	8	26	1	15	1	22	-2	19	7	26	19	31				
24	19	31	15	28	12	23	8	25	10	24	-2	19	0	24	2	16	6	30	13	34				
25	13	31	15	30	8	27	8	26	8	22	2	21	6	23	-1	18	10	25	12	33				
26	13	32	12	27	7	30	11	24	6	21	4	20	0	19	1	22	4	19	9	27				
27	16	34	12	30	11	30	12	23	3	16	9	15	0	23	3	23	2	25	3	23				
28	10	27	18	30	12	31	12	26	2	16	4	14	4	23	4	27	6	29	3	26				
29	14	32			11	34	11	27	4	19	2	19	7	22	7	24	11	29	14	29				
30	15	34			17	32	12	25	7	22	7	19	5	23	4	20	11	29	18	31				
31	16	30			20	32			6	21			6	22	6	23			17	33				
Total																								

DAILY RAINFALL : 2017

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
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0		0		0		0	0		0		

SECTION 2 – DESIGN SHEETS

2.1 FORM D2 – CONCRETE DESIGN

Prepared by :	Designed by:	CONCRETE MIX DESIGN	Contract Number	NRA N.012-090-2017/1	Form D 2
B.D.Croney	B.D.Croney		Contract Describtion	RESEAL OF N12 - SECTION 9 (km 0.15 to km 30.80)	2015
Date: 2016/11/15	Date: 2016/11/15		Structure	Edgebeams, Inlet - & Outlet Structures	Sheet no. 1 of 1

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AGGREGATE PROPERTIES

Sample No.	Nom. Size	Type and Source
1	20.0mm Stone	Dolerite / Raumix / OMV Crushers Kimberley
2	Coarse Crusher Sand	Dolerite / Raumix / OMV Crushers Kimberley
3	Fine Crusher Sand	Dolerite / Raumix / OMV Crushers Kimberley
4		
5		

Sieve Analysis : % Passing Sieves

Sample			1	2	3	4	5	Mix Grading		
a	% In Mix		52.9%	37.7%	9.4%					
b	% In Mix									
c	% In Mix							a	b	c
		75.0	100	100	100			100		
		63.0	100	100	100			100		
		50.0	100	100	100			100		
		37.5	100	100	100			100		
		28.0	99.5	100	100			99.7		
		20.0	92.8	100	100			96.2		
		14.0	25.1	100	100			60.4		
		10.0	1.3	100	100			47.8		
Sieve Size (mm)		7.1	0.3	100	100			47.2		
		5.00	0.3	96.9	92.5			45.4		
		2.00	0.2	59.9	69.3			29.1		
		1.00	0.2	37.2	52.2			18.9		
		0.600	0.2	26.3	40.2			13.7		
		0.300	0.2	20.2	31.3			10.6		
		0.150	0.2	15.5	23.8			8.1		
		0.075	0.2	11.8	17.9			6.2		
		0.053								

								Water Tests		
Org. Mat. (Y/ N)	*	AG40		N	N			a		
Sugar	*	AG42		NIL	NIL			Thembihihle Municipal water		
PH	*	GR32	0.0	0.0	0.0					
Cond. S / m	*	GR32								
Sol. Salts (%)		SABS 849	0.0	0.004	0.005					
Sol. Sulph. (%)		SABS 850	0.0	0.0006	0.0008					
Chlorides		SABS 830	0.0001	0.0001	0.0001					
Del. Subs (%)	*	AG41								
M.L.D. (%)		SABS 837	0.0	0.0002	0.0					
Sand Eqv. (%)	*	AG5								
Shrinkage (%)		SABS 836	1.106	1.549	1.544			Tests on Admixtures		
Expansion (%)		SABS 836	1.156	1.301	1.294			Conforms to ASTM C494		
Shell Cont. (%)	*	AG43						Type	Mark	Yes / No
Flak. Index (%)	*	AG4	21.3							
ACV. (%)	*	AG10						ASTM C494	Sika V210plus	Yes
10 % Fact.(kn)	*	AG10								
Pol. Value	*	AG11	51.0							
MgS04 Sounds	*	AG12	0.00306	0.00205	0.00348					
Alkali Reac. (Y/N)			0.00006	0.00026	0.00005					
Voids/ (Shape)		SABS 845								
Water Absorp. (%)		SABS 843	0.5	1.2	1.1					

AGGREGATE PROPERTIES CONTINUED

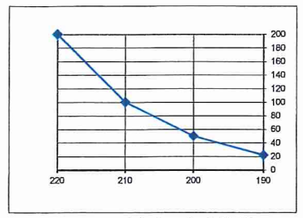
Sample No.		1	2	3	4	5	Air Entrainer		
Water Demand	SABS 535						To ASTM C260:		
Rel. Density	* AG23	3.00	3.00	3.00			Y / N	:	n/a
Loose Bulk Density	TMH1 B9	1452	1724	1927			Type	:	n/a
Compacted Bulk Density	TMH1 B9	1671	1945	2081			Mark	:	n/a

CEMENT PROPTIES

	Type	Source	Relative Density	Total NaO EQU
a	CEM II A-M (L) 52.5N	Afrisam - South Africa ULCO Factory	3.14	0.35%
b				
c				

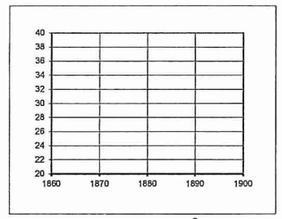
MIX PROPERTIES

a



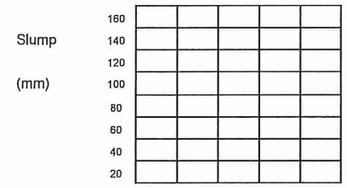
Water l/m³,Admix ml/m³,Air%

b



Admix.ml/m³

c



Air %

DESIGN TARGETS

Properties		a	b	c
Structure Part		Edgebeams / In - Outlet structures		
Class (MPa)	Aggr. Size mm	30 / 20	/	/
Slump (mm)	C / W	100 / 1.452	/	/
Design / Alpha	Air (%)	/	/	/
Des.Std Dev	% Failure	5 / 5	/	/

Mix Proportions				a m³	a Bag 50kg	b m³	b Bag 50kg	c m³	c Bag 50kg
Cement CEM II A-M (L) 52,5N			kg	305	1bag				
Slagment or Fly Ash			kg						
Aggregate (Dry)	1	20.0mm Stone	kg	1100	180				
	2	Coarse Crusher Sand	kg	783	128				
	3	Fine Crusher Sand	kg	196	32				
	4		kg						
	5		kg						
Water (Maximum)			(liters)	210	34				
Admixture			(ml)	2440	400				
C / W Ratio				1.452			( )		( )
C / A Ratio				0.147					
Fine Aggregate (Sand)			(%)	47.1					
Sacks per m³	Cement			6.1					
	Slagment or Fly ash			0					
Slump (Maximum)				100					
Compr. strength	3 Days (MPa)	7 Days (MPa)			32.4				
	28 Days (MPa)	Target (MPa)		42.1	38.2				
Tests for Concrete Durabilty	Oxygen Permeability (OPI = $-\log_{10}k$)								
	Water Sorptivity (mm/√h)								
	Chloride Conductivity σ (mS/cm)								

NOTES : ALL DURABILITY RESULTS SHALL BE SUBMITTED TO SANRAL SEPERATELY IN ELECTRONIC FORMAT
THIS DESIGN WAS APPROVED BY SANRAL FOR CONTRACT N012-090-2014/1
* Tests according to SANS 3001 methods.

Consultant Approval

NAME: Charles Adriaan Viviers

PROF. REG. NO.: 2009 700 82

DATE: 12 April 2017

SANRAL Acceptance

THIS ACCEPTANCE IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OR LIABILITY OF ANY KIND FROM WHATSOEVER CAUSE OR HOWEVER ARISING

SANRAL Project Manager — DATE

HG Fourie — 24/4/2017

SANRAL Materials Specialist — DATE

2.2 FORM D4 – SEAL DESIGN: 20 MM CAPE SEAL

SANRAL	Prepared by:	Designed by:	SEAL DESIGN	CONTRACT:	NRA N.012-090-2017/1	D4
BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Maureen Date: 01-Sep-17	Riyaaz Date: 31-Aug-17		ROUTE: SECTION: TYPE OF CONSTRUCTION:	N12 9 New : Rehabilitation : Reseal : X	2015 sheet 1 of 1

					Design Method
Road (Street)	N12 Section 9				Principal Design method : TRH3 v
Carriageway:	Single				
Lane:	LHS and RHS				Check Design method option 1: TPA
From:	km: 0.26	to	km: 2.58		
Seal Type :	20mm Single Seal with Slurry (Cape Seal)				Check Design method option 2: KZN
Binder Type :	S-E1				

Traffic				
Traffic Counts		Lane	One Way	Both Ways
Traffic Counts (Daily Average)	per lane	1750		
% Heavies		27		
Traffic Factor		1.03		
ELV / Lane / Day		11000		
Design Parameters				
Seal Period	Month start : Sep Month end : Oct			
Target Texture		1		
Existing Texture depth		0.72		
Average Ball Penetration		2.13		
Texture Treatment Yes/No? If Yes - Type?		No		
Climate Zone		3-Dry N>5		

Aggregate			Spray 1	Spray 2	Spray 3
Particulars of Aggregate					
Source			De Aar Crusher		
Type					
Nominal Size			20mm		
ALD (Measured)	mm		12.63		
ALD (Calculated)	mm		12.63		
Flakiness	%		14.1		
ACV (Dry / Wet)	%		11.6		
10% Fact (Dry / Wet)	%		320		
Polished Stone value			51		
Sand equivalent	%				
Precoating fluid type			Bitucote		
Precoating fluid rate (0.5%)	%		12 l/m³		
Application Rate	m²/m³		80		
Application Rate tolerance	m²/m³				

Binder					
			Application 1	Application 1	Application 1
Spray	l/m²		1.68		
Binder Type	pen		S-E1		
Required Cold Nett	l/m²		1.4		
Spraying Temperature	°C		175 - 185		
Recommended Rate	l/m²		1.8		
Spray rate tolerance	l/m² or %		5%		

Slurry					
Proportions per 100kg Aggregate or per m³ mix (Dry)			Texture	Layer Bottom	Top
Design Method		SABITA Manual 28		kg/m³	kg/m³
Crusher Dust type and source	(kg)	Fine/Meduim Slurry Dust		Fine/Meduim	Fine/Fine
Crusher Dust type and source	(kg)			1867	1889
Sand type and source	(kg)	De Aar Crusher			
Cement type and source	(kg)	Afrisam Cem II/B-M (L)42.5N		28	28
Emulsion type	(kg or litre*)	Anionic Stable Grade Mix 60% + 3% Latex		235	240
Water (& source)	(litre)	Portable Water		315	197
Flow of slurry	(mm)			40	40

*Delete if not applicable

Supporting documentation to be supplied with the design form

					Design Method
Road (Street)					Principal Design method : TRH3
Carriageway:					
Lane:					Check Design method option 1: TPA
From:	km:	to	km:		
Seal Type :					Check Design method option 2: KZN
Binder Type :					

Traffic				
Traffic Counts		Lane	One Way	Both Ways
Traffic Counts (Daily Average)	per lane			
% Heavies				
Traffic Factor				
ELV / Lane / Day				
Design Parameters				
Seal Period	Month start : Sep Month end : Oct			
Target Texture				
Existing Texture depth				
Average Ball Penetration				
Texture Treatment Yes/No? If Yes - Type?				
Climate Zone				

Aggregate		Spray 1	Spray 2	Spray 3
Particulars of Aggregate				
Source				
Type				
Nominal Size				
ALD (Measured)	mm			
ALD (Calculated)	mm			
Flakiness	%			
ACV (Dry / Wet)	%			
10% Fact (Dry / Wet)	%			
Polished Stone value				
Sand equivalent	%			
Precoating fluid type				
Precoating fluid rate (0.5%)	%			
Application Rate	m²/m³			
Application Rate tolerance	m²/m³			

Binder				
		Application 1	Application 1	Application 1
Spray	l/m²			
Binder Type	pen			
Required Cold Nett	l/m²			
Spraying Temperature	°C			
Recommended Rate	l/m²			

Slurry			
Proportions per 100kg Aggregate or per m³ mix (Dry)		Layer Bottom	Top
Crusher Dust type	(kg)		
Crusher Dust type	(kg)		
Sand type	(kg)		
Cement type	(kg)		
Emulsion type	(kg or litre*)		
Water	(litre)		
Flow of slurry	(mm)		

*Delete if not applicable

Consultant Approval

NAME: Charles Adriaan Viviers

PROF. REG. NO.: 2009 700 82

DATE: 04 October 2017 (Seal design) & 12 October 2017 (Slurry designs)

SANRAL Acceptance

THIS ACCEPTANCE IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OR LIABILITY OF ANY KIND FROM WHATSOEVER CAUSE OR HOWEVER ARISING

SANRAL Project Manager DATE

HG Fourie 4/10/2017

SANRAL Materials Specialist DATE

2.3 FORM D4 – SEAL DESIGN: 14 MM SINGLE SEAL

SANRAL BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: Maureen Date: 01-Sep-17	Designed by: Riyaaz Date: 31-Aug-17	**SEAL DESIGN**	CONTRACT: ROUTE: SECTION: TYPE OF CONSTRUCTION:	NRA N.012-090-2017/1 N12 9 New : Rehabilitation : Reseal : X

D4
2015
sheet
1 of 1

Road (Street)	N12 Section 9		Design Method		
Carriageway:	Single		Principal Design method :	TRH3 V	
Lane:	LHS and RHS				
From:	km: Rest Areas	to km:	Check Design method option 1:	TPA	
Seal Type :	14mm Single Seal (Cape Seal)				
Binder Type :	SC-E1		Check Design method option 2:	KZN	

Traffic				
Traffic Counts		Lane	One Way	Both Ways
Traffic Counts (Daily Average)	per lane	1750		
% Heavies		27		
Traffic Factor		1.03		
ELV / Lane / Day		12100		
Design Parameters				
Seal Period	Month start : Sep Month end : Oct			
Target Texture		N/A		
Existing Texture depth		0.85		
Average Ball Penetration		2.17		
Texture Treatment Yes/No? If Yes - Type?		No		
Climate Zone		3-Dry N>5		

Aggregate			Spray 1	Spray 2	Spray 3
Particulars of Aggregate					
Source			De Aar Crusher		
Type					
Nominal Size			14mm		
ALD (Measured)	mm		8.3		
ALD (Calculated)	mm		8.3		
Flakiness	%		12.2		
ACV (Dry / Wet)	%		11.6		
10% Fact (Dry / Wet)	%		320		
Polished Stone value			51		
Sand equivalent	%		N/A		
Precoating fluid type			Bitucote		
Precoating fluid rate (0.5%)	%		16 l/m³		
Application Rate	m²/m³		108		
Application Rate tolerance	m²/m³				

Binder			Application 1	Application 2	Application 3
Spray	l/m²		1.2		
Binder Type	pen		SC-E1		
Required Cold Nett	l/m²		0.81		
Spraying Temperature	°C		50 - 70		
Recommended Rate	l/m²		1.2		
Spray rate tolerance	l/m² or %		5%		

Slurry					
Proportions per 100kg Aggregate or per m³ mix (Dry)			Texture	Layer Bottom	Top
Design Method		SABITA Manual 28		kg/m³	kg/m³
Crusher Dust type and source	(kg)	Fine/Meduim Slurry Dust		Fine/Meduim	Fine/Fine
Crusher Dust type and source	(kg)			1867	1889
Sand type and source	(kg)	De Aar Crusher			
Cement type and source	(kg)	Afrisam Cem II/B-M (L)42.5N		28	28
Emulsion type	(kg or litre*)	Anionic Stable Grade Mix 60%		235	240
Water (& source)	(litre)	Potable Water		315	197
Flow of slurry	(mm)			40	40

*Delete if not applicable

Supporting documentation to be supplied with the design form

Road (Street)	N12 Section 9		Design Method		
Carriageway:	Single		Principal Design method :	TRH3 V	
Lane:	LHS and RHS				
From:	km: 3.88	to km: 30.80	Check Design method option 1:	TPA	
Seal Type :	14mm Single Seal with Fog Spray				
Binder Type :	S-R1		Check Design method option 2:	KZN	

Traffic				
Traffic Counts		Lane	One Way	Both Ways
Traffic Counts (Daily Average)	per lane	1750		
% Heavies		27		
Traffic Factor		1.03		
ELV / Lane / Day		11000		
Design Parameters				
Seal Period	Month start : Sep Month end : Oct			
Target Texture		0.7		
Existing Texture depth		0.85		
Average Ball Penetration		2.22		
Texture Treatment Yes/No? If Yes - Type?		No		
Climate Zone		3-Dry N>5		

Aggregate			Spray 1	Spray 2	Spray 3
Particulars of Aggregate					
Source			De Aar Crusher		
Type					
Nominal Size			14mm		
ALD (Measured)	mm		8.3		
ALD (Calculated)	mm		8.3		
Flakiness	%		12.2		
ACV (Dry / Wet)	%		11.6		
10% Fact (Dry / Wet)	%		320		
Polished Stone value			51		
Sand equivalent	%		N/A		
Precoating fluid type			Bitucote		
Precoating fluid rate (0.5%)	%		16 l/m³		
Application Rate	m²/m³		100		
Application Rate tolerance	m²/m³				

