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

Physical Address: 48 Tambotie Avenue,
Val de Grace Pretoria
Po Box 415, Pretoria, 0001

Tel: +27(0)12 844 8000
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Reg No: 1998/009584/30

Inventory Pavement Age - Detail

Region	Western Region	**Route**	N012
Authority	SANRAL	**Section**	9
Year From	2022	**Year To**	2024
		User	Elethu Zembe

										2024 SANRAL Non Toll										
										Surface				Base Layer				Subbase Layer		
Authority	Region	Route	Road ID	Begin Description	End Description	From (km)	To (km)	Distance (km)	Original Surface	Year	Age	Type	Material	Year	Age	Type	Material	Year	Age	Type
SANRAL	Western Region	N012	N01209N	Hopetown	Orange River	0	1	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						1	2	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						2	3	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
				Orange River	The Horn	3	4	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						4	5	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						5	6	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						6	7	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						7	8	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						8	9	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
				The Horn	Witput	9	10	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						10	11	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						11	12	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						12	13	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						13	14	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						14	15	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						15	16	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						16	17	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						17	18	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						18	19	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						19	20	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						20	21	1	S1	2010	13.45	S1	27	1985	38.91	G2	11	1985	38.91	G5
						21	22	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						22	23	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
				Witput	Belmont	23	24	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						24	25	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						25	26	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						26	27	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						27	28	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						28	29	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						29	30	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						30	31	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						31	32	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						32	33	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						33	34	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						34	35	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						35	36	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						36	37	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						37	38	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						38	39	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						39	40	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						40	41	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						41	42	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						42	43	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
				Belmont	1.8 km from Driehoek	43	44	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						44	45	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						45	46	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						46	47	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						47	48	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						48	49	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						49	50	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						50	51	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						51	52	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						52	53	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						53	54	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						54	55	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						55	56	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						56	57	1	S1	2010	13.45	S1	27	1984	39.91	G2	11	1984	39.91	G5
						57	58	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						58	59	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						59	60	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						60	61	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						61	62	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5

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Region	Western Region	**Route**	N012
Authority	SANRAL	**Section**	9
Year From	2022	**Year To**	2024
		User	Elethu Zembe

						62	63	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						63	64	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						64	65	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						65	66	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						66	67	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						67	68	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						68	69	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						69	70	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						70	71	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						71	72	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						72	73	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						73	74	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
				1.8 km from Driehoek	.9 km from Doringdam	74	75	1	S1	2010	13.45	S1	27	1983	40.91	G2	11	1983	40.91	G5
						75	76	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						76	77	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						77	78	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						78	79	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						79	80	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						80	81	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						81	82	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						82	83	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						83	84	1	S1	2010	13.45	S1	27	1975	48.91	G3	12	1975	48.91	G5
						84	85	1	S1	2010	13.45	S1	27	1975	48.91	G3	12	1975	48.91	G5
						85	86	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						86	87	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						87	88	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						88	89	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						89	90	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						90	91	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						91	92	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						92	93	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						93	94	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						94	95	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
				.9 km from Doringdam	1.4 km from Ariel	95	96	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						96	97	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						97	98	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						98	99	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						99	100	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						100	101	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						101	102	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						102	103	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						103	104	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						104	105	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						105	106	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
						106	107	1	S1	2010	13.45	S1	27	1982	41.91	G2	11	1982	41.91	G5
				1.4 km from Ariel	Kimberley	107	108	1	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5
						108	109	1	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5
						109	110	1	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5
						110	111	1	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5
						111	112	1	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5
						112	113	1	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5
						113	114	1	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5
						114	115	1	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5
						115	116	1	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5
						116	117	1	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5
						117	117.467	0.467	S1	2010	13.45	S1	27	1981	42.91	G2	11	1981	42.91	G5

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:

UWP CONSULTING (PTY) LTD
P.O. BOX 46920
GLOSDERRY
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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

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Document Issue Record		
Rev. No.	Description:	Issue Date:
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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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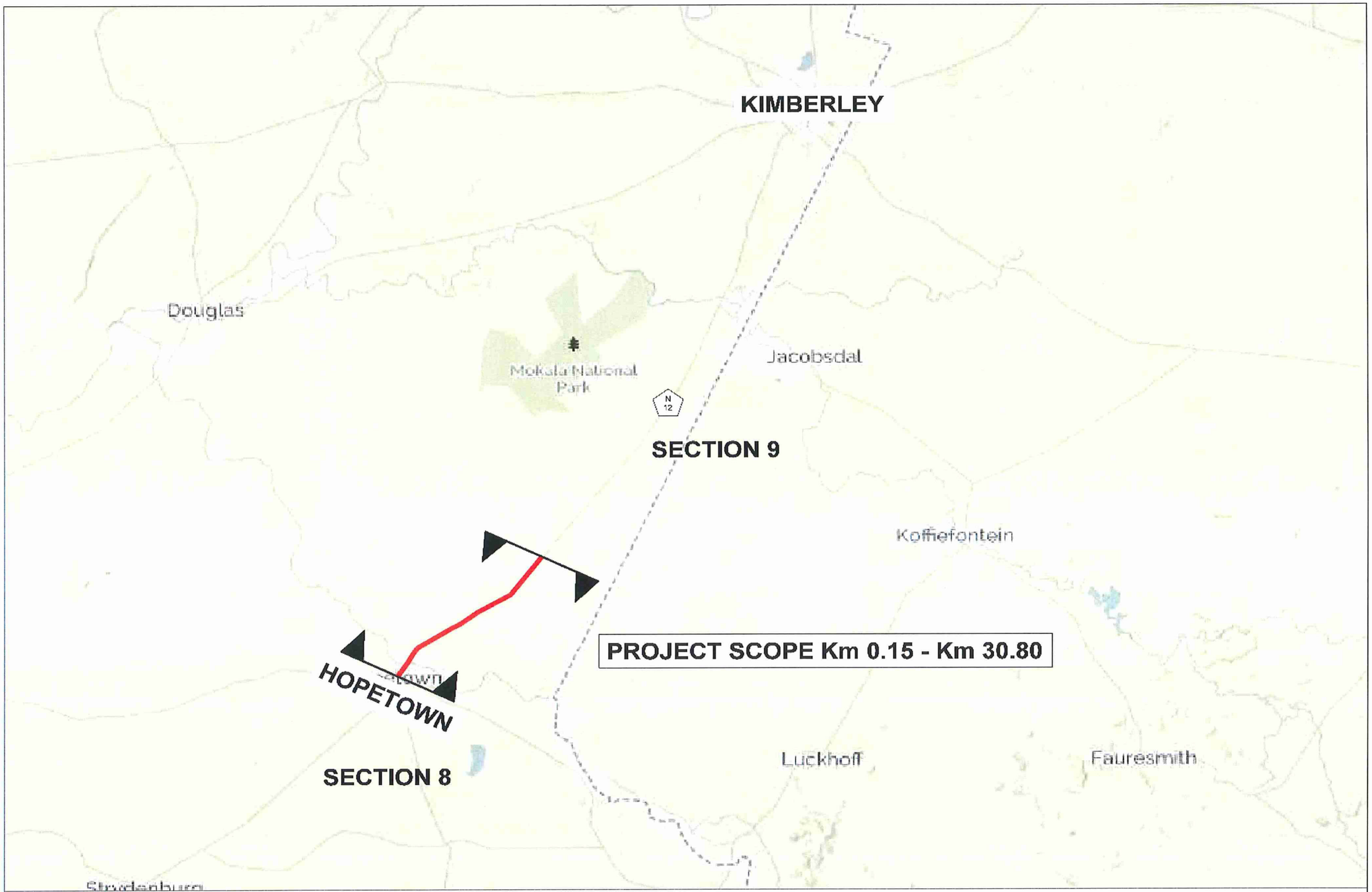
SECTION 1 – GENERAL

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

SANRAL
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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

SANRAL
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. **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
0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0		
0		0		0		0	0		0		

SECTION 2 – DESIGN SHEETS

2.1 FORM D2 – CONCRETE DESIGN

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

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								
Org. Mat. (Y/ N)	* AG40			N	N			Water Tests		
Sugar	* AG42			NIL	NIL			a		
PH	* GR32		0.0	0.0	0.0			Thembihihle Municipal water		
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

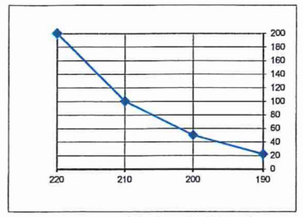
Sample No.		1	2	3	4	5	Air Entrainer		
Water Demand	SABS 535						To ASTM C260:		
Rel. Density	* AG23	3.00	3.00	3.00			Y / N	:	n/a
Loose Bulk Density	TMH1 B9	1452	1724	1927			Type	:	n/a
Compacted Bulk Density	TMH1 B9	1671	1945	2081			Mark	:	n/a

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				

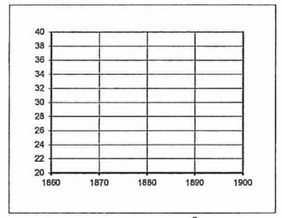
MIX PROPERTIES

a



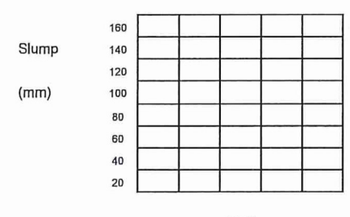
Water l/m³,Admix ml/m³,Air%

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				m³	Bag 50kg	m³	Bag 50kg	m³	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 — SANRAL Materials Specialist — 24/4/2017 DATE

2.2 FORM D4 – SEAL DESIGN: 20 MM CAPE SEAL

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

Prepared by:	Designed by:
Maureen	Riyaaz
Date:	Date:
01-Sep-17	31-Aug-17

SEAL DESIGN

CONTRACT: NRA N.012-090-2017/1
ROUTE: N12
SECTION: 9
TYPE OF CONSTRUCTION: 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: 0.26	to	km: 2.58	Check Design method option 1:	TPA
Seal Type :	20mm Single Seal with Slurry (Cape Seal)				
Binder Type :	S-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		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					
Particulars of Aggregate			Spray 1	Spray 2	Spray 3
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

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

				Design Method
Road (Street)	N12 Section 9			
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		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 : 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				Layer	
Proportions per 100kg Aggregate or per m³ mix (Dry)			Texture	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

				Design Method
Road (Street)	N12 Section 9			
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		Lane	One Way	Both Ways
Traffic Counts				
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			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: 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

HG 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

Road (Street)	National Route 12 - Section 9	Design Method	
Carriageway:	Single	Principal Design method :	TRH3
Lane:	Both		
From:	km: 0.15 to km: 30.80	Check Design method option 1:	TPA
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				
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 : 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				
Particulars of Aggregate		Spray 1	Spray 2	Spray 3
Source		Kimcrush		
Type		Dolerite		
Nominal Size	mm	10		
ALD (Measured)	mm	-		
ALD (Calculated)	mm	6.2		
Flakiness	%	16.3		
ACV (Dry / Wet)	%	10.1 / 9.5		
10% Fact (Dry / Wet)	%	336 / 423		
Polished Stone value		47		
Sand equivalent	%	-		
Precoating fluid type		Bitucote		
Precoating fluid rate (0.5%)	%	12		
Application Rate	m²/m³	180 - 200		
Application Rate tolerance	m²/m³	10		

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				
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 - 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

Road (Street)		Design Method	
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: 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

HG FOURIE 3/3/2017
SANRAL Materials Specialist 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: 24 / 11 / 2016	Date: 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

Road (Street)	National Route 12 - Section 9		Design Method
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

Road (Street)			Design Method
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

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 — 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		

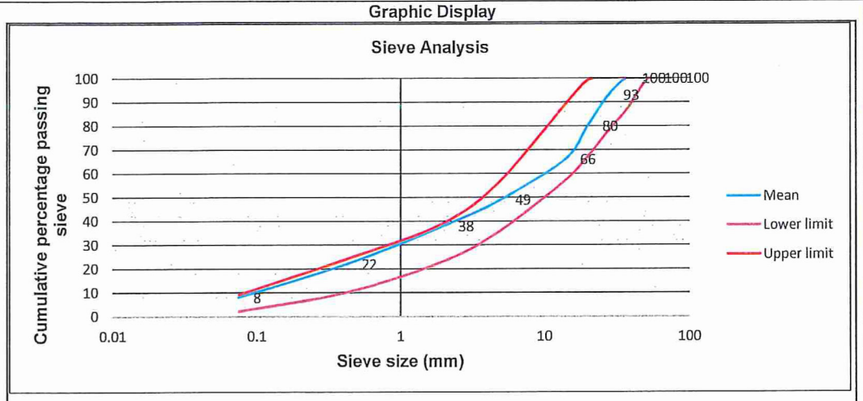
Source	(3) 50% G2 + 50% INSITU			EFFECT OF ACTIVE FILLER (Pre-Level 1)			
MAASHTO-MDD (kg/m³)	2228			All mixes with1.0% bitumen		0%	1% Cement	1% Lime
OMC (%)	6.3			Testing carried out on 100mm diameter specimens using Level 1 test procedure	ITS dry (kPa)	89	104	91
ICL	0,385				ITS wet (kPa)	61	92	67
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) (°)			

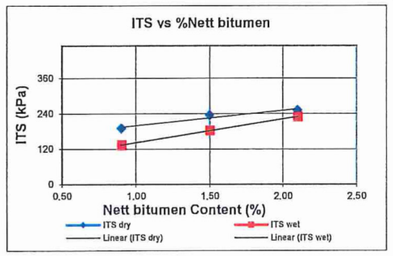
Notes :

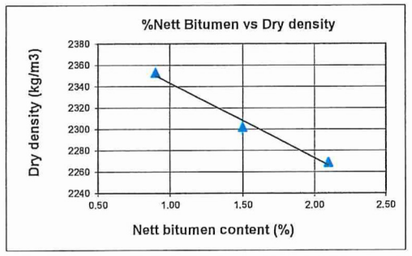
1) Addition of 2.5% Emulsion + 1% cement meets the TG2 (2009) specified requirements for BSM 1
2) Level 3 Not done on this sample
3) * % Emulsion added