Binder			Application 1	Application 2	Application 3
Spray	l/m²		1.6	0.8	
Binder Type	pen		SR-1	CAT60	
Required Cold Nett	l/m²		1.48	0.12	
Spraying Temperature	°C		195 - 210	60	
Recommended Rate	l/m²		1.9	0.8	

Slurry				
Proportions per 100kg Aggregate or per m³ mix (Dry)			Layer Bottom	Top
Crusher Dust type	(kg)			
Crusher Dust type	(kg)			
Sand type	(kg)			
Cement type	(kg)			
Emulsion type	(kg or litre*)			
Water	(litre)			
Flow of slurry	(mm)			

*Delete if not applicable

Consultant Approval

NAME: Charles Adriaan Viviers

PROF. REG. NO.: 2009 700 82

DATE: 24 September 2017

SANRAL Acceptance

THIS ACCEPTANCE IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OR LIABILITY OF ANY KIND FROM WHATSOEVER CAUSE OR HOWEVER ARISING

SANRAL Project Manager DATE

H G FOURIE 27/9/2017

SANRAL Materials Specialist DATE

2.4 FORM D4 – SEAL DESIGN: 10 MM ARMOUR SEAL

SANRAL
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by:	Designed by:
R Isaacs	R Viviers
Date: 16 / 02 / 2017	Date: 14 / 02 / 2017

SEAL DESIGN

CONTRACT: NRA N.012-090-2017/1
ROUTE: National Route 12
SECTION: Section 9 Between Hopetown (km0.15) and Chalk Farm (km30.80)
TYPE OF CONSTRUCTION: New : / Rehabilitation : / Reseal : X

Form **D4** 2015 sheet 1 of 1

				Design Method	
Road (Street)	National Route 12 - Section 9			Principal Design method :	TRH3
Carriageway:	Single				
Lane:	Both			Check Design method option 1:	TPA
From:	km: 0.15	to	km: 30.80		
Seal Type :	10mm Armouring Seal on Emulsion Treated Base (ETB) with AC-E1 modified slurry				
Binder Type :	SC - E1 (70%)			Check Design method option 2:	KZN

Traffic		Lane	One Way	Both Ways
Traffic Counts				
Traffic Counts (Daily Average)	per lane	1750		
% Heavies		27		
Traffic Factor		1.03		
ELV / Lane / Day		12100		
Design Parameters				
Seal Period	Month start : January 2017	Month end : July 2017		
Target Texture		0.7		
Existing Texture depth		0.5		
Average Ball Penetration		1.9		
Texture Treatment Yes/No? If Yes - Type?		No		
Climate Zone		Dry		

Aggregate		Spray 1	Spray 2	Spray 3
Particulars of Aggregate		Kimcrush		
Source		Dolerite		
Type		10		
Nominal Size	mm	-		
ALD (Measured)	mm	6.2		
ALD (Calculated)	mm	16.3		
Flakiness	%	10.1 / 9.5		
ACV (Dry / Wet)	%	336 / 423		
10% Fact (Dry / Wet)	%	47		
Polished Stone value		-		
Sand equivalent	%	Bitucote		
Precoating fluid type		12		
Precoating fluid rate (0.5%)	%	180 - 200		
Application Rate	m²/m³	10		
Application Rate tolerance	m²/m³			

Binder		Application 1	Application 1	Application 1
Spray	l/m²	1.29		
Binder Type	pen	SC - E1		
Required Cold Nett	l/m²	0.895		
Spraying Temperature	°C	50 - 70		
Recommended Rate	l/m²	1.29		
Spray rate tolerance	l/m² or %	10%		

Slurry			Layer	
Proportions per 100kg Aggregate or per m³ mix (Dry)		Texture	Bottom	Top
Design Method		SABITA MANUAL 28		
Crusher Dust type and source	(kg)	Fine - Medium Grade - Kimcrush Quarry	1947	
Crusher Dust type and source	(kg)		-	
Sand type and source	(kg)		-	
Cement type and source	(kg)	Afrisam CEMII -42,5N	29	
Emulsion type	(kg or litre*)	AC - E1 - Polymer Modified Bitumen (Colpave COLAS)	233	
Water (& source)	(litre)	Municipal Supply - Hopetown	171	
Flow of slurry	(mm)		30 - 40	

*Delete if not applicable

Supporting documentation to be supplied with the design form

				Design Method	
Road (Street)				Principal Design method :	TRH3
Carriageway:					
Lane:				Check Design method option 1:	TPA
From:	km:	to	km:		
Seal Type :					
Binder Type :				Check Design method option 2:	KZN

Traffic		Lane	One Way	Both Ways
Traffic Counts				
Traffic Counts (Daily Average)	per lane			
% Heavies				
Traffic Factor				
ELV / Lane / Day				
Design Parameters				
Seal Period	Month start :	Month end :		
Target Texture				
Existing Texture depth				
Average Ball Penetration				
Texture Treatment Yes/No? If Yes - Type?				
Climate Zone				

Aggregate		Spray 1	Spray 2	Spray 3
Particulars of Aggregate				
Source				
Type				
Nominal Size				
ALD (Measured)	mm			
ALD (Calculated)	mm			
Flakiness	%			
ACV (Dry / Wet)	%			
10% Fact (Dry / Wet)	%			
Polished Stone value				
Sand equivalent	%			
Precoating fluid type				
Precoating fluid rate (0.5%)	%			
Application Rate	m²/m³			
Application Rate tolerance	m²/m³			

Binder		Application 1	Application 1	Application 1
Spray	l/m²			
Binder Type	pen			
Required Cold Nett	l/m²			
Spraying Temperature	°C			
Recommended Rate	l/m²			

Slurry		Layer	
Proportions per 100kg Aggregate or per m³ mix (Dry)		Bottom	Top
Crusher Dust type	(kg)		
Crusher Dust type	(kg)		
Sand type	(kg)		
Cement type	(kg)		
Emulsion type	(kg or litre*)		
Water	(litre)		
Flow of slurry	(mm)		

*Delete if not applicable

Consultant Approval

NAME: Charles Adriaan Viviers

PROF. REG. NO.: 2009 700 82

DATE: 03 March 2017

SANRAL Acceptance

THIS ACCEPTANCE IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OR LIABILITY OF ANY KIND FROM WHATSOEVER CAUSE OR HOWEVER ARISING

SANRAL Project Manager — DATE

H G FOURIE — SANRAL Materials Specialist — 3/3/2017 DATE

2.5 FORM D4 – SEAL DESIGN: TEXTURE SLURRY SEAL

SANRAL
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by:	Designed by:
R Isaacs	R Viviers
Date:	Date:
24 / 11 / 2016	22 / 11 / 2016

SEAL DESIGN

CONTRACT: NRA N.012-090-2017/1
ROUTE: National Route 12
SECTION: Section 9 Between Hopetown (km0.15) and Chalk Farm (km30.80)
TYPE OF CONSTRUCTION: New : / Rehabilitation : / Reseal : X

Form **D4** 2015 sheet 1 of 1

				Design Method	
Road (Street)	National Route 12 - Section 9				
Carriageway:	Single			Principal Design method :	SABITA 28
Lane:	Both				
From:	km: 0.15	to	km: 30.80	Check Design method option 1:	
Seal Type :	TEXTURE SLURRY				
Binder Type :	SS60 - Anionic Stable Grade Emulsion (TOSAS)			Check Design method option 2:	

Traffic				
Traffic Counts		Lane	One Way	Both Ways
Traffic Counts (Daily Average)	per lane	1750		
% Heavies		27		
Traffic Factor		1.03		
ELV / Lane / Day		12100		
Design Parameters				
Seal Period	Month start : Month end :			
Target Texture				
Existing Texture depth				
Average Ball Penetration				
Texture Treatment Yes/No? If Yes - Type?				
Climate Zone				

Aggregate				
Particulars of Aggregate		Spray 1	Spray 2	Spray 3
Source				
Type				
Nominal Size				
ALD (Measured)	mm			
ALD (Calculated)	mm			
Flakiness	%			
ACV (Dry / Wet)	%			
10% Fact (Dry / Wet)	%			
Polished Stone value				
Sand equivalent	%			
Precoating fluid type				
Precoating fluid rate (0.5%)	%			
Application Rate	m²/m³			
Application Rate tolerance	m²/m³			

Binder				
		Application 1	Application 1	Application 1
Spray	l/m²			
Binder Type	pen			
Required Cold Nett	l/m²			
Spraying Temperature	°C			
Recommended Rate	l/m²			
Spray rate tolerance	l/m² or %			

Slurry				
Proportions per 100kg Aggregate or per m³ mix (Dry)			Layer	
		Texture	Bottom	Top
Design Method		SABITA MANUAL 28		
Crusher Dust type and source	(kg)	Fine - Fine Grade - KimCrush	1830	
Crusher Dust type and source	(kg)			
Sand type and source	(kg)			
Cement type and source	(kg)	Afrisam CEMII -32,5N	27	
Emulsion type	(kg or litre*)	SS60 Emulsion Anionic Stable Grade	195	
Water (& source)	(litre)	Municipal Supply - Hopetown	198	
Flow of slurry	(mm)		30 - 40	

*Delete if not applicable

Supporting documentation to be supplied with the design form

				Design Method	
Road (Street)					
Carriageway:				Principal Design method :	TRH3
Lane:					
From:	km:	to	km:	Check Design method option 1:	TPA
Seal Type :					
Binder Type :				Check Design method option 2:	KZN

Traffic				
Traffic Counts		Lane	One Way	Both Ways
Traffic Counts (Daily Average)	per lane			
% Heavies				
Traffic Factor				
ELV / Lane / Day				
Design Parameters				
Seal Period	Month start : Month end :			
Target Texture				
Existing Texture depth				
Average Ball Penetration				
Texture Treatment Yes/No? If Yes - Type?				
Climate Zone				

Aggregate				
Particulars of Aggregate		Spray 1	Spray 2	Spray 3
Source				
Type				
Nominal Size				
ALD (Measured)	mm			
ALD (Calculated)	mm			
Flakiness	%			
ACV (Dry / Wet)	%			
10% Fact (Dry / Wet)	%			
Polished Stone value				
Sand equivalent	%			
Precoating fluid type				
Precoating fluid rate (0.5%)	%			
Application Rate	m²/m³			
Application Rate tolerance	m²/m³			

Binder				
		Application 1	Application 1	Application 1
Spray	l/m²			
Binder Type	pen			
Required Cold Nett	l/m²			
Spraying Temperature	°C			
Recommended Rate	l/m²			

Slurry			
Proportions per 100kg Aggregate or per m³ mix (Dry)		Layer	
		Bottom	Top
Crusher Dust type	(kg)		
Crusher Dust type	(kg)		
Sand type	(kg)		
Cement type	(kg)		
Emulsion type	(kg or litre*)		
Water	(litre)		
Flow of slurry	(mm)		

*Delete if not applicable

Consultant Approval

NAME: Charles Adriaan Viviers

PROF. REG. NO.: 2009 700 82

DATE: 29 November 2016

SANRAL Acceptance

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SANRAL Project Manager — DATE

HG Fourie — SANRAL Materials Specialist — 29/11/2016 DATE

2.6 FORM D5 – STABILIZATION DESIGN (PATCHES)

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by : R ISAACS
Date : 21/11/2016
Approved by : R VIVIERS

STABILISATION DESIGN PAVEMENTS

BITUMEN STABILISED MIX DESIGN

Contract : NRA N.012-090-2017/1
Route : National Route N12
Section : Section 9 Beween Hopetown (km0.15) and Chalk Farm (km30.80)
Layer : Base layer
BSM Classification : 50% G2 Crushed Dolerite + 50% insitu + Cement + Emulsion

Form **D5 (BSM)** 2015
1 of 1
Revision #

Materials Data

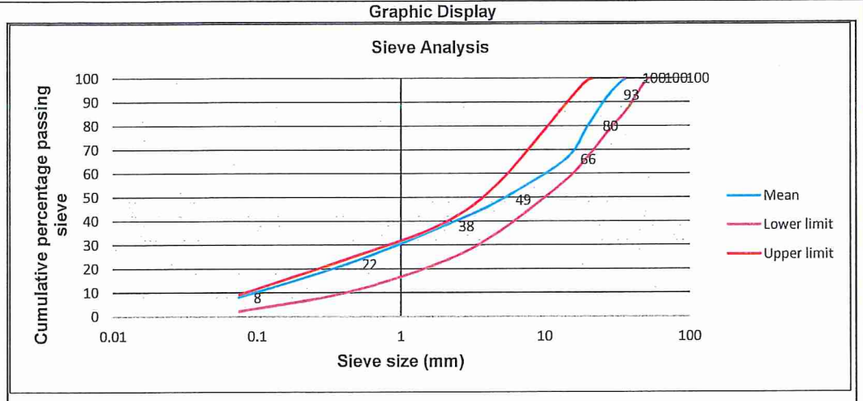
Sources		(1) KIMCRUSH - KIMBERLEY				(2) INSITU BASE + SUBBASE LAYER				Stockpile (No./Km)		QUARRY	
Description		50% (G2 CRUSHED DOLERITE) + 50% INSITU BASE & SUBBASE											
Bitumen		1% ANIONIC 60% STABLE GRADE EMULSION											
Filler		1% CEMENT - AFRISAM CEMII / B-M (L) 42.5N											
Before Treatment													
Properties		Sieve Analysis (% passing)											
Sources		75	53	37.5	28.0	20	14.0	5.0	2.0	0.425	0.075	GM	ICL
(1)	014 / 3418 (G2)	100	100	100	96	81	74	50	30	15	5.0	2.5	0.260
(2)													
(3) Mixture Ratio of (1) & (2) :- 50:50		100	100	100	93	80	66	49	38	22	8.0	2.320	0.385
Specification Lower Limit				87	78	67	57	36	23	10	2.0		
Specification Upper Limit				100	100	99	89	57	39	24	9		

Source	(3) 50% G2 + 50% INSITU			EFFECT OF ACTIVE FILLER (Pre-Level 1)			
MAASHTO-MDD (kg/m³)	2228			All mixes with1.0% bitumen		0%	1% Cement	1% Lime
OMC (%)	6.3			Testing carried out on 100mm diameter specimens using Level 1 test procedure	ITS dry (kPa)	89	104	91
ICL	0,385				ITS wet (kPa)	61	92	67
LL / PI / LS	26	6	3		TSR (%)	69	89	74
CBR @ 98% / 9/55 / 93%	86	52	37		Decision	Cement selected as active filler		

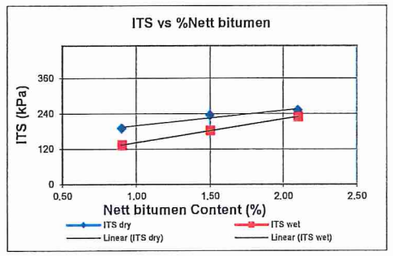
Mix Design Report - Level 1			
Nett bitumen added (%)	0.90	1.5	2.10
Type and percentage filler added (%)	1.0% Cement	1.0% Cement	1.0% Cement
Moulding moisture content (%)	6.2	6.3	6.3
ITS dry (kPa)	**189**	**234**	**251**
Moisture content at break (%)	1.9	2.1	2
Dry Density (kg/m³)			
ITS wet (kPa)	**133**	**182**	**229**
Moisture content at break (%)	5.9	6.1	5.8
Dry Density (kg/m³)			
Mix Design Report - Level 2			
Nett bitumen added (%)	0.9% (1.5%*)	1.5% (2.5%*)	2.1% (3.5%*)
Type and percentage filler added (%)	1.0% Cement	1.0% Cement	1.0% Cement
Moulding moisture content (%)	6.2	6.3	6.3
ITS equilibrium (kPa)	**142**	**216**	**256**
Moisture content at break (%)	2.1	1.9	2.2
Dry Density (kg/m³)	2353	2302	2269
ITS soaked (kPa)	**124**	**149**	**169**
Moisture content at break (%)	6.0	6.0	5.9
Dry Density (kg/m³)	2317	2301	2266
Mix Design Report - Level 3 Triaxial			
Compaction effort			
Nett bitumen added (%)			
Type and percentage filler added (%)			
Average diameter (mm)			
Average height (mm)			
Moulding moisture content (%)			
Dry Density (kg/m³)			
Applied confining Stress (σ3) (kPa)			
Applied failure load (kN)			
Applied failure Stress (kPa)			
Major Principle Stress at failure (σ1.f) (kPa)			
Cohesion (C) (kPa)			
Internal angle of friction (φ) (°)			

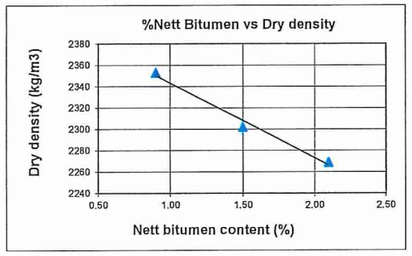
Notes :
1) Addition of 2.5% Emulsion + 1% cement meets the TG2 (2009) specified requirements for BSM 1
2) Level 3 Not done on this sample
3) * % Emulsion added