Graphic Display

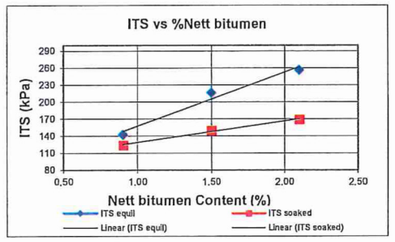


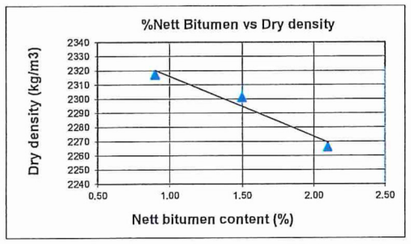
Level 1





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

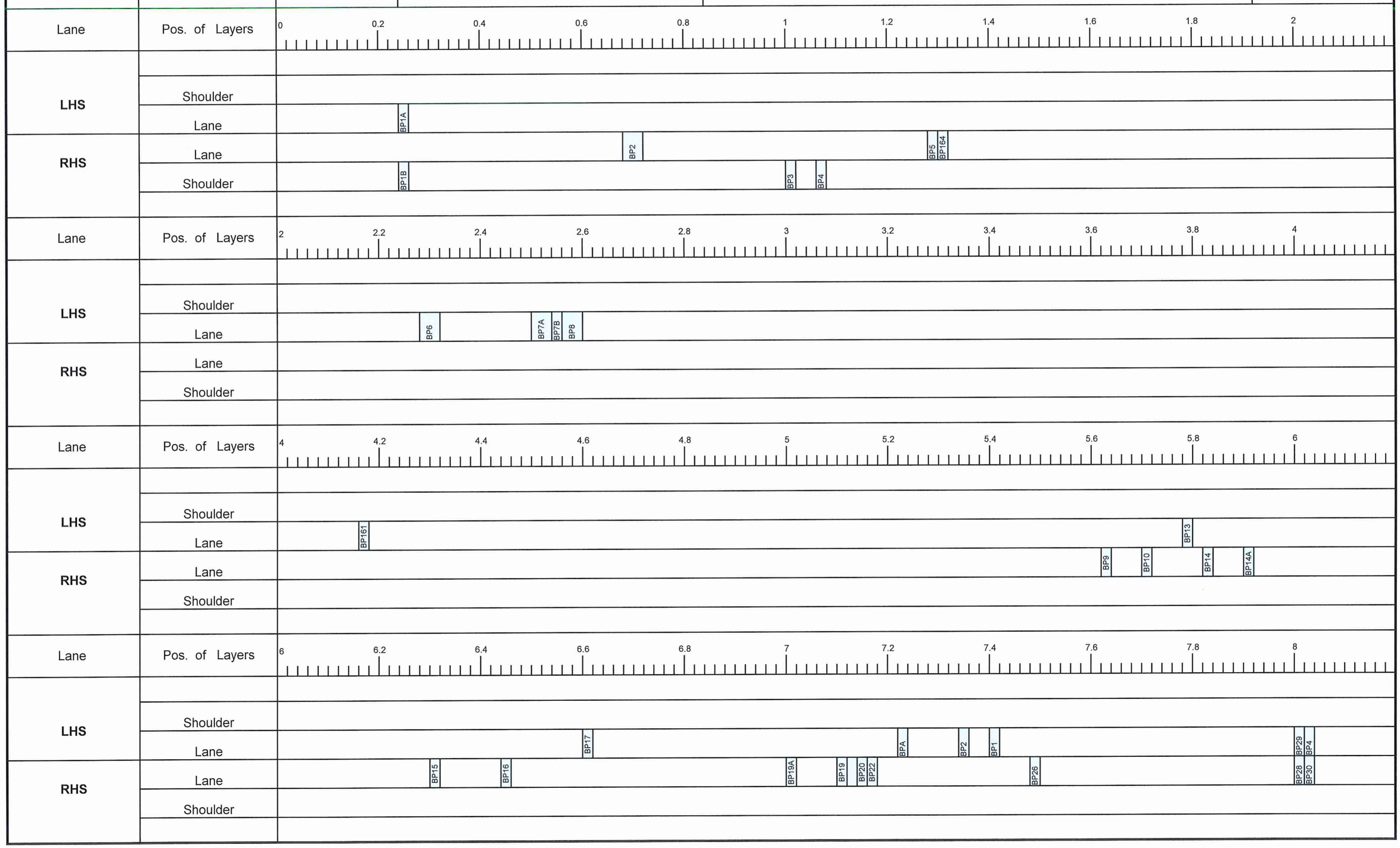
Approved by: Ian Date: 23-Nov-17

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



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

Prepared by : Maureen Date: 20-Jun-17

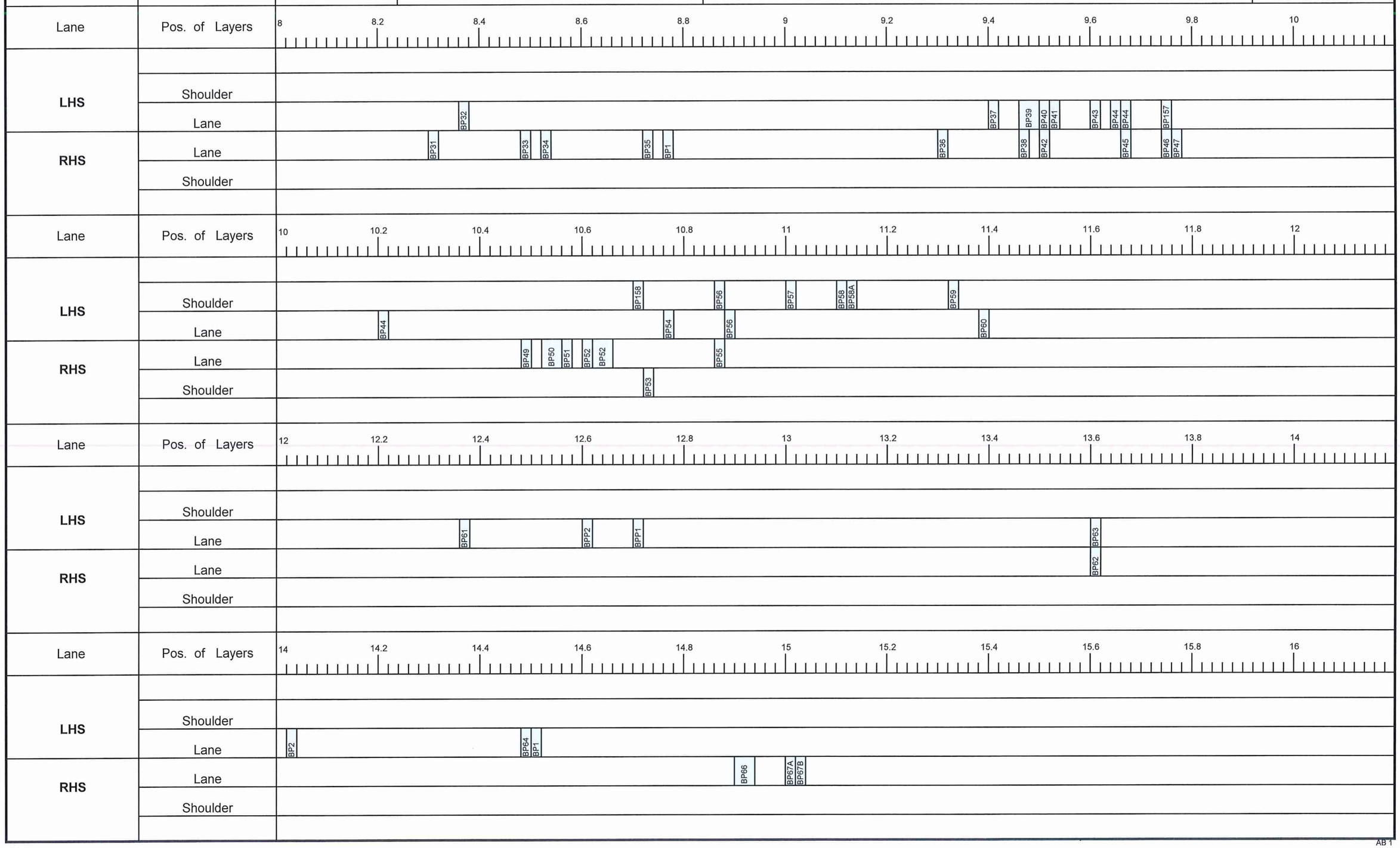
Approved by: Ian Date: 23-Nov-17

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



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

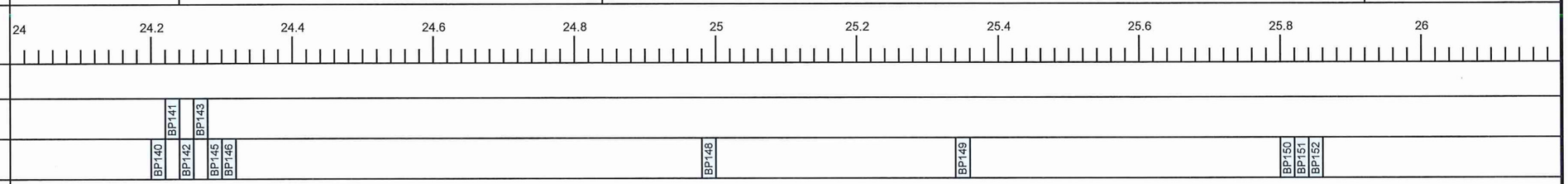
Prepared by :
Maureen
Date:
20-Jun-17

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



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	Date	SOILS & GRAVELS	Section :	9	To km	(04 / 2015)
2017/10/30	2017/11/23		Carriageway :	Single		Sheet no.
			Layer :	Base Patches	30.80	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

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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		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 ($\bar{x}$) // 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	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 ($\bar{x}$) // 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 / 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 ($\bar{x}$) // 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 / 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

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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

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

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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	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	
b	Lane		LHS		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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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	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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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 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	30.80	7 of 9
			Layer : Base Patches		

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	(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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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 / Layer : Base Patches		To km 30.80	(04 / 2015) Sheet no. 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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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

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. 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 : Route : Section : Carriageway: Seal Type :	NRA N012-080-2017/1 N12 9 Single Reseal	From km 0 To km 2	FORM **AB7** (02/2015) SHEET 1 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 2 To km 4		FORM **AB7** (02/2015) SHEET 2 OF 16

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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

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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 6 To km 8		FORM AB7 (02/2015) SHEET 4 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 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											
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 — 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 12 To km 14		FORM **AB7** (02/2015) SHEET 7 OF 16

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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)													
		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 3.8 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	
	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	
		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

Section (km)			20	20.2	20.4	20.6	20.8	21	21.2	21.4	21.6	21.8	22
Date opened to traffic			24.10.2017				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 3.8 m	(23.10.2017) 0.8 l/m2				(14.10.2017) 0.8 l/m2						
l/m²		LHL 2.1 m	(23.10.2017) 0.8 l/m2				(14.10.2017) 0.8 l/m2						
Cold		RHL 2.1 m	(19.10.2017) 0.795 l/m2				(12.10.2017) 0.79 l/m2						
Hot	Date / Datum	RHS 3.6 m	9.10.2017) 0.8 l/m	(19.10.2017) 0.8 l/m2			(12.10.2017) 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				(13.10.2017) 118.4 m2/m3			(13.10.2017) 118.4 m2/m3			
	Actual obtained	LHL 3.7 m	(20.10.2017) 118.4 m2/m3				(13.10.2017) 118.4 m2/m3			(13.10.2017) 118.4 m2/m3			
		RHL 3.7 m	8.10.2017) 118.4 m2/m	(18.10.2017) 118.4 m2/m3			(11.10.2017) 118.4 m2/m3			(11.10.2017) 118.4 m2/m3			
(m² / m³)		RHS m m	8.10.2017) 118.4 m2/m	(18.102017) 118.4 m2/m3			(11.10.2017) 118.4 m2/m3			(11.10.2017) 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) 1.87 l/m2				(13.10.2017) 1.9 l/m2			(13.10.2017) 1.9 l/m2			
l/m²		LHL 2.1 m	(20.10.2017) 1.83 l/m2				(13.10.2017) 1.9 l/m2			(13.10.2017) 1.9 l/m2			
		RHL 2.1 m	(18.10.2017) 1.9 l/m2	(18.10.2017) 1.9 l/m2			(11.10.2017) 1.9 l/m2			(11.10.2017) 1.89 l/m2			
Hot	Date	RHS 3.6 m	(18.10.2017) 1.9 l/m2	(18.102017) 1.9l/m2			(11.10.2017) 1.85 l/m2			(11.10.2017) 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 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 r	(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 r	(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:	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 28
To km 30

FORM **AB7** (02/2015)
SHEET 15 OF 16

| | | |

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___

a	Type Polymer	S-E1	S-E1								**UNIT**	**SPECIFICATIONS TG1 Elastomer Polymer**		**TEST METHOD**
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

a	Type Polymer										**UNIT**	**SPECIFICATIONS TG1 Elastomer Polymer**		**TEST METHOD**
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	

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NATIONAL ROUTE 12 SECTION 9: NRA 012 – 090 - 2017/4F

MATERIAL AS-BUILT INDEX

1. LOCALITY PLAN

2. GENERAL DESCRIPTION

3. SCOPE OF CONTRACT

4. DESIGN

4.1 D1 Form: Pavement Design
4.2 DTS: Texture Slurry Mix Design
4.3 D3 Asphalt Mix Design
4.4 D4 Final Seal Design

5. MATERIALS AS-BUILTS

5.1 AB 1: Patching Completion Schedule
5.2 AB 5: Patching Test Results
5.3 AB 5: Asphalt Overlay Test Results
5.4 AB 7: Texture Slurry and Double Seal Completion Schedule

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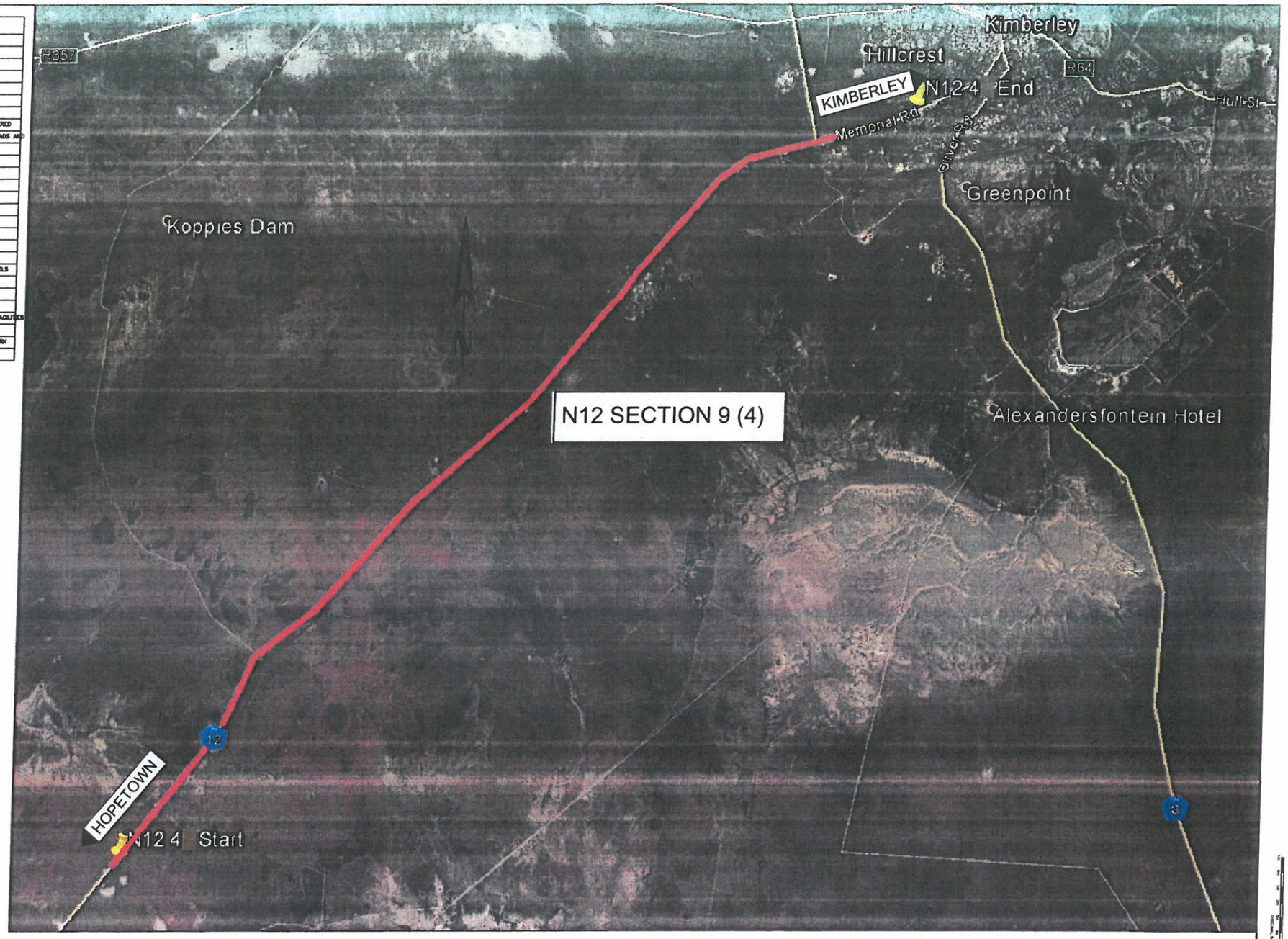
THROUGH BETTER ROADS

1. LOCALITY PLAN

SANRAL No.	DRAWING No.	DESCRIPTION
	K312 00497/02-DL/01	LOCALITY PLAN AND LIST OF DRAWINGS
	K312 00497/02-TP/01	TYPICAL CROSS SECTIONS FOR THE EXISTING
		AND DESIGNED ROAD SOLUTIONS
	K312 00497/02-SC/01	STRIP CHART km 92,00 TO km 117,50
	K312 00497/02-J/01	T-JUNCTIONS AND INTERSECTIONS: T-JUNCTION WITH SHELTERED
		RIGHT TURN LANE ON CLASS 1 ROADS, GRAVEL CLASS 2 ROADS AND
		TYPICAL FARM ROAD ACCESSES
	K312 00497/02-RM/01	ROAD MARKINGS: LONGITUDINAL LINES
	K312 00497/02-RM/02	ROAD MARKINGS: ARROWS AND SYMBOLS
	K312 00497/02-RS/01	ROAD SIGNS: DETAILS
	K312 00497/02-IB/01	ROAD SIGNS: INFORMATION BOARD DETAILS
	K312 00497/02-MS/01	GEOMETRIC LAYOUT OF REST POINTS ALONG FREEWAYS
	K312 00497/02-MS/02	REST AND SERVICE AREAS: DETAIL OF TABLE UNITS AND STOOLS
	K312 00497/02-SL/01	GENERAL SITE OFFICE AND LABORATORY LAYOUT
	K312 00497/02-SP/01	ACCOMMODATION OF TRAFFIC: LAYOUT OF TRAFFIC CONTROL FACILITIES
		AT WORK AREAS: ONE LANE OPERATION
	K312 00497/02-SP/02	ACCOMMODATION OF TRAFFIC: SIGNPOSTING FOR SHOULDER WORK
	K312 00497/02-SP/03	ACCOMMODATION OF TRAFFIC: SHORT TERM MOBILE WORK



LOCALITY PLAN: THE PERIODIC MAINTENANCE (RESURFACING) OF NATIONAL ROUTE 12
SECTION 9 BETWEEN VOETPADDRIFT (km 92,00)AND KIMBERLEY (km 117,50)