Graphic Display

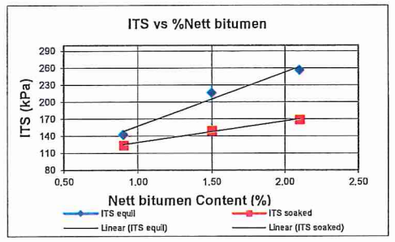


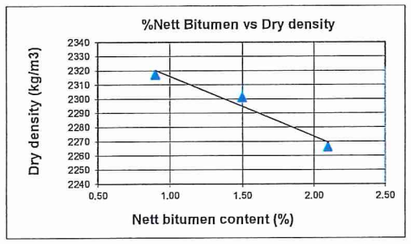
Level 1





Level 2





Proposal

Sources :	50% Crushed Dolerite +50% insitu-Base &Subbase (KIMCRUSH QUARRY & ROAD)
Materials :	50% Crushed Dolerite +50% insitu-Base &Subbase + 1% Cement + 2.8% Emulsion
Bitumen added :	2.5 % Emulsion - 60% Anionic Stable Grade Emulsion
% Filler per Mass :	1% CEMENT - AFRISAM CEMII / B-M (L) 42.5N
MDD of Treated Mixture :	2287 kg/m³ Treated
OMC of Treated Mixture :	6,90%
Compaction Moisture :	6,90%
Target :	Bitumen Emulsion Treated Materials - BSM1
Cohesion (kPa) :	> 250 kPa
Friction Angle (°) :	> 40 °
ITS dry :	> 225 (kPa)
ITS wet :	> 100 (kPa)

Consultant Approval

NAME: Charles Adriaan Viviers

PROF. REG. NO.: 2009 700 82

DATE: 25 November 2016

SANRAL Acceptance

THIS ACCEPTANCE IS FOR PROCEDURAL AND ADMINISTRATIVE REVIEW PURPOSES ONLY AND DOES NOT ATTRACT LEGAL LIABILITY OR LIABILITY OF ANY KIND FROM WHATSOEVER CAUSE OR HOWEVER ARISING

SANRAL Project Manager DATE

HG Fourie 25/11/2016

SANRAL Materials Specialist DATE

SECTION 3 – NON CONFORMING WORK

SECTION 2: NON-CONFORMING WORK

Nothing to report

SECTION 4 – LAYERWORKS COMPLETION SCHEDULE

4.1 FORM AB1 – BASE PATCH LAYERWORKS COMPLETION SCHEDULE

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by :
Maureen
Date:
20-Jun-17

Approved by:
Ian
Date:
23-Nov-17

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.012-090-2017/1
Route : N12
Section : 9
Carriageway : SINGLE
From : 0.15 to 30.80

Form
AB 1
(02 / 2015)
Sheet no. 1 of 4

Lane	Pos. of Layers	0 0.2 0.4 0.6 0.8 1 1.2 1.4 1.6 1.8 2
LHS		
	Shoulder	
	Lane	BP1A
RHS	Lane	BP2 BP5 BP164
	Shoulder	BP1B BP3 BP4
Lane	Pos. of Layers	2 2.2 2.4 2.6 2.8 3 3.2 3.4 3.6 3.8 4
LHS		
	Shoulder	
	Lane	BP6 BP7A BP7B BP8
RHS	Lane	
	Shoulder	
Lane	Pos. of Layers	4 4.2 4.4 4.6 4.8 5 5.2 5.4 5.6 5.8 6
LHS		
	Shoulder	
	Lane	BP161 BP13
RHS	Lane	BP9 BP10 BP14 BP14A
	Shoulder	
Lane	Pos. of Layers	6 6.2 6.4 6.6 6.8 7 7.2 7.4 7.6 7.8 8
LHS		
	Shoulder	
	Lane	BP17 BPA BP2 BP1 BP29 BP4
RHS	Lane	BP15 BP16 BP19A BP19 BP20 BP22 BP26 BP28 BP30
	Shoulder	

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by : Maureen Date: 20-Jun-17

Approved by: Ian Date: 23-Nov-17

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.012-090-2017/1
Route : N12
Section : 9
Carriageway : SINGLE
From : 0.15 to 30.80

Form **AB 1** (02 / 2015)

Sheet no. 2 of 4

Lane	Pos. of Layers	8	8.2	8.4	8.6	8.8	9	9.2	9.4	9.6	9.8	10
LHS												
	Shoulder											
	Lane			BP32					BP37	BP39	BP40 BP41	BP43 BP44 BP44 BP157
RHS	Lane		BP31		BP33 BP34		BP35 BP1		BP36	BP38	BP42	BP45 BP46 BP47
	Shoulder											

Lane	Pos. of Layers	10	10.2	10.4	10.6	10.8	11	11.2	11.4	11.6	11.8	12
LHS												
	Shoulder					BP158	BP56	BP57	BP58 BP58A	BP59		
	Lane		BP44			BP54	BP56			BP60		
RHS	Lane				BP49 BP50 BP51 BP52 BP52		BP55					
	Shoulder					BP53						

Lane	Pos. of Layers	12	12.2	12.4	12.6	12.8	13	13.2	13.4	13.6	13.8	14
LHS												
	Shoulder											
	Lane			BP61		BPP2	BPP1			BP63		
RHS	Lane									BP62		
	Shoulder											

Lane	Pos. of Layers	14	14.2	14.4	14.6	14.8	15	15.2	15.4	15.6	15.8	16
LHS												
	Shoulder											
	Lane		BP2		BP64 BP1							
RHS	Lane						BP66		BP67A BP67B			
	Shoulder											

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by : Maureen Date: 20-Jun-17

Approved by: Ian Date: 23-Nov-17

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.012-090-2017/1
Route : N12
Section : 9
Carriageway : SINGLE
From : 0.15 to 30.80

Form **AB 1** (02 / 2015)

Sheet no. 3 of 4

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by : Maureen Date: 20-Jun-17

Approved by: Ian Date: 23-Nov-17

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.012-090-2017/1
Route : N12
Section : 9
Carriageway : SINGLE
From : 0.15 to 30.80

Form **AB 1** (02 / 2015)

Sheet no. 4 of 4

Lane	Pos. of Layers	24 24.2 24.4 24.6 24.8 25 25.2 25.4 25.6 25.8 26
LHS		
	Shoulder	BP141 BP143
	Lane	BP140 BP142 BP145 BP146 BP148 BP149 BP150 BP151 BP152
RHS	Lane	
	Shoulder	
Lane	Pos. of Layers	26 26.2 26.4 26.6 26.8 27 27.2 27.4 27.6 27.8 28
LHS		
	Shoulder	
	Lane	
RHS	Lane	
	Shoulder	
Lane	Pos. of Layers	28 28.2 28.4 28.6 28.8 29 29.2 29.4 29.6 29.8 30
LHS		
	Shoulder	
	Lane	BP155
RHS	Lane	BP156 BP156A
	Shoulder	
Lane	Pos. of Layers	30 30.2 30.4 30.6 30.8
LHS		
	Shoulder	
	Lane	
RHS	Lane	
	Shoulder	

SECTION 5 – LAYERWORKS: SOILS, GRAVELS AND CRUSHED STONE

5.1 FORM AB4 –BASE PATCHES

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg. No. 1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by :	Approved by :	PAVEMENT LAYERS	Contract :	NRA N.012-090-2017/1	From km	Form
Maureen Tetsoane	Ian Weston		Route :	N12	0.15	AB 4
Date 2017/10/30	Date 2017/11/23	SOILS & GRAVELS	Section : 9 / Carriageway : Single		To km	(04 / 2015)
			Layer :	Base Patches	30.80	Sheet no. 1 of 9

a	Section : (km - km)		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		10.8-18.8	
b	Lane		RHS		RHS		RHS		RHS		RHS		LHS		LHS		RHS	
c	Date placed (Lot no.)		BP49 07/07/2017		BP50 07/07/2017		BP52 07/07/2017		BP55 07/07/2017		BP46 06/07/2017		BP47 06/07/2017		BP28 06/07/2017		BP31 06/07/2017	
d	Source		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	82 / 50 / 21 / 8		82 / 50 / 21 / 8		82 / 50 / 21 / 8		82 / 50 / 21 / 8		85 / 54 / 18 / 7		85 / 54 / 18 / 7		85 / 54 / 18 / 7		85 / 54 / 18 / 7	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	4.9 / 6.4 / 0.7 / 0.7		4.9 / 6.4 / 0.7 / 0.7		4.9 / 6.4 / 0.7 / 0.7		4.9 / 6.4 / 0.7 / 0.7		3.5 / 1.4 / 1.4 / 0.7		3.5 / 1.4 / 1.4 / 0.7		3.5 / 1.4 / 1.4 / 0.7		3.5 / 1.4 / 1.4 / 0.7	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2316.33		2315.33		2344		2328.5		2178.5		2135		2381		2344	
n	Refer. OMC (%)		6.5		6.5		6.6		6.6		5.6		5.6		6.5		6.5	
o	Compaction (%)		100	0.6	100.0	0.6	102	0.6	100.7	0.6	93.4	2.4	91.55	2.4	102	2.5	100.4	2.5
a	Section : (km - km)		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8	
b	Lane		RHS		RHS		RHS		RHS		RHS		RHS		RHS		RHS	
c	Date placed (Lot no.)		BP33 06/07/2017		BP34 06/07/2017		BP35 06/07/2017		BP1 06/07/2017		BP36 06/07/2017		BP38 06/07/2017		BP42 06/07/2017		BP45 06/07/2017	
d	Source		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
h	Layer thickness (mm)		200	----	200	----	200	----	150	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	85 / 54 / 18 / 7		85 / 54 / 18 / 7		85 / 54 / 18 / 7		85 / 54 / 18 / 7		85 / 54 / 18 / 7		85 / 54 / 18 / 7		85 / 54 / 18 / 7		85 / 54 / 18 / 7	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	3.5 / 1.4 / 1.4 / 0.7		3.5 / 1.4 / 1.4 / 0.7		3.5 / 1.4 / 1.4 / 0.7		3.5 / 1.4 / 1.4 / 0.7		3.5 / 1.4 / 1.4 / 0.7		3.5 / 1.4 / 1.4 / 0.7		3.5 / 1.4 / 1.4 / 0.7		3.5 / 1.4 / 1.4 / 0.7	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2329		2331		2326.5		2326.5		2330		2329.5		2199.33		2259	
n	Refer. OMC (%)		6.5		6.5		6.5		6.5		6.6		5.6		5.6		5.6	
o	Compaction (%)		99.8	2.5	99.9	2.5	99.7	2.5	99.7	2.5	99.8	2.5	99.9	2.5	94.26	2.5	96.9	2.5
a	Section : (km - km)		7.2-10.8		7.2-10.8		14.8.18.8		14.8.18.8		14.8.18.8		14.8.18.8		14.8.18.8		14.8.18.8	
b	Lane		RHS		RHS		LHS		LHS		LHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP26 05/07/2017		BP30 05/07/2017		BP68 26/06/2017		BP69 26/06/2017		BP69 26/06/2017		BP70 26/06/2017		BP72 26/06/2017		BP75 26/06/2017	
d	Source		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS		km 34.000 RHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	88 / 58 / 21 / 7		88 / 58 / 21 / 7		76 / 43 / 16 / 19		76 / 43 / 16 / 19		76 / 43 / 16 / 19		76 / 43 / 16 / 19		76 / 43 / 16 / 19		76 / 43 / 16 / 19	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	0.7 / 0.7 / 0.7 / 0.0		0.7 / 0.7 / 0.7 / 0.0		2.8 / 4.9 / 1.4 / 1.1		2.8 / 4.9 / 1.4 / 1.1		2.8 / 4.9 / 1.4 / 1.1		2.8 / 4.9 / 1.4 / 1.1		2.8 / 4.9 / 1.4 / 1.1		2.8 / 4.9 / 1.4 / 1.1	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2360.5		2364.33		2341.33		2345		2308		2375		2424.33		2396	
n	Refer. OMC (%)		6.4		6.4		6.4		6.4		6.4		6.4		6.4		6.5	
o	Compaction (%)		99.85	0.5	100.37	0.5	99.8	2.3	100	2.3	100	2.3	101.65	2.3	100.47	2.3	103	2.3

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg.No. 1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by :	Approved by :	PAVEMENT LAYERS	Contract : NRA N.012-090-2017/1	From km 0.15	Form AB 4
Maureen Tetsoane	Ian Weston		Route : N12	To km	(04 / 2015)
Date 2017/10/30	Date 2017/11/23	SOILS & GRAVELS	Section : 9 Carriageway : Single Layer : Base Patches	30.80	Sheet no. 2 of 9

a	Section : (km - km)		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8	
b	Lane		LHS		LHS		LHS		LHS		LHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP44A 23/06/2017		BP44 23/06/2017		BPA 22/06/2017		BP2 22/06/2017		BP1 22/06/2017		BP158 22/06/2017		BP54 22/06/2017		BP 2 22/06/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean (x̄) // Std Dev. (s)		(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI (x̄)	20.0 / 5.00 / 0.425 / 0.075	76 / 43 / 16 / 19		76 / 43 / 16 / 19		81 / 42 / 15 /18		81 / 42 / 15 /18		81 / 42 / 15 /18		81 / 42 / 15 /18		81 / 42 / 15 /18		81 / 42 / 15 /18	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	2.8 / 4.9 / 1.4 / 1.1		2.8 / 4.9 / 1.4 / 1.1		0.0 / 0.7 / 0.7 / 0.4		0.0 / 0.7 / 0.7 / 0.4		0.0 / 0.7 / 0.7 / 0.4		0.0 / 0.7 / 0.7 / 0.4		0.0 / 0.7 / 0.7 / 0.4		0.0 / 0.7 / 0.7 / 0.4	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2392.25		2377.5		2369		2381		2334		2373		2346.33		2316.5	
n	Refer. OMC (%)		7.8		7.4		5.6		5.6		5.6		7.4		7.4		7.6	
o	Compaction (%)		103.475	1.3	102.7	1.3	102.4	1.1	102.9	1.1	100.9	1.1	102.65	1.1	101	1.1	99.9	1.1
a	Section : (km - km)		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8	
b	Lane		LHS		LHS		LHS		LHS		LHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP1 22/06/2017		BP39 21/06/2017		BP37 21/06/2017		BP32 21/06/2017		BP4 21/06/2017		BP29 21/06/2017		BP48 20/06/2017		BP157 20/06/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean (x̄) // Std Dev. (s)		(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI (x̄)	20.0 / 5.00 / 0.425 / 0.075	81 / 42 / 15 /18		85 / 50 / 19 / 19		85 / 50 / 19 / 19		85 / 50 / 19 / 19		85 / 50 / 19 / 19		85 / 50 / 19 / 19		84 / 54 / 23 / 21		84 / 54 / 23 / 21	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	0.0 / 0.7 / 0.7 / 0.4		4.9 / 11.3 / 4.9 / 0.8		4.9 / 11.3 / 4.9 / 0.8		4.9 / 11.3 / 4.9 / 0.8		4.9 / 11.3 / 4.9 / 0.8		4.9 / 11.3 / 4.9 / 0.8		0.7 / 2.1 / 0.7 / 0.2		0.7 / 2.1 / 0.7 / 0.2	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2336		2358.75		2370.33		2385		2333		2347		2319.5		2313.5	
n	Refer. OMC (%)		7.6		6.8		7.3		5.5		5.5		5.5		7.4		7.4	
o	Compaction (%)		100.7	1.1	101.3	1.1	101.4	1.1	102.6	1.1	100.4	1.1	101	1.1	99.9	1.1	99.65	1.1
a	Section : (km - km)		7.2-10.8		7.2-10.8		7.2-10.8		10.8-18.8		10.8-14.8		22.8-26.8		10.8-14.8		10.8-14.8	
b	Lane		LHS		LHS		LHS		RHS		RHS		RHS		LHS		LHS	
c	Date placed (Lot no.)		BP43 20/06/2017		BP41 20/06/2017		BP40 20/06/2017		BPP1 12/06/2017		BP62 09/06/2017		BP144 08/06/2017		BP1 02/06/2017		BP2 02/06/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean (x̄) // Std Dev. (s)		(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)	(x̄)	(s)
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI (x̄)	20.0 / 5.00 / 0.425 / 0.075	84 / 54 / 23 / 21		84 / 54 / 23 / 21		84 / 54 / 23 / 21						82 / 50 / 20 / 7		85 / 55 / 21 / 7		85 / 55 / 21 / 7	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	0.7 / 2.1 / 0.7 / 0.2		0.7 / 2.1 / 0.7 / 0.2		0.7 / 2.1 / 0.7 / 0.2						0.0 / 4.2 / 4.2 / 2.3		1.4 / 1.4 / 0.7 / 0.2		1.4 / 1.4 / 0.7 / 0.2	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2326		2359.5		2324.5		2324		2352.25		2298		2300		2318	
n	Refer. OMC (%)		7.2		7.1		6.9		7.7		7.4		5.5		7.6		7.3	
o	Compaction (%)		100.45	1.1	102.05	1.1	100.7	1.1	100.85	0.8	101.65	6.4	99.7	1.2	99.6	1	100.325	1

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg No. 1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by :	Approved by :
Maureen Tetsoane	Ian Weston
Date 2017/10/30	Date 2017/11/23

PAVEMENT LAYERS

SOILS & GRAVELS

Contract : NRA N.012-090-2017/1
Route : N12
Section : 9
Carriageway : Single
Layer : Base Patches

From km 0.15
To km 30.80

Form AB 4 (04 / 2015)
Sheet no. 3 of 9

a	Section : (km - km)		10.8-14.8		10.8-14.8		22.8-26.8		22.8-26.8		22.8-26.8		22.8-26.8		22.8-26.8		22.8-26.8	
b	Lane		LHS		LHS		LHS		LHS		LHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP57 02/06/2017		BP56 02/06/2017		BP150 02/06/2017		BP152 02/06/2017		BP145 24/05/2017		BP146 24/05/2017		BP149 24/05/2017		BP151 24/05/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	85 / 55 / 21 / 7		85 / 55 / 21 / 7		85 / 55 / 21 / 7		85 / 55 / 21 / 7		87 / 53 / 22 / 8		87 / 53 / 22 / 8		87 / 53 / 22 / 8		87 / 53 / 22 / 8	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	1.4 / 1.4 / 0.7 / 0.2		1.4 / 1.4 / 0.7 / 0.2		1.4 / 1.4 / 0.7 / 0.2		1.4 / 1.4 / 0.7 / 0.2		1.4 / 2.8 / 2.1 / 1.4		1.4 / 2.8 / 2.1 / 1.4		1.4 / 2.8 / 2.1 / 1.4		1.4 / 2.8 / 2.1 / 1.4	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2302		2304.5		2351		2336		2388		2341		2361		2316.33	
n	Refer. OMC (%)		7.7		7.7		7.7		7.7		6.6		6.6		6.6		6.5	
o	Compaction (%)		99.85	1	100.2	1.0	102.2	1	101.5	1.0	102.7	2.7	100.6	2.7	100.8	2.7	99.73	2.7
a	Section : (km - km)		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		10.8-14.8	
b	Lane		LHS		LHS		RHS		LHS		LHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP64 23/05/2017		BP137 23/05/2017		BP139 23/05/2017		BP140 23/05/2017		BP141 23/05/2017		BP142 23/05/2017		BP143 23/05/2017		BP58 12/05/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	86 / 56 / 22 / 8		86 / 56 / 22 / 8		86 / 56 / 22 / 8		86 / 56 / 22 / 8		86 / 56 / 22 / 8		86 / 56 / 22 / 8		86 / 56 / 22 / 8		83 / 49 / 21 / 6	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	2.1 / 0.7 / 0.7 / 0.7		2.1 / 0.7 / 0.7 / 0.7		2.1 / 0.7 / 0.7 / 0.7		2.1 / 0.7 / 0.7 / 0.7		2.1 / 0.7 / 0.7 / 0.7		2.1 / 0.7 / 0.7 / 0.7		2.1 / 0.7 / 0.7 / 0.7		0.0 / 0.7 / 0.0 / 0.0	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2346		2296		2316		2305		2309		2314		2303		2294	
n	Refer. OMC (%)		6.5		6.5		6.5		6.5		6.5		7.2		7.2		7.2	
o	Compaction (%)		101.4	1.5	99.5	1.5	100.1	0.3	99.6	0.3	99.8	0.3	100.3	0.3	99.8	0.3	99.6	1.9
a	Section : (km - km)		10.8-14.8		10.8-14.8		10.8-14.8		10.8-14.8		10.8-14.8		10.8-14.8		10.8-14.8		10.8-14.8	
b	Lane		LHS		LHS		LHS		LHS		LHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP58A 12/05/2017		BP63 12/05/2017		BP2 12/05/2017		BP59 11/05/2017		BP60 11/05/2017		BP61 11/05/2017		BPP1 10/05/2017		BP56 09/05/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	(x)	(s)
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	83 / 49 / 21 / 6		83 / 49 / 21 / 6		83 / 49 / 21 / 6								84 / 49 / 21 / 7		81 / 46 / 21 / 7	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	0.0 / 0.7 / 0.0 / 0.0		0.0 / 0.7 / 0.0 / 0.0		0.0 / 0.7 / 0.0 / 0.0								0.0 / 0.0 / 0.7 / 0.7		4.9 / 4.4 / 2.5 / 0.6	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2314		2327.33		2313.25		2325		2317		2334.6		2333.25		2332	
n	Refer. OMC (%)		7.2		7.2		5.7		6.1		6.1		6.2		5.5		5.1	
o	Compaction (%)		100.45	1.9	101.06	1.9	100.1	1.9	100.3	0.7	99.9	0.7	100.54	0.7	100.85	0.8	101.3	1

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg No 1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by :	Approved by :	PAVEMENT LAYERS	Contract :	NRA N.012-090-2017/1	From km	Form
Maureen Tetsoane	Ian Weston		Route :	N12	0.15	AB 4
Date	Date	SOILS & GRAVELS	Section :	9	To km	(04 / 2015)
2017/10/30	2017/11/23		Carriageway :	Single		Sheet no.
			Layer :	Base Patches	30.80	4 of 9

a	Section : (km - km)		10.8-14.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8	
b	Lane		LHS		RHS		RHS		RHS		RHS		RHS		RHS		RHS		RHS	
c	Date placed (Lot no.)		BP57 09/05/2017		BP105 21/04/2017		BP109 21/04/2017		BP130 21/04/2017		BPA 21/04/2017		BP92 20/04/2017		BP100 20/04/2017		BP111 11/04/2017		
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB		
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----	
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	81 / 46 / 21 / 7														89 / 50 / 21 / 7		
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	4.9 / 4.4 / 2.5 / 0.6														2.8 / 4.2 / 2.1 / 0.0		
k	UCS @ 97%																		
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	
m	Ref Density (kg / m³)		2306.5		2303		2321		2304		2329		2329		2311		2316.33		
n	Refer. OMC (%)		5.1		5.1		5.1		6.5		6.5		8		8.4		8.6		
o	Compaction (%)		99.9	1	99.9	0.6	100.7	0.6	99.7	0.6	100.8	0.6	100.43	0.8	99.4	0.8	100.13	1.4	
a	Section : (km - km)		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		
b	Lane		RHS		RHS		RHS		RHS		RHS		RHS		RHS		RHS		
c	Date placed (Lot no.)		BP112 11/04/2017		BP113 11/04/2017		BP117 11/04/2017		BP118 11/04/2017		BP119 11/04/2017		BP126 11/04/2017		BP132 11/04/2017		BP133 11/04/2017		
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB		
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----	
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	89 / 50 / 21 / 7		89 / 50 / 21 / 7		89 / 50 / 21 / 7		89 / 50 / 21 / 7		89 / 50 / 21 / 7		89 / 50 / 21 / 7		89 / 50 / 21 / 7		89 / 50 / 21 / 7		
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	2.8 / 4.2 / 2.1 / 0.0		2.8 / 4.2 / 2.1 / 0.0		2.8 / 4.2 / 2.1 / 0.0		2.8 / 4.2 / 2.1 / 0.0		2.8 / 4.2 / 2.1 / 0.0		2.8 / 4.2 / 2.1 / 0.0		2.8 / 4.2 / 2.1 / 0.0		2.8 / 4.2 / 2.1 / 0.0		
k	UCS @ 97%																		
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	
m	Ref Density (kg / m³)		2314		2327		2320.5		2315.5		2364		2320		2340		2315		
n	Refer. OMC (%)		8.6		8.6		8.6		7.6		7.6		7.6		7.6		7.6		
o	Compaction (%)		100	1.4	97.1	1.4	100.6	1.4	100.55	7.6	102.7	1.4	100.8	1.4	101.7	1.4	100.9	1.4	
a	Section : (km - km)		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		
b	Lane		RHS		RHS		RHS		RHS		RHS		RHS		RHS		RHS		
c	Date placed (Lot no.)		BP134 11/04/2017		BP135 11/04/2017		BP99 09/04/2017		BP102 09/04/2017		BP103 09/04/2017		BP104 09/04/2017		BP95 09/04/2017		BP96 09/04/2017		
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB		
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----	
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	89 / 50 / 21 / 7		89 / 50 / 21 / 7														
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	2.8 / 4.2 / 2.1 / 0.0		2.8 / 4.2 / 2.1 / 0.0														
k	UCS @ 97%																		
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	
m	Ref Density (kg / m³)		2323		2317		2318		2308		2321		2351		2321.3		2311		
n	Refer. OMC (%)		7.6		7.6		5.5		5.5		5.5		5.5		5.5		5.5		
o	Compaction (%)		100.9	1.4	100.6	1.4	99.85	1.9	99.4	1.9	100	1.9	101.3	1.9	100	1.4	99.5	1.4	

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SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg.No.1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by :	Approved by :	PAVEMENT LAYERS	Contract : NRA N.012-090-2017/1	From km 0.15	Form AB 4
Maureen Tetsoane	Ian Weston	SOILS & GRAVELS	Route : N12	To km	(04 / 2015)
Date 2017/10/30	Date 2017/11/23		Section : 9		Sheet no.
			Carriageway : Single		
			Layer : Base Patches	30.80	5 of 9

a	Section : (km - km)		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		3.88-7.2		3.88-7.2		3.88-7.2	
b	Lane		RHS		RHS		RHS		RHS		RHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP98 09/04/2017		BP104 09/04/2017		BP106 09/04/2017		BP108 09/04/2017		BP93 06/04/2017		BP23 05/04/2017		BP17 05/04/2017		BP 23 30/03/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075									79 / 46 / 20 / 6		86 / 52 / 24 / 7		86 / 52 / 24 / 7		82 / 50 / 22 / 7	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075									0		0.0 / 1.4 / 1.4 / 0.7		0.0 / 1.4 / 1.4 / 0.7		5.7 / 4.9 / 2.8 / 0.7	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2306.5		2325.5		2339.3		2303		2328		2381.5		2382		2328.2	
n	Refer. OMC (%)		5.5		5.4		5.6		5.6		7.4		7.1		7.3		7.3	
o	Compaction (%)		99.35	1.4	100.7	1.4	101.03	1.4	99.35	1.4	100.9	1.5	103.275	1.2	103	1.2	101	1.3
a	Section : (km - km)		3.88-7.2		3.88-7.2		18.8-22.8		18.8-22.8		18.8-22.8		3.88-7.2		3.88-7.2		3.88-7.2	
b	Lane		LHS		LHS		RHS		RHS		RHS		RHS		RHS		RHS	
c	Date placed (Lot no.)		BP13 30/03/2017		BP161 30/03/2017		BP90 28/03/2017		BP88 28/03/2017		BP84 28/03/2017		BP19A 24/03/2017		BP10 22/03/2017		BP14A 22/03/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	82 / 50 / 22 / 7		82 / 50 / 22 / 7		81 / 48 / 22 / 7		81 / 48 / 22 / 7		81 / 48 / 22 / 7				86 / 49 / 21 / 7		86 / 49 / 21 / 7	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	5.7 / 4.9 / 2.8 / 0.7		5.7 / 4.9 / 2.8 / 0.7		0.7 / 0.0 / 0.7 / 0. 0		0.7 / 0.0 / 0.7 / 0. 0		0.7 / 0.0 / 0.7 / 0. 0							
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2328		2321		2309.67		2342		2337		2387.5		2307		2305	
n	Refer. OMC (%)		7		7		7.3		7.4		7.4		7.4		7.4		7.4	
o	Compaction (%)		100.6	1.3	100.3	1.3	99.8	1.1	100.93	1.1	101.1	1.1	103.225	1.3	100.3	0.5	100.2	0.5
a	Section : (km - km)		3.88-7.2		3.88-7.2		3.88-7.2		3.88-7.2		3.88-7.2		3.88-7.2		3.88-7.2		26.8-30.8	
b	Lane		RHS		RHS		RHS		RHS		RHS		RHS		RHS		RHS	
c	Date placed (Lot no.)		BP14 22/03/2017		BP15 22/03/2017		BP16 22/03/2017		BP20 21/03/2017		BP19 21/03/2017		BP19A 21/03/2017		BP18 21/03/2017		BP156A 20/03/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	86 / 49 / 21 / 7		86 / 49 / 21 / 7		86 / 49 / 21 / 7		88 / 53 / 24 / 7		88 / 53 / 24 / 7		88 / 53 / 24 / 7		88 / 53 / 24 / 7		88 / 53 / 24 / 7	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075							0.7 / 0.7 / 2.1 / 1.4		0.7 / 0.7 / 2.1 / 1.4		0.7 / 0.7 / 2.1 / 1.4		0.7 / 0.7 / 2.1 / 1.4		0.7 / 0.7 / 2.1 / 1.4	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2313		2327		2316		2334		2307.67		2322.67		2314.33		2302	
n	Refer. OMC (%)		7.4		7.4		7.4		7.3		7.3		7.4		7.4		7.1	
o	Compaction (%)		100.6	0.5	101.05	0.5	100.55		100.87	0.7	99.8	0.7	100.167	0.7	99.8	0.7	99.4	1.6

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SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg.No. 1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by : **Maureen Tetsoane**
Date **2017/10/30**

Approved by : **Ian Weston**
Date **2017/11/23**

PAVEMENT LAYERS

SOILS & GRAVELS

Repeat

Contract : **NRA N.012-090-2017/1**
Route : **N12**
Section : **9**
Carriageway : **Single**
Layer : **Base Patches**

From km **0.15**
To km **30.80**

Form **AB 4** (04 / 2015)
Sheet no. 6 of 9

Repeat

a	Section : (km - km)		26.8-30.8		3.8-7.2		3.8-7.2		3.8-7.2		3.8-7.2		3.8-7.2		3.8-7.2		3.8-7.2	
b	Lane		RHS		RHS		RHS		RHS		RHS		RHS		RHS		RHS	
c	Date placed (Lot no.)		BP156 20/03/2017		BP19A 15/03/2017		BP18 15/03/2017		BP16 15/03/2017		BP15 15/03/2017		BP14 15/03/2017		BP14A 15/03/2017		BP10 15/03/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	84 / 47 / 20 / 7		82 / 48 / 14 / 5		82 / 48 / 14 / 5		82 / 48 / 14 / 5		82 / 48 / 14 / 5		82 / 48 / 14 / 5		82 / 48 / 14 / 5		82 / 48 / 14 / 5	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	0.7 / 1.4 / 1.4 / 0.7		1.4 / 2.1 / 0.0 / 0.7		1.4 / 2.1 / 0.0 / 0.7		1.4 / 2.1 / 0.0 / 0.7		1.4 / 2.1 / 0.0 / 0.7		1.4 / 2.1 / 0.0 / 0.7		1.4 / 2.1 / 0.0 / 0.7		1.4 / 2.1 / 0.0 / 0.7	
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2311		2324		2276.67		2320.5		2302		2252		2256.5		2207	
n	Refer. OMC (%)		7.1		7.2		7.2		7.2		7.2		7.2		7.4		7.4	
o	Compaction (%)		99.7	1.6	100.3	1.6	98.47	1.6	99.7	1.6	98.9	1.6	96.7	1.6	97.3	1.6	95.1	1.6
a	Section : (km - km)		3.8-7.2		3.8-7.2		3.8-7.2		3.8-7.2		0.15-2.58		18.8-22.8		18.8-22.8		18.8-22.8	
b	Lane		RHS		RHS		RHS		RHS		RHS		RHS		LHS		LHS	
c	Date placed (Lot no.)		BP9 15/03/2017		BP22 14/03/2017		BP20 14/03/2017		BP19 14/03/2017		BP4 17/02/2017		BP164 17/03/2017		BP131 17/03/2017		BP129 17/03/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	82 / 48 / 14 / 5															
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	1.4 / 2.1 / 0.0 / 0.7															
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2319.67		2377		2296		2331.75		2402		2384.5		2308		2365.5	
n	Refer. OMC (%)		7.4		7.4		7.4		7.3		7.3		7.3		7.3		7.7	
o	Compaction (%)		100	1.6	103.1	1.6	99.7	1.6	101.375	1.6	104.03	1	103.3	1	102.6	1	102.05	1.1
a	Section : (km - km)		18.8-22.8		18.8-22.8		18.8-22.8		0.15-2.58		0.15-2.58		0.15-2.58		0.15-2.58		0.15-2.58	
b	Lane		LHS		LHS		LHS		RHS		RHS		RHS		RHS		RHS	
c	Date placed (Lot no.)		BP129 13/02/2017		BP128 13/02/2017		BP123 13/03/2017		BP2 10/02/2017		BP3 10/02/2017		BP5 10/02/2017		EB8 10/02/2017		EB5 10/02/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075																
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075																
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2365.5		2400		2349		2317.5		2346.67		2388.33		2330.5		2261.5	
n	Refer. OMC (%)		7.7		7.7		7.7		7.3		7.3		7.1		7.3		7.1	
o	Compaction (%)		102.05	1.1	103.5	1.1	101.3	1.1	100.575	1.9	101.83	1.9	103.1	1.9	101.15	1.9	97.65	3.1