K312 00497/02-DL/01

01	15/02/18	SCHEME: FINAL CONSTRUCTION RECORD (AS BUILT)	A. GLEIGHORN
V1.4	13/06/17	SCHEME: FOR CONSTRUCTION	A. GLEIGHORN
V1	12/06/17	SCHEME: FOR TENDER	A. GLEIGHORN
No.	DATE	REVISION	DESIGNED / CHECKED

CONSTRUCTION RECORD
WORKS CONTRACTOR'S ENGINEER
Name: J. DE VILLIERS
Prof. Reg. No.: 20140412
Date: 20/07/2018
SANRAL PROJECT MANAGER
Name: K. MATSH
Date:

Knight Piésold CONSULTING
Tel: +27(0)11 805 4301
Fax: +27(0)11 805 7010

DESIGNED BY	
NAME	SIGNED BY: A. G. EGHORN
Prof. Reg. No.	20030171
CHECKED BY	
NAME	SIGNED BY: W. ISAACS
Prof. Reg. No.	20120027
DRAWN BY	
NAME	

CONSULTANT APPROVAL
SIGNED BY: A. G. EGHORN
Name: A. G. EGHORN
Prof. Reg. No.: 20030171
Date: 21/01/2021
THE ABOVE SIGNATORY CERTIFIES THAT THE DESIGNER AND CHECKER HAVE CONSENTED TO THAT AGREEING UNDERTAKEN IN THE DRAWING AND THAT HE DOES / DO APPROVE THE CONTENT

HEAD OFFICE
48 Tambotie Avenue
Val de Grace
Pretoria
0184
PO Box 415
Pretoria, 0001
South Africa
Tel: (012) 844 0004

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD

WESTERN REGION
1 Hevenga Street
Oakdale
7530
Private Bag X16
Bellville
South Africa
7535
Tel: (021) 957 4600

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
SIGNED: E. ERASMUS
for CEO: SA NATIONAL ROADS AGENCY LTD
Tel: 012 844 0004

PROJECT DESCRIPTION
THE PERIODIC MAINTENANCE (RESURFACING) OF NATIONAL ROUTE 12 SECTION 9 BETWEEN VOETPADDRIFT (km 92,00) AND KIMBERLEY (km 117,50)

DRAWING DESCRIPTION
LOCALITY PLAN AND LIST OF DRAWINGS

SCALE @ A1: 1:50 000 | SHEET: 01 OF 01

PROJECT NUMBER	NRA N.012-090-2017/4	
DRAWING LOCATION DATA	START	END
ROUTE	N12	N12
SECTION	09	09
TOTAL km DISTANCE	92,00	117,50
DRAWING TYPE	ROADS - INDEX	
BRIDGE/STRUCTURE No.	-	
CONSULTANT DRAWING No.	K312-00497/02-DL/01	VER:
SANRAL DOC #	3M4793	VER:

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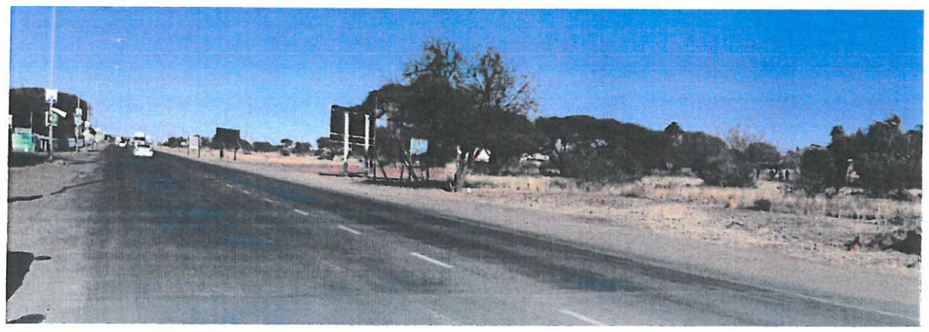
2. GENERAL DESCRIPTION

The National Route 12 starts in George in the Western Cape, passes through Beaufort West, Kimberley and Johannesburg and ends in eMalahleni (Witbank) in Mpumalanga. The project is located on Section 9, between Voetpaddrift (km 92.00) and Kimberley (km 117.50), a total of 25.5km in extent. The locality map is provided in *Figure 1.1*, the start and end of the project are depicted in *Photographs 1.1 and 1.2.*



Photograph 1.1: Start of Project (km 92.00) Voetpaddrift looking north (before)



Photograph 1.2: End of Project (km 117.50) Kimberley looking south (before)

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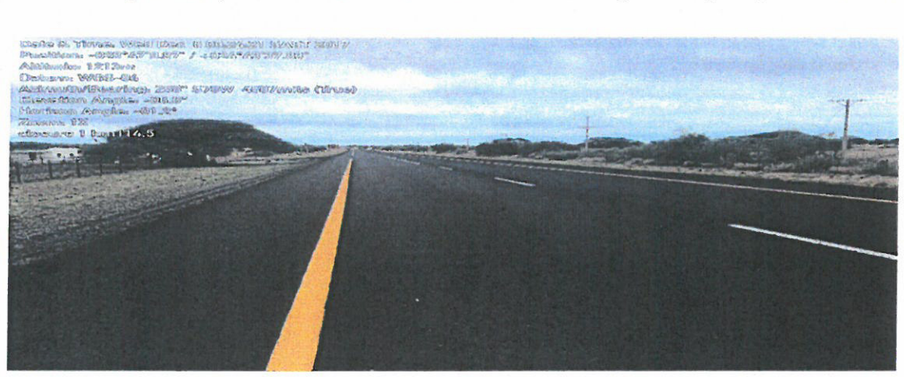
The road was originally constructed under the direction of the Cape Provincial Administration (CPA). The section from Hopetown to Kimberley is currently a major mobility route between Cape Town and Johannesburg and also serves as an alternate route to the National Route 1 between these two cities. The town of Kimberley has also grown substantially and is continuing to do so, which makes it greatly dependent on this road.

Entering Kimberley from the south the road traverses flat terrain and there are no major bridges or culverts on this section. In general, this section of road has posted speed limits of 120km/h. The speed limit is reduced to 80km/h in the last few kilometres of the project, before entering the town of Kimberley, where the road passes through an urbanised area.

There are no interchanges located within the project limits; however, there are two intersections (km 115.50 and km 117.33) and numerous accesses. The R31/N12 intersection is currently planned for upgrade but this will not form part of this project.

The purpose of this report is to present the assessment of the current single carriageway route between km 92.00 and km 117.50. The road functions adequately with a lane width of 3.7m and a shoulder width of 2m.



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3. SCOPE OF CONTRACT

This contract entails:

ROADWORKS

- The reseal of National Route 12 Section 9 between km 92.0 and km 117.5 with a 20/7mm modified binder double seal.
- The repairing of pavement defects with base and surface patching using hot mix asphalt.
- The upgrade and resurfacing of a rest area.
- Edge break repairs where necessary.
- Asphalt overlay at intersection
- Painting and Roadmarkings
- Roadstuds

PAVEMENT DESIGN FOR ALL PARTS OF THE VARIOUS ROADS

- Surface Repairs
- Base Repair
- Shoulder Drop-Offs and Edge Break Repairs
- Hydro Texturing
- Texture Treatment Slurry
- Re-surfacing (Double Seal +Asphalt Overlayer)

MAINTENANCE WORKS

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4. DESIGN

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DESIGN

4.1 D1-Pavement Design

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

Prepared by:	Designed by:	PAVEMENT DESIGN	Contract	NRA N.012-090-2017/4F	Form D1 -2001
A.Cleghorn	A. Cleghorn		Route	National Route 12	Sheet no. 1 of 1
Date 20-Nov-17	Date 20-Nov-17		Section	9 from Voetpaddrift (km 92,00) & Kimberley (km 117,50)	

Road / Street:	National Route 12 Section 9			Road / Street:	National Route 12 Section 9			Road / Street:			
From:	Voetpaddrift (km 92,00)	to	Kimberley (km 117,50)	From:	Voetpaddrift (km 92,00)	to	Kimberley (km 117,50)		to		
Carriageway:	Northbound			Carriageway:	Southbound			Carriageway:			
Lane:	Left	Design E80	4.9 million	Lane:	Right	Design E80	4.9 million	Lane:	Design E80		