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SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg.No. 1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by :	Approved by :	PAVEMENT LAYERS	Contract :	NRA N.012-090-2017/1	From km	Form
Maureen Tetsoane	Ian Weston		Route :	N12	0.15	AB 4
Date 2017/10/30	Date 2017/11/23	SOILS & GRAVELS	Section :	9	To km	(04 / 2015)
			Carriageway :	Single		Sheet no.
			Layer :	Base Patches	30.80	7 of 9

a	Section : (km - km)		0.15-2.58		0.15-2.58		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8	
b	Lane		RHS		RHS		LHS		LHS		LHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP1 08/02/2017		BP6 26/01/2017		BP129 25/01/2017		BP97 24/01/2017		BP101 24/01/2017		BP107 24/01/2017		BP110 24/01/2017		BP115 24/01/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075																
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075																
k	UCS @	97%																
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2319		2312.25		2330.25		2322		2327		2329		2315		2323	
n	Refer. OMC (%)		6.3		6.4		7.2		6.3		6.3		6.3		6.3		6.3	
o	Compaction (%)		100.525	1.8	100.3	0.2	100.175	0.3	100.3	1.2	100.5	1.2	100.6	1.2	100	1.2	100.3	1.2
a	Section : (km - km)		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8	
b	Lane		LHS		LHS		LHS		LHS		LHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP116 24/01/2017		BP120 24/01/2017		BP121 24/01/2017		BP122 24/01/2017		BP123 24/01/2017		BP124 24/01/2017		BP125 24/01/2017		BP128 24/01/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075																
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075																
k	UCS @	97%																
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2317		2263		2317		2328		2315		2355		2366		2287	
n	Refer. OMC (%)		6.3		6.3		6.3		6.5		6.5		6.5		6.5		6.5	
o	Compaction (%)		100	1.2	97.7	1.2	100.0	1.2	100.1	1.2	99.5	1.2	101.25	1.2	101.7	1.2	98.3	1.2
a	Section : (km - km)		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8		18.8-22.8	
b	Lane		LHS		LHS		LHS		LHS		LHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP162 24/01/2017		BP89 23/01/2017		BP85A 23/01/2017		BP85 23/01/2017		BP86 23/01/2017		BP91 23/01/2017		BP94 23/01/2017		BP80 23/01/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075																
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075																
k	UCS @	97%																
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2386		2354		2343		2393		2317		2331		2328		2307	
n	Refer. OMC (%)		6.5		6.5		6.5		6.5		6.5		6.5		6.5		6.3	
o	Compaction (%)		102.6	1.2	101.0.75	1.3	100.6	1.3	102.7	1.3	99.5	1.3	100.1	1.3	99.95	1.3	100.5	1.4

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SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg No: 1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by :	Approved by :	PAVEMENT LAYERS	Contract : NRA N.012-090-2017/1	From km 0.15	Form AB 4 (04 / 2015)
Maureen Tetsoane	Ian Weston	SOILS & GRAVELS	Route : N12	To km	Sheet no.
Date 2017/10/30	Date 2017/11/23		Section : 9		
			Carriageway : Single		
			Layer : Base Patches	30.80	8 of 9

a	Section : (km - km)		18.8-22.8		18.8-22.8		18.8-22.8		0.15-2.58		0.15-2.58		0.15-2.58		0.15-2.58		0.15-2.58	
b	Lane		LHS		LHS		LHS		LHS		LHS		LHS		LHS		LHS	
c	Date placed (Lot no.)		BP81 21/01/2017		BP83 21/01/2017		BP85 21/01/2017		EB1 20/01/2017		EB2 20/01/2017		BP7A 20/01/2017		BP7 19/01/2017		BP8 19/01/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
h	Layer thickness (mm)		200	----	200	----	200	----	200	----	200	----	200	----	200	----	200	----
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075																
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075																
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----	NP	----
m	Ref Density (kg / m³)		2304.5		2301		2348		2150		2076		2375.33		2373.66		2393	
n	Refer. OMC (%)		6.3		6.3		6.3		7.4		7.4		7.4		6.1		6.1	
o	Compaction (%)		100.35	1.4	100.2	1.4	102.25	1.4	93.1	6.4	89.9	6.4	102.83	6.4	102.57	1.6	103.43	1.6
a	Section : (km - km)		0.15-2.58		0.15-2.58													
b	Lane		LHS		LHS													
c	Date placed (Lot no.)		BP1 18/01/2017		BP6 17/01/2017													
d	Source		km 34.000 LHS		km 34.000 LHS													
e	Mat. Class (Description)		ETB		ETB													
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem													
g	Mean ($\bar{x}$) // Std Dev. (s)		$\bar{x}$	s	$\bar{x}$	s												
h	Layer thickness (mm)		200	----	200	----												
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075			82 / 47 / 16 / 6													
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075																
k	UCS @ 97%																	
l	PI (Before / After Treat.)		NP	----	NP	----												
m	Ref Density (kg / m³)		2344.25		2254													
n	Refer. OMC (%)		7.7		7.3													
o	Compaction (%)		101.3	0.8	97.0	2.4												
a	Section : (km - km)																	
b	Lane																	
c	Date placed (Lot no.)																	
d	Source																	
e	Mat. Class (Description)																	
f	Stab. Agent and %																	
g	Mean ($\bar{x}$) // Std Dev. (s)																	
h	Layer thickness (mm)																	
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075																
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075																
k	UCS @ 97%																	
l	PI (Before / After Treat.)																	
m	Ref Density (kg / m³)																	
n	Refer. OMC (%)																	
o	Compaction (%)																	

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SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg No 1998/009584/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by :	Approved by :	PAVEMENT LAYERS	Contract :	NRA N.012-090-2017/1	From km	Form
Maureen Tetsoane	Ian Weston		Route :	N12	0.15	AB 4
Date 2017/10/30	Date 2017/11/23	SOILS & GRAVELS	Section :	9	To km	(04 / 2015)
			Carriageway :	Single		Sheet no.
			Layer :	Base Patches	30.80	9 of 9

a	Section : (km - km)		14.8-18.8		14.8-18.8		14.8-18.8		14.8-18.8		14.8-18.8		7.2-10.8		7.2-10.8		7.2-10.8	
b	Lane		RHS		RHS		RHS		RHS		RHS		RHS		RHS		RHS	
c	Date placed (Lot no.)		BP74B 13/07/2017		BP76 13/07/2017		BP77 13/07/2017		BP78 13/07/2017		BP82 13/07/2017		BP45 11/07/2017		BP46 11/07/2017		BP47 11/07/2017	
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS	
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB		ETB		ETB	
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem	
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)
h	Layer thickness (mm)		200	0	200	0	200	0	200	0	200	0	200	0	200	0	200	0
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	82 / 49 / 19 / 7		82 / 49 / 19 / 7		82 / 49 / 19 / 7		82 / 49 / 19 / 7		82 / 49 / 19 / 7		85 / 54 / 20 / 8		85 / 54 / 20 / 8		85 / 54 / 20 / 8	
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	0.7 / 2.8 / 0.7 / 0.7		0.7 / 2.8 / 0.7 / 0.7		0.7 / 2.8 / 0.7 / 0.7		0.7 / 2.8 / 0.7 / 0.7		0.7 / 2.8 / 0.7 / 0.7		0.7 / 0.7 / 0 / 0		0.7 / 0.7 / 0 / 0		0.7 / 0.7 / 0 / 0	
k	UCS @	97%																
l	PI (Before / After Treat.)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
m	Ref Density (kg / m³)		2332		2332		2331		2344		2344		2344		2344		2344	
n	Refer. OMC (%)		5.4		5.4		7.5		7.5		7.5		7.5		7.5		7.5	
o	Compaction (%)		103	1.4	101.4	1.4	102.1	1.4	100.7	1.4	103.2	1.4	100.1	0.5	100.3	0.5	100.3	0.5
a	Section : (km - km)		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8		7.2-10.8					
b	Lane		RHS		RHS		RHS		RHS		RHS		RHS					
c	Date placed (Lot no.)		BP66 11/07/2017		BP67 11/07/2017		BP71 11/07/2017		BP73 11/07/2017		BP51 10/07/2017		BP42 10/07/2017					
d	Source		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS		km 34.000 LHS					
e	Mat. Class (Description)		ETB		ETB		ETB		ETB		ETB		ETB					
f	Stab. Agent and %		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem		2.8%SS60 + 1%Cem					
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)
h	Layer thickness (mm)		200	0	200	0	200	0	200	0	200	0	200	0				
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075	85 / 54 / 20 / 8		85 / 54 / 20 / 8		85 / 54 / 20 / 8		85 / 54 / 20 / 8		85 / 51 / 21 / 7		85 / 51 / 21 / 7					
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075	0.7 / 0.7 / 0 / 0		0.7 / 0.7 / 0 / 0		0.7 / 0.7 / 0 / 0		0.7 / 0.7 / 0 / 0		4.2 / 4.2 / 2.1 / 0		4.2 / 4.2 / 2.1 / 0					
k	UCS @	97%																
l	PI (Before / After Treat.)		0	0	0	0	0	0	0	0	0	0	0	0				
m	Ref Density (kg / m³)		2345		2346		2346		2346		2328		2328					
n	Refer. OMC (%)		7		6.4		6.4		6.4		7.5		7.5					
o	Compaction (%)		100	0.5	100.1	0.5	99.7	0.5	99.7	0.5	101.6	1.4	99.9	1.4				
a	Section : (km - km)																	
b	Lane																	
c	Date placed (Lot no.)																	
d	Source																	
e	Mat. Class (Description)																	
f	Stab. Agent and %																	
g	Mean ($\bar{x}$) // Std Dev. (s)		($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)	($\bar{x}$)	(s)
h	Layer thickness (mm)																	
i	SAI ($\bar{x}$)	20.0 / 5.00 / 0.425 / 0.075																
j	SAI (s)	20.0 / 5.00 / 0.425 / 0.075																
k	UCS @	97%																
l	PI (Before / After Treat.)																	
m	Ref Density (kg / m³)																	
n	Refer. OMC (%)																	
o	Compaction (%)																	

SECTION 6 – SEAL WORK

6.1 FORM AB7 – SEAL WORK COMPLETION SCHEDULE

SANRAL BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: M Tetsoane Date: 02.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 0 To km 2		FORM **AB7** (02/2015) SHEET 1 OF 16

Section (km)			0	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8	2
Date opened to traffic				01.11.2017									
Permeability (l/h)													
Type	Appt.	Strip											
Slurry	Total:	L: m m											
(kg/m²) (m²/m³)		R: m m											
and	2nd (Fine-Fine)	L: m m		(31.10.2017) m^2/m^3									
% Binder obtained	(Date)	R: m m		(25.10.2017) m^2/m^3		(26.10.2017) m^2/m^3							
	1st (Fine-Meduim)	L: m m		(24.10.2017) 172.8 m2/m3		(23.10.2017) 158.4 m^2/m^3			(24.10.2017) 172.8 m2/m3			(25.10.2017) 158.6 m2/m3	
	(Date)	R: m m		(23.10.2017) 158.4	(11.10.2017) 193.8 m2/m3			(12.10.2017) 187.4 m2/m3					
Recommended Hot appl. (l/m²)													
Design Tol // Design Tol. (l/m²)													
Total Hot Nett Obtained		m m m											
		m m m											
		m m m											
		m m m											
Final Spray	Type // Grad. // Source // Application												
	Actual obtained	LHS m m											
l/m²		LHL 3.7 m											
Cold		RHL 3.7 m											
Hot	Date / Datum	RHS m m											
Aggregate	Type // Grad. // Source // Application												
2nd layer		LHS m m											
	Actual obtained	LHL 3.7 m											
		RHL 3.7 m											
(m² / m³)		RHS m m											
2nd Spray	Type // Grad. // Source // Application												
	Actual obtained	LHS m m											
l/m²		LHL 3.7 m											
		RHL 3.7 m											
Hot	Date	RHS m m											
Aggregate	Type // Grad. // Source // Application			20mm Roadstone // Grade 1 // De Aar Crusher // 84.6 m2/m3									
1st Layer		LHS m m		(21.10.2017) 84.6 m2/m3									
	Actual obtained	LHL 3.7 m		(21.10.2017) 84.6 m2/m3		(21.10.2017) 84.6 m2/m3		(21.10.2017) 84.6 m2/m3		(21.10.2017) 84.6 m2/m3			
		RHL 3.7 m		(21.10.2017) 84.6 m2/m3	(7.10.2017) 84.6 m2/m3	(7.10.2017) 84.6 m2/m3	(07.10.2017) 84.6 m2/m3		(07.10.2017) 84.6 m2/m3		(07.10.2017) 84.6 m2/m3		
(m² / m³)		RHS m m		(21.10.2017) 84.6 m2/m3	(7.10.2017) 84.6 m2/m3		(07.10.2017) 84.6 m2/m3			(07.10.2017) 84.6 m2/m3			
1st Spray	Type // Grad. // Source // Application			S-E1 // Modified binder // Tosas // 1.7 l/m2									
	Actual obtained	LHS 1.8 m		(21.10.2017) 1.6 l/m2									
l/m²		LHL 4.2 m		(21.10.2017) 1.7 l/m2		(21.10.2017) 1.7 l/m2		(21.10.2017) 1.7 l/m2		(21.10.2017) 1.6 l/m2			
		RHL 3.7 m		(21.10.2017) 1.7 l/m2	(7.10.2017) 1.7 l/m2	(7.10.2017) 1.7 l/m2	(07.10.2017) 1.7 l/m2		(07.10.2017) 1.7 l/m2		(07.10.2017) 1.71 l/m2		
Hot	Date	RHS m m		(21.10.2017) 1.6 l/m2	(7.10.2017) 1.67 l/m2		(07.10.2017) 1.7 l/m2			(07.10.2017) 1.71 l/m2			
M C After Prime	(x /s)												
	Type // Grad. // Source // Application												
Prime	Actual obtained	m m											
		m m											
(l/m²)		m m											
	Date	m m											
M C After Prime	(x /s)												
Section (km)													

SANRAL — BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by:	Approved by:
M Tetsoane Date: 02.10.2017	I Weston Date: 23.11.2017

SEAL WORK COMPLETION SCHEDULE

Contract :	NRA N012-080-2017/1
Route :	N12
Section :	9
Carriageway:	Single
Seal Type :	Reseal

From km 2 — To km 4

FORM **AB7** (02/2015) SHEET 2 OF 16

Section (km)			2 … 2.2 … 2.4 … 2.6 … 2.8 … 3 … 3.2 … 3.4 … 3.6 … 3.8 … 4	
Date opened to traffic			01.11.2017	
Permeability (l/h)				
Type	Appt.	Strip		
Slurry	Total:	L: m m		
(kg/m²) (m²/m³)		R: m m		
and	2nd	L: m m	(31.10.2017) m^2/m^3	
% Binder obtained	(Date)	R: m m	(26.10.2017) m^2/m^3	
	1st	L: m m	(25.10.2017) 158.6 m2/m3	
	(Date)	R: m m	(13.10.2017) 204.3 m2/m3	
Recommended Hot appl. (l/m²)				
Design Tol // Design Tol. (l/m²)				
Total Hot Nett Obtained		m m m		
		m m m		
		m m m		
		m m m		
Final Spray	Type // Grad. // Source // Application			
	Actual obtained	LHS m m		(05.10.2017) 0.82 l/m2
l/m²		LHL 3.7 m		(05.10.2017) 0.86 l/m2
Cold		RHL 3.7 m		(02.10.2017) 0.79 l/m2
Hot	Date / Datum	RHS m m		(02.10.2017)0.78 l/m2
Aggregate	Type // Grad. // Source // Application			
2nd layer		LHS m m		
	Actual obtained	LHL 3.7 m		
		RHL 3.7 m		
(m² / m³)		RHS m m		
2nd Spray	Type // Grad. // Source // Application			
	Actual obtained	LHS m m		
l/m²		LHL 3.7 m		
		RHL 3.7 m		
Hot	Date	RHS m m		
Aggregate	Type // Grad. // Source // Application		20mm Roadstone // Grade 1 // De Aar Crusher // 84.6 m2/m3	
1st Layer		LHS m m	(21.10.2017) 84.6 m2/m3	
	Actual obtained	LHL 3.7 m	(21.10.2017) 84.6 m2/m3 | (21.10.2017) 84.6 m2/m3	
		RHL 3.7 m	(07.10.2017) 84.6 m2/m3 | 07.10.2017) 84.6 m2/m | 7.10.2017) 84.6 m2/m	
(m² / m³)		RHS m m	(07.10.2017) 84.6 m2/m3 | (07.10.2017) 84.6 m2/m3	
1st Spray	Type // Grad. // Source // Application		S-E1 // Modified binder // Tosas // 1.7 l/m2	
	Actual obtained	LHS m m	(21.10.2017) 1.6 l/m2	(03.10.2017) 1.9 l/m2
l/m²		LHL 3.7 m	(21.10.2017) 1.6 l/m2 | (21.10.2017) 1.6 l/m2	(03.10.2017) 1.9 l/m2
		RHL 3.7 m	(07.10.2017) 1.79 l/m2 | (07.10.2017) 1.64 l/m2 | 07.10.2017) 2.78 l/m	2.10.2017) 1.99 l/
Hot	Date	RHS m m	(07.10.2017) 1.71 l/m2 | (07.10.2017) 1.71 l/m2	2.10.2017) 1.92 l/
M C After Prime	(x /s)			
	Type // Grad. // Source // Application			
Prime	Actual obtained	m m		
		m m		
(l/m²)		m m		
	Date	m m		
M C After Prime	(x /s)			
Section (km)				

SANRAL BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: M Tetsoane Date: 27.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 4 To km 6		FORM **AB7** (02/2015) SHEET 3 OF 16