Layer	TRH 14 Class	Thickness (mm)	Reference Density % of	Layer	TRH 14 Class	Thickness (mm)	Reference Density % of	Layer	TRH 14 Class	Thickness (mm)	Reference Density % of
Surfacing	20/7mm SE-1		N/A	Surfacing	20/7mm SE-1		N/A	Surfacing			
Base 1	G5	150	N/A - Existing	Base 1	G5	150	N/A - Exisitng	Base 1			
Base 2				Base 2				Base 2			
Subbase 1	G6	Varies	N/A - Existing	Subbase 1	G6	Varies	N/A - Exisitng	Subbase 1			
Subbase 2	G7	Varies	N/A - Existing	Subbase 2	G7	Varies	N/A - Exisitng	Subbase 2			
Selected Subgrade				Selected Subgrade				Selected			
Subgrade	G9	Varies	N/A - Existing	Subgrade	G9	Varies	N/A - Exisitng	Subgrade			

Designed by:
Signature: A.Cleghorn
Designer Name: A. Cleghorn
Date: 20/11/2017

Approved by:
Signature: A.Cleghorn
Engineer Name: A. Cleghorn
Date: 20/11/2017

Accepted by:
Signature:
SANRAL Eng Name: PE THERON
Date: 20/11/2017

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BUILDING SOUTH AFRICA
THROUGH BETTER ROADS

DESIGN

4.2 DTS: Texture Slurry Mix Design

THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC Ltd. Reg. No. 1998/022884/06

Prepared by: G. Nel

Date / Datum: 06 September 2017

TEXTURE SLURRY MIX DESIGN

TEKSTUUR FLODDER ONTWERP

Contract / Kontrak : NRA N.012-090-2017/4
Route / Roete : N12 Voetpaddrift to Kimberley
Section / Gedeelte : SECTION 9 : KM 92,00 - KM 117,50
Layer / Laag : SURFACING TEXTURE IMPROVEMENT
Mix / Mengsel : TEXTURE SLURRY

Form / Vorm: **D TS** (03/2016)

Sheet no. / Vel no.: 1 of 1

Aggregates / Aggregate

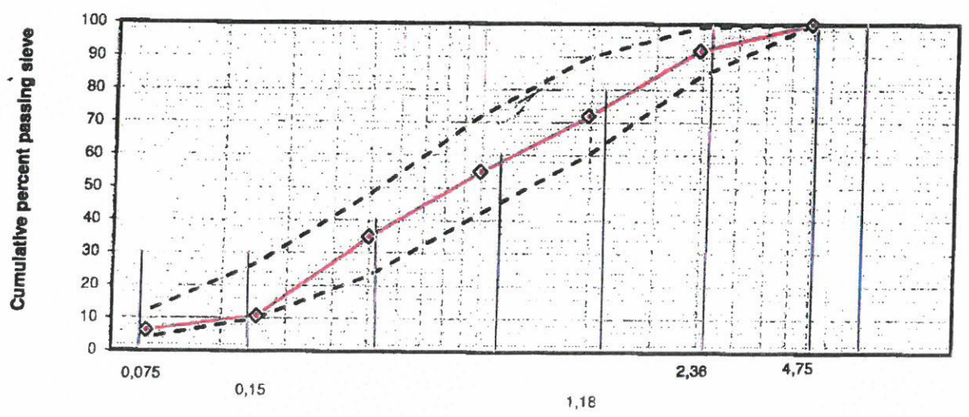
Sample / Monster No.	Nom. Size / Grootte	Type and Source / Tipe en Bron
1	FINE SLURRY - FINE GRADE	Zoutpan Explorations - Windsorton
2	COLTO - (Table B4302/1)	
3		
4		
5		
6		

NOTE: Test Methods Refer To SANS 3001-AG1 - 2009 -1
NOTA: Test Methods Refer To SANS 3001-AG1 - 2009 -1

Sieve Analysis / Sifanalise [B 4] - % Passing Sieves / % Deur Siwwe

Sample No. / Monster No.		1	2	3	4	5	6	Design / Ontwerp		
% In Mix / Mengsel								Mix / Mengsel	Spec. / Spes. min	Spec. / Spes. max
Sieve Size (mm) / Silgrootte (mm)										
	5,00	100						100	100	100
	2,00	92						92	84	99
	1,00	72						72	60	90
	0,600	55						55	42	72
	0,300	35						35	23	48
	0,150	10,7						10,7	10	27
	0,075	6,3						6,3	4	12
BRD		2408						2408		
LBD		1603/1445						1603/1445		
Sand Equivalent		64%						0,64		

Sieve analysis

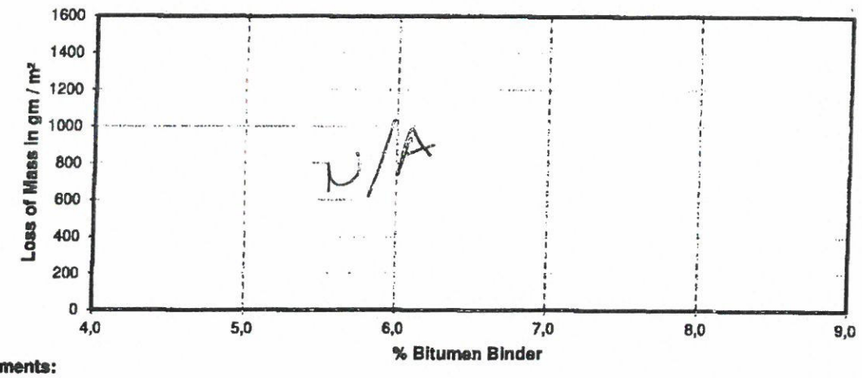


Binder / Bindmiddel

Type / Tipe	Anionic Stable Mix 60%	Source / Bron	Tosas
Pen @ 25 °C (0,1 mm)		Visc. @ 60°C (Pa.s)	
Soft. / Sagw. Pt (°C)		Visc. @ 135°C (Pa.s)	
RD		Hot Flow / Warmvloei (mm)	N/A
Temp. (Mix / Meng) (°C)		Temp. (Comp / Verd.)	

Wet Track Abrasion Test

Binder Content % Bitumen by mass of crusher dust	Litres Emulsion per m³	Mass Loss (g/m²)
N/A		



Comments:

Binder Content % Bitumen by mass of crusherdust	Liters Emulsion per m³	Observation
3,6	87	Brown to Light Black
4,0	95	Dark Grey to Black
4,8	116	Black
6,1	147	Black
7,4	179	Pitch Black
8,5	205	Pitch Black

Blending Proportions

Zoutpan	kg	1445
Afrisam Roadstab CEM II B M (L) 32.5N	kg	22
(Anionic Stable Grade Mix 60% (Tosas)	litre	181
Water	litre	206

Recommended Binder Content

7,40%

Slurry Mix Design - - Design by Simlab, Bloemfontein

Accepted
29/09/2017

Ansuya Ragavan

From: Sonet Gerber
Sent: 19 September 2018 02:06 PM
To: Ansuya Ragavan
Subject: FW: accepted DTS form attached : N.012-090-2017/4
Attachments: Texture Slurry N.012-090-2017_4.pdf

From: Shafeeka Arnold (WR) [mailto:ArnoldS@nra.co.za]
Sent: Tuesday, 03 October 2017 13:29
To: Sonet Gerber <sgerber@knightpiesold.com>; John Craig <jcraig@knightpiesold.com>
Cc: Petronella Theron (WR) <TheronP@nra.co.za>; Gretchen Weber - Cherry <WeberCherryG@nra.co.za>; Gerhard Fourie (WR) <FourieG@nra.co.za>; Joseph Van Houten (WR) <VHoutenJ@nra.co.za>; Keenan Walbrugh (WR) <WalbrughK@nra.co.za>
Subject: accepted DTS form attached : N.012-090-2017/4

CONTRACT NRA N.012-090-2017/4: PERIODIC MAINTENANCE OF NATIONAL ROUTE 12 SECTION 9 BETWEEN VOETPADDRIFT (km 92.0) AND KIMBERLEY (km 117.5)

Dear all,

Herewith the SANRAL acceptance for your records: TEXTURE SLURRY MIX DESIGN.

Kind Regards,

Weber - Cherry
Region Materials & Pavement Specialist

Region | Private Bag X19
+27 21 957 4622 084 358 0199 WeberCherryG@nra.co.za

SANRAL Fraud Hotline: 0800 204 558

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

DESIGN

4.3 D3: Asphalt Mix Design

THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC Ltd
Reg No 1998/009884/30

Prepared by: NATIONAL ASPHALT
Date: 21 August 2017
Revision 1

Form D 3

ASPHALT MIX DESIGN

ASPHALT TYPE — **Continuously Graded AC Medium**

Contract : N12 KIMBERLY
Route : NATIONAL ROUTE 12
Section : N12 KIMBERLY
Layer : SURFACING
Mix : AC Medium
Revision 1

Form D 3 (04 / 2015)
Sheet no. 1 of 1

Aggregates

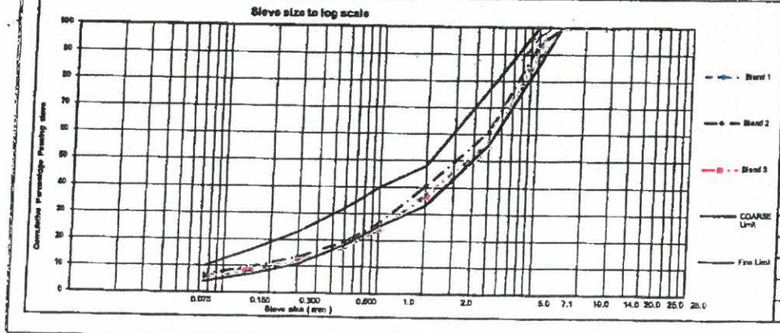
	Sample	Nom. Size	Type	Source
1	1	14.0	Dolerite	Kimberly Raumix
2	2	10.0	Dolerite	Kimberly Raumix
3	3	7.1	Dolerite	Kimberly Raumix
4	4			
5	5	-5.0 Dust	Dolerite	Kimberly Raumix
6	6	-5.0 Blown Dust	Dolerite	Kimberly Raumix
7	7			
8	8			
9	9			

NOTE: Test Methods Refer To SANS 3001-[ ] or BS [ ]

Sieve Analysis (B 4) - % Passing Sieves

Sample No.		1	2	3	4	5	6	7	8	9	MF	Design Mix Blend 1	Design Mix Blend 2	Design Mix Blend 3	Specification
% In Mix Blend 1		13.0	15.0	17.0		28.0	35.0								
% In Mix Blend 2		8.0	15.0	18.0		28.0	31.0								
% In Mix Blend 3		8.0	15.0	24.0		28.0	25.0								
Sieve Size (mm)	37.5	100	100	100	0	100	100	0	0	0	0	100	100	100	100 - 100
	28.0	100	100	100	0	100	100	0	0	0	0	100	100	100	100 - 100
	20.0	100	100	100	0	100	100	0	0	0	0	100	100	100	100 - 100
	14.0	98	100	100	0	100	100	0	0	0	0	100	100	100	100 - 100
	10.0	20	96	100	0	100	100	0	0	0	0	80	93	93	85 - 100
	7.1	2	9	77	0	100	100	0	0	0	0	79	74	72	0 - 0
	5.00	2	1	11	0	99	100	0	0	0	0	67	61	58	56 - 77
	2.00	2	1	1	0	70	65	0	0	0	0	37	46	36	33 - 48
	1.00	2.0	1.0	1.0	0.0	51.0	37.0	0.0	0.0	0.0	0.0	23.7	26.2	24.1	23 - 40
	0.600	1.0	1.0	1.0	0.0	41.0	24.0	0.0	0.0	0.0	0.0	17.1	19.3	18.6	18 - 32
	0.300	1.0	1.0	1.0	0.0	32.0	13.0	0.0	0.0	0.0	0.0	11.4	13.4	12.7	11 - 23
	0.150	1.0	1.0	1.0	0.0	24.0	8.0	0.0	0.0	0.0	0.0	8.1	9.6	9.2	7 - 16
	0.075	0.8	0.7	0.8	0.0	16.9	5.2	0	0.0	0.0	0.0	5.5	6.6	6.3	4.0 - 10.0
Bulk Relative Density (BRD)	[AG20 & AG21]	2 965	2 957	2 946	0	2 896	2 948	0	0	0	0	2 941	2 938	2 936	
Sand eqv.	[AG5]					40.0	75.0	0.0				62	58	57	
Water absorp.	[AG20 & AG21]	0.5	0.6	0.7	0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.7	0.3	0.2	
ACV	[AG10]	10.6													
10 % FACT (Wet)	[AG10]	355.0													
10 % FACT (Dry)	[AG10]	377.0													
WET / DRY RATIO		94.2													
Flak. Index	[AG4]	14.6	19.1	20.1											
PSV	[AG11]	50.0													
Methylene Blue	[AG14]					0.25	0.3								
Fine Agg. Angularity	[Aso TP33]					45.8	46.9								
Los Angeles Abrasion	[S46]														

Sieve size to log scale



Filler

Blend No	Type	% In mix
1	HYDRATED LIME	0.0
	Lime Distributors	
2	HYDRATED LIME	0.0
	Lime Distributors	
3	HYDRATED LIME	0.0
	Lime Distributors	

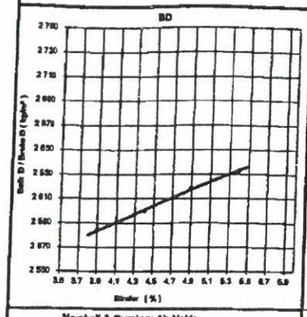
Notes / Notas

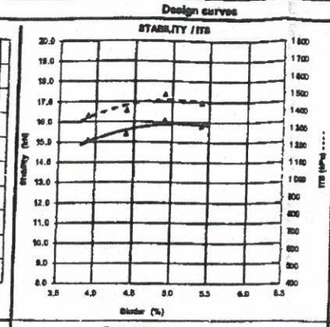
BAILEY BLENDS	B1	B2	B3
% CA LUW	82.0	86.0	90.0
PCS -mm	2.0	2.0	2.0
CA	0.481	0.498	0.498
FA c	0.501	0.487	0.512
FA f			

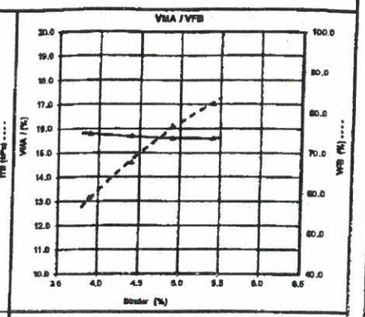
Binder

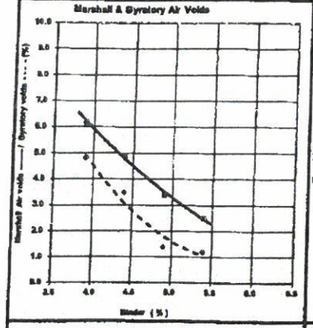
Type	A-E2 + 0.3% Wetfix		PG 70-22 V	Source	CLIFFDALE		
Penetration @ 25°C	EN 1426	N/A	N/A	Dynamic Viscosity @ 165° C	ASTM 4402	0.38	<0.6
Soft. Pt (°C)	ASTM D36	79	65 - 85	Ductility @ 15° C	TG-1 MB4	85	>60
RD		1.030	N/A	Flash Point	ASTM D92	278	>230
Temp. (Mix) (°C)	160 - 175°C			Temp. (Compaction)	142 - 145°C		