Section (km)				4 · 4.2 · 4.4 · 4.6 · 4.8 · 5 · 5.2 · 5.4 · 5.6 · 5.8 · 6
Date opened to traffic				06.10.2017
Permeability (l/h)				
Type	Appt.	Strip		
Slurry	Total:	L: m m		
(kg/m²) (m²/m³)		R: m m		
and	2nd	L: m m		
% Binder obtained	(Date)	R: m m		
	1st	L: m m		
	(Date)	R: m m		
Recommended Hot appl. (l/m²)				
Design Tol // Design Tol. (l/m²)				
		m m m		
Total Hot Nett Obtained		m m m		
		m m m		
		m m m		
Final Spray	Type // Grad. // Source // Application			30% Bitumen Emulsion // Cationic stable grade // Colas // 0.8 l/m2
	Actual obtained	LHS 3.6 m		(05.10.2017) 0.82 l/m2 · 13.10.2017) 0.805 l/m
l/m²		LHL 2.1 m		(05.10.2017) 0.86 l/m2 · 13.10.2017) 0.81 l/m
Cold		RHL 2.1 m		(02.10.2017) 0.79 l/m2 · (16.10.2017) 0.76 l/m2
Hot	Date / Datum	RHS 3.6 m		(02.10.2017) 0.78 l/m2 · (16.10.2017) 0.79 l/m2
Aggregate	Type // Grad. // Source // Application			
2nd layer		LHS m m		
	Actual obtained	LHL 3.7 m		
		RHL 3.7 m		
(m² / m³)		RHS m m		
2nd Spray	Type // Grad. // Source // Application			
	Actual obtained	LHS m m		
l/m²		LHL 3.7 m		
		RHL 3.7 m		
Hot	Date	RHS m m		
Aggregate	Type // Grad. // Source // Application			14mm Roadstone // Grade 1 // De Aar Crusher // 118.4 m2/m3
1st Layer		LHS m m		(03.10.2017) 118.4 m2/m3 · (03.10.2017) 118.4 m2/m3 · (03.10.2017) 118.4 m2/m3 · .10.2017) 118.4 m2/
	Actual obtained	LHL 3.7 m		(03.10.2017) 118.4 m2/m3 · (03.10.2017) 118.4 l/m2 · (03.10.2017) 118.4 m2/m3 · (03.10.2017) 118.4 m2/m3 · (03.10.2017) 118.4 m2/m3 · (03.10.2017) 118.4 m2/m3 · .10.2017) 1118.4 m2
		RHL 3.9 m		(02.10.2017) 118.4 m2/m3 · (02.10.2017) 118.4 m2/m3 · (29.09.2017) 118.4 m2/m3 · (29.09.2017) 118.4 m2/m3 · (29.09.2017) 118.4 m2/m3 · 3.10.2017) 118.4 m2/
(m² / m³)		RHS 2.1 m		(02.10.2017) 118.4 m2/m3 · (02.10.2017) 118.4 m2/m3 · (29.09.2017) 118.4 m2/m3 · (29.09.2017) 118.4 m2/m3 · (02.10.2017) 118.4 m2/m3 · 3.10.2017) 118.4 m2/
1st Spray	Type // Grad. // Source // Application			S-R1 // Bitumen Rubber // Tosas // 1.9 l/m2
	Actual obtained	LHS m m		(03.10.2017) 1.9 l/m2 · (03.10.2017) 1.9 l/m2 · (03.10.2017) 1.9 l/m2 · 11.10.2017) 1.89 l/m
l/m²		LHL 3.7 m		(03.10.2017) 1.9 l/m2 · (03.10.2017) 2.0 l/m2 · (03.10.2017) 1.9 l/m2 · (03.10.2017) 1.9 l/m2 · (03.10.2017) 1.9 l/m2 · (03.10.2017) 1.9 l/m2 · (11.10.2017) 1.9 l/m2
		RHL 3.7 m		(02.10.2017) 1.99 l/m2 · (02.10.2017) 1.94 l/m2 · (29.09.2017) 1.92 l/m2 · (29.09.2017) 1.92 l/m2 · (29.09.2017) 1.93 l/m2 · (13.10.2017) 1.9 l/m2
Hot	Date	RHS m m		(02.10.2017) 1.92 l/m2 · (02.10.2017) 1.80 l/m2 · (29.09.2017) 1.88 l/m2 · (29.09.2017) 1.92 l/m2 · (02.10.2017) 1.976 l/m2 · (13.10.2017) 1.9 l/m2
M C After Prime	(x /s)			
	Type // Grad. // Source // Application			
Prime	Actual obtained	m m		
		m m		
(l/m²)		m m		
	Date	m m		
M C After Prime	(x /s)			
Section (km)				4 · 4.2 · 4.4 · 4.6 · 4.8 · 5 · 5.2 · 5.4 · 5.6 · 5.8 · 6

SANRAL — BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by:	Approved by:
M Tetsoane	I Weston
Date: 27.10.2017	Date: 23.11.2017

SEAL WORK COMPLETION SCHEDULE

Contract :	NRA N012-080-2017/1
Route :	N12
Section :	9
Carriageway:	Single
Seal Type :	Reseal

From km 6 — To km 8

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Section (km): 6 — 6.2 — 6.4 — 6.6 — 6.8 — 7 — 7.2 — 7.4 — 7.6 — 7.8 — 8

Date opened to traffic			17.10.2017
Permeability (l/h)			
Type	Appt.	Strip	
Slurry	Total:	L: m m	
(kg/m²) (m²/m³)		R: m m	
and	2nd	L: m m	
% Binder obtained	(Date)	R: m m	
	1st	L: m m	
	(Date)	R: m m	
Recommended Hot appl. (l/m²)			
Design Tol // Design Tol. (l/m²)			
		m m m	
Date opened to traffic			
Permeability (l/h)			
Type	Appt.	Strip	
Slurry	Total:	L: m m	
(kg/m²) (m²/m³)		R: m m	
and	2nd	L: m m	
% Binder obtained	(Date)	R: m m	
	1st	L: m m	
	(Date)	R: m m	
Recommended Hot appl. (l/m²)			
Design Tol // Design Tol. (l/m²)			
Total Hot Nett Obtained		m m m	
		m m m	
		m m m	
		m m m	
Final Spray	Type // Grad. // Source // Application		30% Bitumen Emulsion // Cationic stable grade // Colas // 0.8 l/m2
	Actual obtained	LHS 3.9 m	(13.10.2017) 0.81 l/m2
l/m²		LHL 2.1 m	(13.10.2017) 0.805 l/m2
Cold		RHL 2.1 m	(16.10.2017) 0.76 l/m2
Hot	Date / Datum	RHS 3.9 m	(16.10.2017) 0.79 l/m2 — (16.10.2017) 0.77 l/m2
Aggregate	Type // Grad. // Source // Application		
2nd layer		LHS m m	
	Actual obtained	LHL 3.7 m	
		RHL 3.7 m	
(m² / m³)		RHS m m	
2nd Spray	Type // Grad. // Source // Application		
	Actual obtained	LHS m m	
l/m²		LHL 3.7 m	
		RHL 3.7 m	
Hot	Date	RHS m m	
Aggregate	Type // Grad. // Source // Application		14mm Roadstone // Grade 1 // De Aar Crusher // 118.4 m2/m3
1st Layer		LHS m m	(11.10.2017) 118.4 m2/m3 — (11.10.2017) 118.4 m2/m3 — (11.10.2017) 118.4 m2/m3 — (11.10.2017) 118.4 m2/m3
	Actual obtained	LHL 3.7 m	(11.10.2017) 118.4 m2/m3 — (11.10.2017) 118.4 m2/m3 — (11.10.2017) 118.4 m2/m3 — (11.10.2017) 118.4 m2/m3
		RHL 3.7 m	(13.10.2017) 118.4 m2/m3 — (13.10.2017) 118.4 m2/m3
(m² / m³)		RHS m m	(13.10.2017) 118.4 m2/m3 — (13.10.2017) 118.4 m2/m3
1st Spray	Type // Grad. // Source // Application		S-R1 // Bitumen Rubber // Tosas // 1.9 l/m2
	Actual obtained	LHS m m	(11.10.2017) 1.89 l/m2 — (11.10.2017) 1.89 l/m2 — (11.10.2017) 1.89 l/m2 — (11.10.2017) 1.86 l/m2
l/m²		LHL 3.7 m	(11.10.2017) 1.9 l/m2 — (11.10.2017) 1.95 l/m2 — (11.10.2017) 1.9 l/m2 — (11.10.2017) 1.9 l/m2
		RHL 3.7 m	(13.10.2017) 1.9 l/m2 — (13.10.2017) 1.89 l/m2
Hot	Date	RHS m m	(13.10.2017) 1.9 l/m2 — (13.10.2017) 1.9 l/m2
M C After Prime	(x /s)		
	Type // Grad. // Source // Application		
Prime	Actual obtained	m m	
		m m	
(l/m²)		m m	
	Date	m m	
M C After Prime	(x /s)		
Section (km)			

SANRAL BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: M Tetsoane Date: 27.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 8 To km 10		FORM **AB7** (02/2015) SHEET 5 OF 16

Section (km)			8	8.2	8.4	8.6	8.8	9	9.2	9.4	9.6	9.8	10
Date opened to traffic			17.10.2017										
Permeability (l/h)													
Type	Appt.	Strip											
Slurry	Total:	L: m m											
(kg/m²) (m²/m³)		R: m m											
and	2nd	L: m m											
% Binder obtained	(Date)	R: m m											
	1st	L: m m											
	(Date)	R: m m											
Recommended Hot appl. (l/m²)													
Design Tol // Design Tol. (l/m²)													
		m m m											
Date opened to traffic													
Permeability (l/h)													
Type	Appt.	Strip											
Slurry	Total:	L: m m											
(kg/m²) (m²/m³)		R: m m											
and	2nd	L: m m											
% Binder obtained	(Date)	R: m m											
	1st	L: m m											
	(Date)	R: m m											
Recommended Hot appl. (l/m²)													
Design Tol // Design Tol. (l/m²)													
Total Hot Nett Obtained		m m m											
		m m m											
		m m m											
		m m m											
Final Spray	Type // Grad. // Source // Application		30% Bitumen Emulsion // Cationic stable grade // Colas // 0.8 l/m2										
	Actual obtained	LHS 3.6 m	(13.10.2017) 0.9 l/m2				(13.10.2017) 0.78 l/m2						
l/m²		LHL 2.1 m	(13.10.2017) 0.9 l/m2				(13.10.2017) 0.76 l/m2						
Cold		RHL 2.1 m	(16.10.2017) 0.76 l/m2										
Hot	Date / Datum	RHS 3.9 m	(16.10.2017) 0.77 l/m2										
Aggregate	Type // Grad. // Source // Application												
2nd layer		LHS m m											
	Actual obtained	LHL 3.7 m											
		RHL 3.7 m											
(m² / m³)		RHS m m											
2nd Spray	Type // Grad. // Source // Application												
	Actual obtained	LHS m m											
l/m²		LHL 3.7 m											
		RHL 3.7 m											
Hot	Date	RHS m m											
Aggregate	Type // Grad. // Source // Application		14mm Roadstone // Grade 1 // De Aar Crusher // 118.4 m2/m3										
1st Layer		LHS m m	(11.10.2017) 118.4 m2/m3		(12.10.2017) 118.4 m2/m3		(12.10.2017) 118.4 m2/m3		(12.10.2017) 118.4 m2/m3		(12.10.2017) 118.4 m2/m3		
	Actual obtained	LHL 3.7 m	(11.10.2017) 118.4 m2/m3		(12.10.2017) 118.4 m2/m3		(12.10.2017) 118.4 m2/m3		(12.10.2017) 118.4 m2/m3		(12.10.2017) 118.4 m2/m3		
		RHL 3.7 m	(13.10.2017) 118.4 m2/m3		(14.10.2017) 118.4 m2/m3		(14.10.2017) 118.4 m2/m3		(14.10.2017) 118.4 m2/m3				
(m² / m³)		RHS m m	(13.10.2017) 118.4 m2/m3		(14.10.2017) 118.4 m2/m3		(14.10.2017) 118.4 m2/m3		(14.10.2017) 118.4 m2/m3				
1st Spray	Type // Grad. // Source // Application		S-R1 // Bitumen Rubber // Tosas // 1.9 l/m2										
	Actual obtained	LHS 3.7 m	(11.10.2017) 1.86 l/m2		(12.10.2017) 1.9 l/m2		(12.10.2017) 1.9 l/m2		(12.10.2017) 1.9 l/m2		(12.10.2017) 1.9 l/m2		
l/m²		LHL 2 m	(11.10.2017) 1.9 l/m2		(12.10.2017) 1.9 l/m2		(12.10.2017) 1.89 l/m2		(12.10.2017) 1.9 l/m2		(12.10.2017) 1.9 l/m2		
		RHL 2.1 m	(13.10.2017) 1.9 l/m2		(14.10.2017) 1.81 l/m2		(14.10.2017) 1.89 l/m2		(14.10.2017) 1.9 l/m2				
Hot	Date	RHS 3.6 m	(13.10.2017) 1.89 l/m2		(14.10.2017) 1.81 l/m2		(14.10.2017) 1.9 l/m2		(14.10.2017) 1.9 l/m2				
M C After Prime		(x /s)											
	Type // Grad. // Source // Application												
Prime	Actual obtained	m m											
		m m											
(l/m²)		m m											
	Date	m m											
M C After Prime		(x /s)											
Section (km)													

SANRAL	Prepared by:	Approved by:	SEAL WORK COMPLETION SCHEDULE	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 10 To km 12		FORM AB7 (02/2015) SHEET 6 OF 16
BUILDING SOUTH AFRICA THROUGH BETTER ROADS	M Tetsoane Date: 27.10.2017	I Weston Date: 23.11.2017					

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SANRAL	Prepared by: M Tetsoane Date: 27.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 12 To km 14		FORM **AB7** (02/2015) SHEET 7 OF 16

BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Section (km)			12	12.2	12.4	12.6	12.8	13	13.2	13.4	13.6	13.8	14
Date opened to traffic			10.10.2017										
Permeability (l/h)													
Type	Appt.	Strip											
Slurry	Total:	L: m m											
(kg/m²) (m²/m³)		R: m m											
and	2nd	L: m m											
% Binder obtained	(Date)	R: m m											
	1st	L: m m											
	(Date)	R: m m											
Recommended Hot appl. (l/m²)													
Design Tol // Design Tol. (l/m²)													
Total Hot Nett Obtained		m m m											
		m m m											
		m m m											
		m m m											
Final Spray	Type // Grad. // Source // Application		30% Bitumen Emulsion // Cationic stable grade // Colas // 0.8 l/m2										
	Actual obtained	LHS 3.7 m	(05.10.2017) 0.797 l/m2					(03.10.2017) 0.805 l/m2					
l/m²		LHL 1.7 m	(05.10.2017) 0.806 l/m2					(03.10.2017) 0.83 l/m2					
Cold		RHL 2.1 m	(09.10.2017) 0.81 l/m2										
Hot	Date / Datum	RHS 3.7 m	(09.10.2017) 0.803 l/m2										
Aggregate	Type // Grad. // Source // Application												
2nd layer		LHS m m											
	Actual obtained	LHL 3.7 m											
		RHL 3.7 m											
(m² / m³)		RHS m m											
2nd Spray	Type // Grad. // Source // Application												
	Actual obtained	LHS m m											
l/m²		LHL 3.7 m											
		RHL 3.7 m											
Hot	Date	RHS m m											
Aggregate	Type // Grad. // Source // Application		14mm Roadstone // Grade 1 // De Aar Crusher // 118.4 m2/m3										
1st Layer		LHS m m	(03.10.2017) 118.4 m2/m3	(03.10.2017) 118.4 m2/m3			(03.10.2017) 118.4 m2/m3		(02.10.2017) 118.4 m2/m3			2017) 118.4	
	Actual obtained	LHL 3.7 m	(02.10.2017) 118.4 m2/m3	(02.10.2017) 118.4 m2/m3	(03.10.2017) 118.4 m2/m3		(02.10.2017) 118.4 m2/m3		(02.10.2017) 118.4 m2/m3		(02.10.2017) 118.4 m2/m3		
		RHL 3.7 m	(06.10.2017) 118.4 m2/m3		(06.10.2017) 118.4 m2/m3			06.10.2017) 118.4 m2/m	(06.10.2017) 118.4 m2/m3			06.10.2017) 118.4 m2/m3	
(m² / m³)		RHS m m	(06.10.2017) 118.4 m2/m3		(06.10.2017) 118.4 m2/m3			06.10.2017) 118.4 m2/m	(06.10.2017) 118.4 m2/m3			06.10.2017) 118.4 m2/m3	
1st Spray	Type // Grad. // Source // Application		S-R1 // Bitumen Rubber // Tosas // 1.9 l/m2										
	Actual obtained	LHS m m	(03.10.2017) 1.87 l/m2	(03.10.2017) 1.94 l/m2			(03.10.2017) 1.89 l/m2		(02.10.2017) 1.89 l/m2			.2017) 1.9	
l/m²		LHL 3.7 m	(02.10.2017) 1.94 l/m2	(02.10.2017) 1.48 l/m2	(03.10.2017) 1.94 l/m2		(02.10.2017) 1.60 l/m2		(02.10.2017) 1.97 l/m2		(02.10.2017) 1.85 l/m2		
		RHL 3.7 m	(06.10.2017) 2.08 l/m2		(06.10.2017) 1.90 l/m2			(06.10.2017) 1.90 l/m2	(06.10.2017) 1.90 l/m2			(06.10.2017) 1.90 l/m2	
Hot	Date	RHS m m	(06.10.2017) 1.9 l/m2		(06.10.2017) 1.89 l/m2			(06.10.2017) 1.90 l/m2	(06.10.2017) 1.90 l/m2			(06.10.2017) 1.90 l/m2	
M C After Prime	(x /s)												
	Type // Grad. // Source // Application												
Prime	Actual obtained	m m											
		m m											
(l/m²)		m m											
	Date	m m											
M C After Prime	(x /s)												
Section (km)													

SANRAL – BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: M Tetsoane Date: 27.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 14 To km 16		FORM **AB7** (02/2015) SHEET 8 OF 16

Section (km)			14	14.2	14.4	14.6	14.8	15	15.2	15.4	15.6	15.8	16
Date opened to traffic			10.10.2017										
Permeability (l/h)													
Type	Appt.	Strip											
Slurry	Total:	L: m m											
(kg/m²) (m²/m³)		R: m m											
and	2nd	L: m m											
% Binder obtained	(Date)	R: m m											
	1st	L: m m											
	(Date)	R: m m											
Recommended Hot appl. (l/m²)													
Design Tol // Design Tol. (l/m²)													
Total Hot Nett Obtained		m m m											
		m m m											
		m m m											
		m m m											
Final Spray	Type // Grad. // Source // Application		30% Bitumen Emulsion // Cationic stable grade // Colas // 0.8 l/m2										
	Actual obtained	LHS m m	(03.10.2017) 0.805 l/m2					(03.10.2017) 0.81 l/m2					(23.10.2017) 0.8 l/m2
l/m²		LHL 3.7 m	(03.10.2017) 0.83 l/m2					(03.10.2017) 0.806 l/m2					(23.10.2017) 0.8 l/m2
Cold		RHL 3.7 m	(09.10.2017) 0.81 l/m2										(19.10.2017) 0.795 l/m2
Hot	Date / Datum	RHS m m	(09.10.2017) 0.8 l/m2										(19.10.2017) 0.8 l/m2
Aggregate	Type // Grad. // Source // Application												
2nd layer		LHS m m											
	Actual obtained	LHL 3.7 m											
		RHL 3.7 m											
(m² / m³)		RHS m m											
2nd Spray	Type // Grad. // Source // Application												
	Actual obtained	LHS m m											
l/m²		LHL 3.7 m											
		RHL 3.7 m											
Hot	Date	RHS m m											
Aggregate	Type // Grad. // Source // Application		14mm Roadstone // Grade 1 // De Aar Crusher // 118.4 m2/m3										
1st Layer		LHS m m	(02.10.2017) 118.4 m2/m3					(02.10.2017) 118.4 m2/m3			(02.10.2017) 118.4 m2/m3		(20.10.2017) 118.4 m2/m3
	Actual obtained	LHL 3.7 m	2.10.2017) 118.4 m2/m	(02.10.2017) 118.4 m2/m3		(02.10.2017) 118.4 m2/m3		(02.10.2017) 118.4 m2/m3			(02.10.2017) 118.4 m2/m3	2017) 118.4	(20.10.2017) 118.4 m2/m3
		RHL 3.7 m	(06.10.2017) 118.4 m2/m3		(06.10.2017) 118.4 m2/m3			(06.10.2017) 118.4 m2/m3			(06.10.2017) 118.4 m2/m3		(18.10.2017) 118.4 m2/m3
(m² / m³)		RHS m m	(06.10.2017) 118.4 m2/m3		(06.10.2017) 118.4 m2/m3			(06.10.2017) 118.4 m2/m3			(06.10.2017) 118.4 m2/m3		(18.10.2017) 118.4 m2/m3
1st Spray	Type // Grad. // Source // Application		S-R1 // Bitumen Rubber // Tosas // 1.9 l/m2										
	Actual obtained	LHS 3.6 m	(02.10.2017) 1.94 l/m2					(02.10.2017) 1.93 l/m2			(02.10.2017) 3.25		(20.10.2017) 1.89 l/m2
l/m²		LHL 2.1 m	(02.10.2017) 1.85 l/m2	(02.10.2017) 1.95 l/m2		(02.10.2017) 1.90 l/m2		(02.10.2017) 1.89 l/m2			(02.10.2017) 1.90 l/m2	2/10/17 (3.42	(20.10.2017) 1.9 l/m2
		RHL 2.1 m	(06.10.2017) 1.90 l/m2		(06.10.2017) 1.9 l/m2			(06.10.2017) 1.89 l/m2			(06.10.2017) 1.89 l/m2		(18.10.2017) 1.9 l/m2
Hot	Date	RHS 3.6 m	(06.10.2017) 1.90 l/m2		(06.10.2017) 1.92 l/m2			(06.10.2017) 1.9 l/m2			(06.10.2017) 2.0 l/m2		(18.10.2017) 1.9 l/m2
M C After Prime	(x /s)												
	Type // Grad. // Source // Application												
Prime	Actual obtained	m m											
		m m											
(l/m²)		m m											
	Date	m m											
M C After Prime	(x /s)												
Section (km)													

SANRAL – BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: M Tetsoane Date: 27.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 16 To km 18		FORM **AB7** (02/2015) SHEET 9 OF 16

Section (km)			16	16.2	16.4	16.6	16.8	17	17.2	17.4	17.6	17.8	18
Date opened to traffic			24.10.2017										
Permeability (l/h)													
Type	Appt.	Strip											
Slurry	Total:	L: m m											
(kg/m²) (m²/m³)		R: m m											
and	2nd	L: m m											
% Binder obtained	(Date)	R: m m											
	1st	L: m m											
	(Date)	R: m m											
Recommended Hot appl. (l/m²)													
Design Tol // Design Tol. (l/m²)													
		m m m											
Total Hot Nett Obtained		m m m											
		m m m											
		m m m											
Final Spray	Type // Grad. // Source // Application		30% Bitumen Emulsion // Cationic stable grade // Colas // 0.8 l/m2										
	Actual obtained	LHS m m	(23.10.2017) 0.8 l/m2						(23.10.2017) 0.8 l/m2				
l/m²		LHL 3.7 m	(23.10.2017) 0.8 l/m2										
Cold		RHL 3.7 m	(19.10.2017) 0.795 l/m2										
Hot	Date / Datum	RHS m m	(19.10.2017) 0.8 l/m2										
Aggregate	Type // Grad. // Source // Application												
2nd layer		LHS m m											
	Actual obtained	LHL 3.7 m											
		RHL 3.7 m											
(m² / m³)		RHS m m											
2nd Spray	Type // Grad. // Source // Application												
	Actual obtained	LHS m m											
l/m²		LHL 3.7 m											
		RHL 3.7 m											
Hot	Date	RHS m m											
Aggregate	Type // Grad. // Source // Application		14mm Roadstone // Grade 1 // De Aar Crusher // 118.4 m2/m3										
1st Layer		LHS m m	(20.10.2017) 118.4 m2/m3		(20.10.2017) 118.4 m2/m3				(20.10.2017) 118.4 m2/m3			(20.10.2017) 118.4 m2/m3	
	Actual obtained	LHL 3.7 m	(20.10.2017) 118.4 m2/m3		(20.10.2017) 118.4 m2/m3				(20.10.2017) 118.4 m2/m3			(20.10.2017) 118.4 m2/m3	
		RHL 3.7 m	(18.10.2017) 118.4 m2/m3			(18.10.2017) 118.4 m2/m3				(18.10.2017) 118.4 m2/m3			
(m² / m³)		RHS m m	(18.10.2017) 118.4 m2/m3			(18.10.2017) 118.4 m2/m3				(18.10.2017) 118.4 m2/m3			
1st Spray	Type // Grad. // Source // Application		S-R1 // Bitumen Rubber // Tosas // 1.9 l/m2										
	Actual obtained	LHS 3.6 m	(20.10.2017) 1.89 l/m2		(20.10.2017) 1.9 l/m2				(20.10.2017) 1.9 l/m2			(20.10.2017) 1.88 l/m2	
l/m²		LHL 2.1 m	(20.10.2017) 1.9 l/m2		(20.10.2017) 1.9 l/m2				(20.10.2017) 1.9 l/m2			(20.10.2017) 1.9 l/m2	
		RHL 2.1 m	(18.10.2017) 1.9 l/m2			(18.10.2017) 1.9 l/m2				(18.10.2017) 1.9 l/m2			
Hot	Date	RHS 3.6 m	(18.10.2017) 1.9 l/m2			(18.10.2017) 1.89 l/m2				(18.10.2017) 1.89 l/m2			
M C After Prime	(x /s)												
	Type // Grad. // Source // Application												
Prime	Actual obtained	m m											
		m m											
(l/m²)		m m											
	Date	m m											
M C After Prime	(x /s)												
Section (km)													

SANRAL	Prepared by: M Tetsoane Date: 27.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 18 To km 20		FORM **AB7** (02/2015) SHEET 10 OF 16

BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Section (km)			18	18.2	18.4	18.6	18.8	19	19.2	19.4	19.6	19.8	20
Date opened to traffic			24.10.2017										
Permeability (l/h)													
Type	Appt.	Strip											
Slurry	Total:	L: m m											
(kg/m²) (m²/m³)		R: m m											
and	2nd	L: m m											
% Binder obtained	(Date)	R: m m											
	1st	L: m m											
	(Date)	R: m m											
Recommended Hot appl. (l/m²)													
Design Tol // Design Tol. (l/m²)													
Total Hot Nett Obtained		m m m											
		m m m											
		m m m											
		m m m											
Final Spray	Type // Grad. // Source // Application		30% Bitumen Emulsion // Cationic stable grade // Colas // 0.8 l/m2										
	Actual obtained	LHS 3.8 m	(23.10.2017) 0.8 l/m2										
l/m²		LHL 2.1 m	(23.10.2017) 0.8 l/m2										
Cold		RHL 2.1 m	(19.10.2017) 0.795 l/m2										
Hot	Date / Datum	RHS 3.6 m	(19.10.2017) 0.8 l/m2										
Aggregate	Type // Grad. // Source // Application												
2nd layer		LHS m m											
	Actual obtained	LHL 3.7 m											
		RHL 3.7 m											
(m² / m³)		RHS m m											
2nd Spray	Type // Grad. // Source // Application												
	Actual obtained	LHS m m											
l/m²		LHL 3.7 m											
		RHL 3.7 m											
Hot	Date	RHS m m											
Aggregate	Type // Grad. // Source // Application		14mm Roadstone // Grade 1 // De Aar Crusher // 118.4 m2/m3										
1st Layer		LHS m m	(20.10.2017) 118.4 m2/m3			(20.10.2017) 118.4 m2/m3			(20.10.2017) 118.4 m2/m3			.2017) 118.4 r	
	Actual obtained	LHL 3.7 m	(20.10.2017) 118.4 m2/m3			(20.10.2017) 118.4 m2/m3			(20.10.2017) 118.4 m2/m3			.2017) 118.4 r	
		RHL 3.7 m	.10.2017) 118.4 m2	(18.10.2017) 118.4 m2/m3			(18.10.2017) 118.4 m2/m3			(18.10.2017) 118.4 m2/m3			
(m² / m³)		RHS m m	.10.2017) 118.4 m2	(18.10.2017) 118.4 m2/m3			(18.10.2017) 118.4 m2/m3			(18.10.2017) 118.4 m2/m3			
1st Spray	Type // Grad. // Source // Application		S-R1 // Bitumen Rubber // Tosas // 1.9 l/m2										
	Actual obtained	LHS 3.6 m	(20.10.2017) 1.86 l/m2			(20.10.2017) 1.86 l/m2			(20.10.2017) 1.9 l/m2			10.2017) 1.87	
l/m²		LHL 2.1 m	(20.10.2017) 1.9 l/m2			(20.10.2017) 1.9 l/m2			(20.10.2017) 1.85 l/m2			10.2017) 1.83	
		RHL 2.1 m	18.10.2017) 1.9 l/m	(18.10.2017) 1.87 l/m2			(18.10.2017) 1.9 l/m2			(18.10.2017) 1.9 l/m2			
Hot	Date	RHS 3.6 m	8.10.2017) 1.89 l/m	(18.10.2017) 1.86 l/m2			(18.10.2017) 1.9 l/m2			(18.10.2017) 1.9 l/m2			
M C After Prime	(x /s)												
	Type // Grad. // Source // Application												
Prime	Actual obtained	m m											
		m m											
(l/m²)		m m											
	Date	m m											
M C After Prime	(x /s)												
Section (km)													

SANRAL	Prepared by: M Tetsoane Date: 27.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 20 To km 22		FORM **AB7** (02/2015) SHEET 11 OF 16

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SANRAL — BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: M Tetsoane Date: 02.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 22 To km 24		FORM **AB7** (02/2015) SHEET 12 OF 16

Section (km)			22	22.2	22.4	22.6	22.8	23	23.2	23.4	23.6	23.8	24
Date opened to traffic			15.10.2017										
Permeability (l/h)													
Type	Appt.	Strip											
Slurry	Total:	L: m m											
(kg/m²) (m²/m³)		R: m m											
and	2nd	L: m m											
% Binder obtained	(Date)	R: m m											
	1st	L: m m											
	(Date)	R: m m											
Recommended Hot appl. (l/m²)													
Design Tol // Design Tol. (l/m²)													
Total Hot Nett Obtained		m m m											
		m m m											
		m m m											
		m m m											
Final Spray	Type // Grad. // Source // Application		30% Bitumen Emulsion // Cationic stable grade // Colas // 0.8 l/m2										
	Actual obtained	LHS 3.6 m	(14.10.2017) 0.8 l/m2	(14.10.2017) 0.8 l/m2									
l/m²		LHL 2.1 m	(14.10.2017) 0.8 l/m2										
Cold		RHL 2.1 m	(12.10.2017) 0.8 l/m2							(11.10.2017) 0.8 l/m2			
Hot	Date / Datum	RHS 3.6 m	(12.10.2017) 0.79 l/m2							(11.10.2017) 0.72 l/m2			
Aggregate	Type // Grad. // Source // Application												
2nd layer		LHS m m											
	Actual obtained	LHL 3.7 m											
		RHL 3.7 m											
(m² / m³)		RHS m m											
2nd Spray	Type // Grad. // Source // Application												
	Actual obtained	LHS m m											
l/m²		LHL 3.7 m											
		RHL 3.7 m											
Hot	Date	RHS m m											
Aggregate	Type // Grad. // Source // Application		14mm Roadstone // Grade 1 // De Aar Crusher // 118.4 m2/m3										
1st Layer		LHS m m	(13.10.2017) 118.4 m2/m3			(? ? 2017) 118.4 m2/m3			(12.10.2017) 118.4 m2/m3			(12.10.2017) 118.4 m2/m3	
	Actual obtained	LHL 3.7 m	(13.10.2017) 118.4 m2/m3			(? ? 2017) 118.4 m2/m3			(12.10.2017) 118.4 m2/m3			(12.10.2017) 118.4 m2/m3	
		RHL 3.7 m	.2017) 118.4	(11.10.2017) 118.4 m2/m3		(11.10.2017) 118.4 m2/m3			(09.10.2017) 118.4 m2/m3			(09.10.2017) 118.4 m2/m3	
(m² / m³)		RHS m m	.2017) 118.4	(11.10.2017) 118.4 m2/m3		(11.10.2017) 118.4 m2/m3			(09.10.2017) 118.4 m2/m3			(09.10.2017) 118.4 m2/m3	
1st Spray	Type // Grad. // Source // Application		S-R1 // Bitumen Rubber // Tosas // 1.9 l/m2										
	Actual obtained	LHS m m	(13.10.2017) 1.9 l/m2			(? ? 2017) 1.86 l/m2			(12.10.2017) 1.9l/m2			(12.10.2017) 1.9l/m2	
l/m²		LHL 3.7 m	(13.10.2017) 1.9 l/m2			(? ? 2017) 1.88 l/m2			(12.10.2017) 1.9 l/m2			(12.10.2017) 1.8l/m2	
		RHL 3.7 m	1.10.2017) 1.89 l/	(11.10.2017) 1.9 l/m2		(11.10.2017) 1.9 l/m2			(09.10.2017) 1.9 l/m2			(09.10.2017) 1.9 l/m2	
Hot	Date	RHS m m	1.10.2017) 1.9 l/m	(11.10.2017) 1.9 l/m2		(11.10.2017) 1.9 l/m2			(09.10.2017) 1.9 l/m2			(09.10.2017) 1.9 l/m2	
M C After Prime	(x /s)												
	Type // Grad. // Source // Application												
Prime	Actual obtained	m m											
		m m											
(l/m²)		m m											
	Date	m m											
M C After Prime	(x /s)												
Section (km)													

SANRAL BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: M Tetsoane Date: 02.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 24 To km 26		FORM **AB7** (02/2015) SHEET 13 OF 16

Section (km)			24	24.2	24.4	24.6	24.8	25	25.2	25.4	25.6	25.8	26
Date opened to traffic			15.10.2017										21.10.2017
Permeability (l/h)													
Type	Appt.	Strip											
Slurry	Total:	L: m m											
(kg/m²) (m²/m³)		R: m m											
and	2nd	L: m m											
% Binder obtained	(Date)	R: m m											
	1st	L: m m											
	(Date)	R: m m											
Recommended Hot appl. (l/m²)													
Design Tol // Design Tol. (l/m²)													
		m m m											
Total Hot Nett Obtained		m m m											
		m m m											
		m m m											
Final Spray	Type // Grad. // Source // Application		30% Bitumen Emulsion // Cationic stable grade // Colas // 0.8 l/m2										
	Actual obtained	LHS 3.6 m	(14.10.2017) 0.8 l/m2										(18.10.2017) 0.802 l/m2
l/m²		LHL 2.1 m	(14.10.2017) 0.8 l/m2										(18.10.2017) 0.805 l/m2
Cold		RHL 2.1 m	(11.10.2017) 0.72 l/m2										(20.10.2017) 0.795 l/m2
Hot	Date / Datum	RHS 3.6 m	(11.10.2017) 0.8 l/m2										(20.10.2017) 0.811 l/m2
Aggregate	Type // Grad. // Source // Application												
2nd layer		LHS m m											
	Actual obtained	LHL 3.7 m											
		RHL 3.7 m											
(m² / m³)		RHS m m											
2nd Spray	Type // Grad. // Source // Application												
	Actual obtained	LHS m m											
l/m²		LHL 3.7 m											
		RHL 3.7 m											
Hot	Date	RHS m m											
Aggregate	Type // Grad. // Source // Application		14mm Roadstone // Grade 1 // De Aar Crusher // 118.4 m2/m3										
1st Layer		LHS m m	(12.10.2017) 118.4 m2/m3				(12.10.2017) 118.4 m2/m3			(12.10.2017) 118.4 m2/m3			(16.10.2017) 118.4 m2/m3
	Actual obtained	LHL 3.7 m	(12.10.2017) 118.4 m2/m3				(12.10.2017) 118.4 m2/m3			(12.10.2017) 118.4 m2/m3			(16.10.2017) 118.4 m2/m3
		RHL 3.7 m	(09.10.2017) 118.4 m2/m3				(09.10.2017) 118.4 m2/m3			(09.10.2017) 118.4 m2/m3			(19.10.2017) 118.4 m2/m3
(m² / m³)		RHS m m	(09.10.2017) 118.4 m2/m3				(09.10.2017) 118.4 m2/m3			(09.10.2017) 118.4 m2/m3			(19.10.2017) 118.4 m2/m3
1st Spray	Type // Grad. // Source // Application		S-R1 // Bitumen Rubber // Tosas // 1.9 l/m2										
	Actual obtained	LHS m m	(12.10.2017) 1.9l/m2				(12.10.2017) 1.9l/m2			(12.10.2017) 2 l/m2			(16.10.2017) 1.9 l/m2
l/m²		LHL 3.7 m	(12.10.2017) 1.8l/m2				(12.10.2017) 1.7l/m2			(12.10.2017) 1.9 l/m2			(16.10.2017) 1.9 l/m2
		RHL 3.7 m	(09.10.2017) 1.9 l/m2				(09.10.2017) 1.8 l/m2			(09.10.2017) 1.9 l/m2			(19.10.2017) 1.9 l/m2
Hot	Date	RHS m m	(09.10.2017) 1.9 l/m2				(09.10.2017) 1.8 l/m2			(09.10.2017) 1.9 l/m2			(19.10.2017) 1.9 l/m2
M C After Prime	(x /s)												
	Type // Grad. // Source // Application												
Prime	Actual obtained	m m											
		m m											
(l/m²)		m m											
	Date	m m											
M C After Prime	(x /s)												
Section (km)													

SANRAL BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: M Tetsoane Date: 02.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 26 To km 28		FORM **AB7** (02/2015) SHEET 14 OF 16

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SANRAL — BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: M Tetsoane Date: 02.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 28 To km 30		FORM **AB7** (02/2015) SHEET 15 OF 16

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SANRAL BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: M Tetsoane Date: 02.10.2017	Approved by: I Weston Date: 23.11.2017	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N012-080-2017/1 Route : N12 Section : 9 Carriageway: Single Seal Type : Reseal	From km 30 To km 32		FORM **AB7** (02/2015) SHEET 16 OF 16

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SECTION 7 – BITUMEN TESTS

7.1 FORM B5 – BITUMEN TEST RESULTS SUMMARY

SANRAL SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared By: Maureen Tetsoane Date: 8.12.2017	**BITUMEN TEST RESULTS SUMMARY**	Contract: NRA N.012-090-2017/1 Route : N12 Section : 9 Carriageway: Single From: km 0.15 to km 30.80	Form **B5** (1/2015) Sheet no 1 of 1

DATE	29.09.2017 (Arrived on site)
SV: FROM - TO	

SAMPLE No.	BASE BITUMEN (70 / 100)			
PROPERTY	SPEC	ON-SITE	OFF-SITE	
Softening Point (R&B) °C	42-51		48.2	49.2
Penetration @ 25°C,1/10mm	70-100		83	84
Viscosity @ 60°C, Pa.s			137.1	140.3
B/field Visc. @ 135°C, Pa.s	-		354.0	346.5
Ductility @ 10°C, mm	min			
Performance subjected to rolling thin film oven test:				
a) mass change, % (m/m)	max		0.058	0.044
b) viscosity @ 60°C, % of origina	max		223.6	224.2
c) ductility @ 10°C, mm	min			
d) softening point (R&B) °C	min		54.2	54.2
e) inc. in softening point, °C	max		6	5
f) retained pen, % of original	min		66.3	66.7
Spot test, % Xylene	max			

COLD-APPLIED CATIONIC MODIFIED BITUMEN				
PROPERTY		SPEC	ON-SITE	OFF-SITE
Modified Binder Content, %		min		
Viscosity @ 50°C, Saybolt Furol, sec.		min		
Residue on sieving (g/10ml)		max		
Particle charge		Positive		
Sedimentation after 60 rotations		Nil		
RECLAIMED BINDER FROM LATEX EMULSIONS				
Softening point (R&B) °C		min		
B/field Visc. @ 135°C, Pa.s		min		
Ductility @ 10°C (DIN52013)(mm)		min		
Elastic Recovery @ 10°C (%)		min		
Mod. Vialit	@ 5°C %	min		
Adhesion Test	@ 50°C %	min		

DATE	
SV: FROM - TO	

SAMPLE No.	BASE BITUMEN (/)			
PROPERTY	SPEC	ON-SITE	OFF-SITE	
Softening Point (R&B) °C	-			
Penetration @ 25°C,1/10mm	-			
Viscosity @ 60°C, Pa.s	-			
B/field Visc. @ 135°C, Pa.s	-			
Ductility @ 10°C, mm	min			
Performance subjected to rolling thin film oven test:				
a) mass change, % (m/m)	max			
b) viscosity @ 60°C, % of origina	max			
c) ductility @ 10°C, mm	min			
d) softening point (R&B) °C	min			
e) inc. in softening point, °C	max			
f) retained pen, % of original	min			
Spot test, % Xylene	max			

COLD-APPLIED CATIONIC MODIFIED BITUMEN				
PROPERTY		SPEC	ON-SITE	OFF-SITE
Modified Binder Content, %		min		
Viscosity @ 50°C, Saybolt Furol, sec.		min		
Residue on sieving (g/10ml)		max		
Particle charge		Positive		
Sedimentation after 60 rotations		Nil		
RECLAIMED BINDER FROM LATEX EMULSIONS				
Softening point (R&B) °C		min		
B/field Visc. @ 135°C, Pa.s		min		
Ductility @ 10°C (DIN52013)(mm)		min		
Elastic Recovery @ 10°C (%)		min		
Mod. Vialit	@ 5°C %	min		
Adhesion Test	@ 50°C %	min		

7.2 FORM B9(T) – BINDER RUBBER QUALITY CONTROL

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared By: Maureen Tetsoane

Date: 16.01.2018

BINDER RUBBER QUALITY CONTROL

Contract: NRA N.012-090-2017/1

Route: N12

Section: 9

Form **B9(T)** (12/2015) Sheet no 1 of 2

a	Sampling Point	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	SPECS TG1	TEST METHOD
b	Bitumen Grade	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100		
c	Supplier	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas		
d	Crude Source	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref		
e	Date Sampled	29.09.2017	02.10.2017	02.10.2017	02.10.2017	02.10.2017	03.10.2017	03.10.2017	06.10.2017	06.10.2017	06.10.2017	06.10.2017	07.10.2017	09.10.2017		
f	Field Sample No.	2136	2137	2136	2141	2137	2136	2137								
g	Lab Sample No.	2136	2137	2136	2141	2137	2136	2137								
h	Date Tested	29.09.2017	02.10.2017	02.10.2017	02.10.2017	02.10.2017	03.10.2017	03.10.2017	06.10.2017	06.10.2017	06.10.2017	06.10.2017	07.10.2017	09.10.2017		
l	Resilience (%)	18				28					27			32	13-35	MB10
j	Flow (mm)	20				30					40			35	15-70	MB12
k	Compression Recovery (%) 5 min	70.7				82.7					83.7			84.8	>70	MB11
	1 hr	68.7				80.1					80.5			81.3	>70	MB11
	4 hrs					73					75.4			76.2		MB11
	4 days	41				43.5					41.5			44.3	>25	MB11
l	Softening Point (R&B) (°C)	61.5	60.5	60.5	61.5	60.5	64	63.5	60.5	59.5	58.5	59	59	63	55-65	MB17
m	Dyn. Viscosity at Spray Temp. (cP)	35	35	30	35	30	35	36	30	21	26	23	25	38	20-40	MB13
a	Sampling Point	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	SPECS TG1	TEST METHOD
b	Bitumen Grade	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100		
c	Supplier	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas		
d	Crude Source	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref		
e	Date Sampled	07.10.2017	09.10.2017	11.10.2017	11.10.2017	11.10.2017	11.10.2017	12.10.2017	12.10.2017	12.10.2017	12.10.2017	13.10.2017	13.10.2017	14.10.2017		
f	Field Sample No.															
g	Lab Sample No.															
h	Date Tested	07.10.2017	09.10.2017	11.10.2017	11.10.2017	11.10.2017	11.10.2017	12.10.2017	12.10.2017	12.10.2017	12.10.2017	13.10.2017	13.10.2017	14.10.2017		
l	Resilience (%)							28						27	13-35	MB10
j	Flow (mm)							20						12	15-70	MB12
k	Compression Recovery (%) 5 min							84.1						88	>70	MB11
	1 hr							81.1						85.2	>70	MB11
	4 hrs							75.4						80.5		MB11
	4 days							43.5						45.1	>25	MB11
l	Softening Point (R&B) (°C)	61	62	57	59	62	61	63	62	61	60	61	63	59.5	55-65	MB17
m	Dyn. Viscosity at Spray Temp. (cP)	30	31	30	30	29	25	35	30	35	35	33	31	34	20-40	MB13

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared By: Maureen Tetsoane

Date: 16.01.2018

BINDER RUBBER QUALITY CONTROL

Contract: NRA N.012-090-2017/1

Route: N12

Section: 9

Form **B9(T)** (12/2015) Sheet no 2 of 2

a	Sampling Point	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant	Batch plant					PECS TG	TEST METHOD
b	Bitumen Grade	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100	70/100						
c	Supplier	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas	Tosas						
d	Crude Source	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref	Natref						
e	Date Sampled	13.10.2017	13.10.2017	14.10.2017	16.10.2017	16.10.2017	17.10.2017	17.10.2017	19.10.2017	20.10.2017						
f	Field Sample No.															
g	Lab Sample No.															
h	Date Tested	13.10.2017	13.10.2017	14.10.2017	16.10.2017	16.10.2017	17.10.2017	17.10.2017	19.10.2017	20.10.2017						
l	Resilience (%)							23	26	31					13-35	MB10
j	Flow (mm)							25	11	10					15-70	MB12
k	Compression Recovery (%) 5 min						80.1		84.5	84.5					>70	MB11
	1 hr						74		81.3	81.9					>70	MB11
	4 hrs						68.7		75.8	76.6						MB11
	4 days						41.1		49	48.2					>25	MB11
l	Softening Point (R&B) (°C)	62.5	60	60	62	62.5	63.5	59.5	65	68					55-65	MB17
m	Dyn. Viscosity at Spray Temp. (cP)	30	26	35	30	35	35	25	18	12					20-40	MB13

a	Sampling Point														PECS TG	TEST METHOD
b	Bitumen Grade															
c	Supplier															
d	Crude Source															
e	Date Sampled															
f	Field Sample No.															
g	Lab Sample No.															
h	Date Tested															
l	Resilience (%)														13-35	MB10
j	Flow (mm)														15-70	MB12
k	Compression Recovery (%) 5 min														>70	MB11
	1 hr														>70	MB11
	4 hrs															MB11
	4 days														>25	MB11
l	Softening Point (R&B) (°C)														55-65	MB17
m	Dyn. Viscosity at Spray Temp. (cP)														20-40	MB13

7.3 FORM B10(T) – POLYMER MODIFIED BITUMEN QUALITY CONTROL

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared By: Maureen Tetsoane

Date: 8.12.2018

POLYMER MODIFIED BITUMEN QUALITY CONTROL

Contract: NRA N012.090.2017/1

Route: N12

Section: 9

Form **B10(T)** (12/2015)

Sheet no __1___ of __1___

												UNIT	SPECIFICATIONS TG1 Elastomer Polymer		TEST METHOD
a	Type Polymer	S-E1	S-E1												
b	Sampling Point	km 34 (Stockpile)	km 34 (Stockpile)												
c	Bitumen Grade												S-E1	S-E2	
d	Supplier	Tosas	Tosas												
e	Crude Source	Natref	Natref												
f	Date Sampled	07.10.2018	21.10.2018												
g	Field Sample No.	S-E1/01	S-E1/01												
h	Lab Sample No.	S-E1/01	S-E1/01												
i	Date Tested	27.10.2018	05.12.2018												
j	Penetration @ 25°C (0.1mm)														ASTM D5/IP49
k	Elastic Recovery by Ductilometer @ 15°C (%)	72.5	71.8									%	> 50	>70	MB4
l	Stability (R&B Difference °C)											°c	max. 2		
m	Softening Point [R&B] (°C)	58.2	58.2									°c	50-60	60-80	MB17
n	Dyn. Visc. @ 135°C [Brookfield] (Pa.s)	0.195	0.195									Pa.S	≤ 0.55	≤ 0.60	MB18
o	Ductility @ 10°C (mm)												min. 1000		DIN 52013/ASTM D113
p	Flash Point											°c	≥ 230	≥ 230	ASTM D93
q	Force Ductility @ 5°C											N	Report	Report	EN 13703

		UNIT	SPECIFICATIONS TG1 Elastomer Polymer		TEST METHOD
a	Type Polymer				
b	Sampling Point				
c	Bitumen Grade		S-E1	S-E2	
d	Supplier				
e	Crude Source				
f	Date Sampled				
g	Field Sample No.				
h	Lab Sample No.				
i	Date Tested				
j	Penetration @ 25°C (0.1mm)				ASTM D5/IP49
k	Elastic Recovery by Ductilometer @ 15°C (%)	%	> 50	>70	MB4
l	Stability (R&B Difference °C)	°c	max. 2		
m	Softening Point [R&B] (°C)	°c	50-60	60-80	MB17
n	Dyn. Visc. @ 135°C [Brookfield] (Pa.s)	Pa.S	≤ 0.55	≤ 0.60	MB18
o	Ductility @ 10°C (mm)		min. 1000		DIN 52013/ASTM D113
p	Flash Point	°c	≥ 230	≥ 230	ASTM D93
q	Force Ductility @ 5°C	N	Report	Report	EN 13703

7.4 FORM B11(T) – BITUMEN EMULSION TEST RESULTS SUMMARY

SANRAL SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD — BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared By: Maureen Tetsoane Date: 16.01.2018	**BITUMEN EMULSION TEST RESULTS SUMMARY** **FOG SPRAY (CAT 30)**	Contract: NRA N012.090.2017/1 Route : N12 Section : 9 Carriageway: Single From: km 0.15 to km 30.80	Form **B 11 (T)** (1/2015) Sheet no 1 of 1

COLD-APPLIED CATIONIC BITUMEN											
PROPERTY		ON-SITE	OFF-SITE	ON-SITE	OFF-SITE	ON-SITE	OFF-SITE	ON-SITE	OFF-SITE	SPEC	TEST METHOD
DATE											
SV: FROM - TO											
Modified Binder Content, %			31		32.9					min	ASTM D244
Viscosity @ 50°c, Saybolt Furol, sec.			9		9					min	MB21
Residue on sieving (g/10ml)			0.01		0.02					max	SABS 548
Particle charge			Positive		Positive					Positive	SABS 548
Sedimentation after 60 rotations			Nil		Nil					Nil	SABS 548
RECLAIMED BINDER FROM EMULSIONS											
Penetration @ 25°C										min	ASTM D5
Softening point (R&B) °C			47.2		49.2					min	ASTM D36
B/field Visc. @ 135°C, Pa.s										min	ASTM D4402
Ductility @ 10°C (DIN52013)(mm)										min	DIN 52013
Elastic Recovery @ 10°C (%)			2.8		3.3					min	
Mod. Vialit	@ 5°C %									min	
Adhesion Test	@ 50°C %									min	

COLD-APPLIED CATIONIC BITUMEN											
PROPERTY		ON-SITE	OFF-SITE	ON-SITE	OFF-SITE	ON-SITE	OFF-SITE	ON-SITE	OFF-SITE	SPEC	TEST METHOD
DATE											
SV: FROM - TO											
Modified Binder Content, %										min	ASTM D244
Viscosity @ 50°c, Saybolt Furol, sec.										min	MB21
Residue on sieving (g/10ml)										max	SABS 548
Particle charge										Positive	SABS 548
Sedimentation after 60 rotations										Nil	SABS 548
RECLAIMED BINDER FROM EMULSIONS											
Penetration @ 25°C										min	ASTM D5
Softening point (R&B) °C										min	ASTM D36
B/field Visc. @ 135°C, Pa.s										min	ASTM D4402
Ductility @ 10°C (DIN52013)(mm)										min	DIN 52013
Elastic Recovery @ 10°C (%)										min	
Mod. Vialit	@ 5°C %									min	
Adhesion Test	@ 50°C %									min	