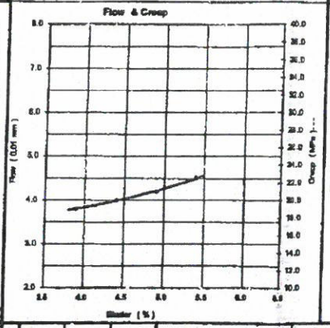
Design curves

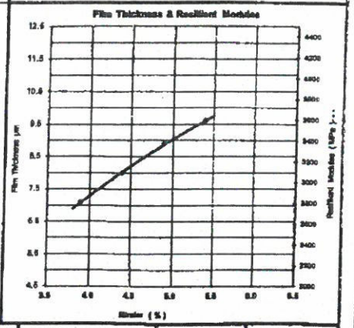












Trial LAB Blends		B1	B2	B3	FINAL LAB DESIGN	4	5	5.5	1 Plant Trial			Specification	Proposal / Voorstel	
Binder / Bindmiddel - Total Added	%	5.0	5.0	5.0	4.0	4.5	5.0	5.5	4.3	4.8	5.3			
Binder / Bindmiddel - Total Recovered	%	4.9	5.0	4.9	3.9	4.4	4.9	5.4	4.4	4.8	5.3	N/A	4.4	5.1
Max. / Maks. TRD (Rice)	kg/m³	2 710	2 710	2 720	2 756	2 735	2 710	2 701	2 782	2 736	2 716	N/A	2 735	2 725
BD (Marshall)	kg/m³	2 618	2 643	2 639	2 584	2 600	2 618	2 633	2 651	2 682	2 696	N/A	2 601	2 621
Voids in Mix / Ruimtes in Mengsel	%	3.4	2.7	3.0	6.2	4.9	3.4	2.5	7.3	5.6	4.4	4 - 6	4.9	4.9
Stab. (Marshall)	kN	16.1	16.8	15.8	15.1	15.4	16.1	15.8	15.7	16.2	16.4	8 - 18	15.5	16.3
Flow / Vloei (Marshall)	mm	4.2	3.2	3.3	3.8	4.0	4.2	4.5	3.7	3.7	3.9	2 - 5	4.0	3.8
Stab. / Flow Quotient	kN / mm	3.8	4.8	4.8	4.0	3.9	3.8	3.5	4.2	4.4	4.2	2.5 Min	3.9	4.2
ITS	kPa	1 463	1 500	1 468	1 370	1 400	1 463	1 444	1 383	1 347	1 365	1000 Min	1 411	1 356
Immersion / Dompel Ind.	%	93.8	93.9	93.2	80.4	92.2	93.8	93.3	83.3	96.6	97.0	-	87.9	96.7
VMA / RMA	%	15.6	14.9	14.9	15.9	15.7	15.6	15.6	17.3	16.7	16.6	15.0 Min	15.7	16.7
VFB / RGB	%	78.7	79.5	77.7	58.9	67.7	78.7	82.3	67.6	86.3	73.4	65 - 75	67.4	78.4
Creep / Kruip [Dyn.] *	Mpa	N/A	N/A	N/A	N/A	N/A	N/A	N/A		20.7		20 Min	N/A	20.7
Resilient Modulus	Mpa	N/A	N/A	N/A	N/A	N/A	N/A	N/A		3 236		N/A	N/A	3236
Air Perm. / Lugdeurlaatbaarheid	cm³	N/A	N/A	N/A	N/A	0.510	N/A	N/A		0.250		1.0x10-8 Max	0.510	0.250
Modified Lottman (TSR)	%	N/A	N/A	N/A	N/A	0.9	N/A	N/A		0.9		0.8 Min	0.9	0.9
Filler Binder Ratio		1.1	1.3	1.3	1.3	1.2	1.1	1.0	1.3	1.3	1.2	1.0 - 1.5	1.2	1.2
Absorp. (Binder / Bindmiddel)	%	0.2	0.4	0.4	0.2	0.2	0.2	0.4	0.4	0.4	0.5	0.5 Max	0.2	0.5
Film thickness / Film dikte	µm	8.8	7.1	8.8	7.1	8.0	8.9	9.6	7.4	8.2	8.8	5.5 - 8.0	8.0	8.5
Gyratory Compaction @ 300	%				4.8	3.5	1.4	1.2	6.7	3.9	1.6	2.0 Min	3.5	2.5
Permanent Deformation (Rut) Hamburg	mm									3.3		6.0mm Max		3.3

Consultant Approval

NAME: J.O. CRAIG Pr Eng
PROF. REG. NO.: 910110
DATE: 28-9-2017

Acceptance

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Project Manager
Materials Specialist
DATE 04/10/2017

Ansuya Ragavan

From: Sonet Gerber
Sent: 19 September 2018 02:06 PM
To: Ansuya Ragavan
Subject: FW: N.012-100-2017/4 - accepted D3 Form : Asphalt Mix Design
Attachments: SWRRM17100506550.pdf

From: Shafeeka Arnold (WR) [mailto:ArnoldS@nra.co.za]
Sent: Thursday, 05 October 2017 06:51
To: Sonet Gerber <sgerber@knightpiesold.com>; John Craig <jcraig@knightpiesold.com>
Cc: Petronella Theron (WR) <TheronP@nra.co.za>; Gretchen Weber - Cherry <WeberCherryG@nra.co.za>; Gerhard Fourie (WR) <FourieG@nra.co.za>; Joseph Van Houten (WR) <VHoutenJ@nra.co.za>; Keenan Walbrugh (WR) <WalbrughK@nra.co.za>
Subject: N.012-100-2017/4 - accepted D3 Form : Asphalt Mix Design

CONTRACT NRA N.012-090-2017/4: PERIODIC MAINTENANCE OF NATIONAL ROUTE 12 SECTION 9 BETWEEN VOETPADDRIFT (km 92.0) AND KIMBERLEY (km 117.5)

Dear all,

Your letter with reference 312-00497 dated 28 September 2017 refers.

Your approved recommendation of 5.1% binder content is accepted. Herewith attached please find the SANRAL acceptance for your records: D3 FORM : ASPHALT MIX DESIGN.

Please ensure that the target grading is maintained during construction.

Kind Regards,

Gretchen Weber - Cherry
Western Region Materials & Pavement Specialist

Western Region | Private Bag X19

+27 21 957 4622 084 358 0199 WeberCherryG@nra.co.za

SANRAL Fraud Hotline: 0800 204 558

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THROUGH BETTER ROADS

DESIGN

4.4 D4: Final Seal Design

SANRAL

SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD

Prepared by:	Designed by:
G.Smit	J.Craig
Date: 06/11/2017	Date: 06/11/2017

SEAL DESIGN

CONTRACT: NRA N.012-090-2017/4
ROUTE: N12 SECTION 9 BETWEEN VOETPADDRIFT AND KIMBERLEY
SECTION: 9 (km 92.00 to km 117.50)

TYPE OF CONSTRUCTION: New : / Rehabilitation : / Reseal : X

Form **D4** 2015 sheet 1 of 1

Road (Street)	N12 SECTION 9 BETWEEN VOETPADDRIFT AND KIMBERLEY		Design Method
Carriageway:	North (LHS) & South bound (RHS)		Principal Design method : TRH3
Lane:	Full width		
From:	km: 92,0 to km: 117,5		Check Design method option 1: CSIR
Seal Type :	20/7 mm Double Seal		
Binder Type :	S-E1 tack & penetration coat / 60% KRS65 cover spray (supplied by TOSAS)		

Traffic			
Traffic Counts (per)	Lane	One Way	Both Ways
Traffic Counts (Daily Average) per lane	1990	1990	3769
% Heavies	14,9	14,9	15,4
Traffic Factor			
ELV / Lane / Day	13573	13573	

Seal Period	Month start : November	Month end : February		
Target Texture		1	1	1
Existing Texture depth		1,1	1,1	1,1
Average Ball Penetration		1,3	1,3	1,3
Texture Treatment Yes/No? If Yes - Type?		Fine/Fine	Fine/Fine	Fine/Fine
Climate Zone		3	3	3

Aggregate				
Particulars of Aggregate		Spray 1	Spray 2	Spray 3
Source		National Asphalt	National Asphalt	
Type		Dolerite	Dolerite	
Nominal Size		20	7	
ALD (Measured)	mm	13,0	4,3	
ALD (Calculated)	mm			
Flakiness	%	6,0	11,5 *	
ACV (Dry / Wet)	%	12,2/13,7	12,2/13,7	
10% Fact (Dry / Wet)	%	380/332	380/332	
Polished Stone value		51	51	
Sand equivalent	%			
Precoating fluid type		Bitucote	Bitucote	
Precoating fluid rate (0.5%)	%	12 l/m³	22 l/m³	
Application Rate	m³/m³	65 (22,9kg/m²)	163 (9,0kg/m²)	
Application Rate tolerance	m³/m³	+/- 5%	+/- 5%	

Binder				
		Application 1	Application 1	Application 1
Spray	l/m²	1,3 *	1,1	0,8
Binder Type	pen	S-E1	S-E1	KRS65
Required Cold Nett	l/m²	1,2	1,0	0,26
Spraying Temperature	°C	190-210	190-210	60-70
Recommended Rate	l/m²	1,3	1,1	0,8
Spray rate tolerance	l/m² or %	+/- 5%	+/- 5%	+/- 5%

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

*Delete if not applicable

Supporting documentation to be supplied with the design form

Road (Street)			Design Method
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			

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	m³/m³			
Application Rate tolerance	m³/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: J.O. CRAIG

PROF. REG. NO.: 910110

DATE: 7-11-2017

SANRAL Acceptance

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SANRAL Project Manager — DATE

HG Fourie — 16-11-2017

SANRAL Materials Specialist — DATE

* Spray rates to include spray tolerance

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5. MATERIALS AS-BUILTS

SANRAL
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BUILDING SOUTH AFRICA
THROUGH BETTER ROADS

MATERIALS AS-BUILTS

5.1 AB 1: Patching Completion Schedule

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

Prepared by : C PHILANDER
Date: 26/02/2018

Approved by:
Date: 23/07/2018

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.12 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
From : 92 to 96,4

Form AB 1 (01 / 2001)
Sheet no. 1 of 6

Lane	Pos. of Layers	92,0 ... 93,0
Northbound (LHS)	Shoulder	
	Outer wheeltrack	
	Inner wheeltrack	81
Southbound (RHS)	Inner wheeltrack	84
	Outer wheeltrack	89 86
	Shoulder	88 87
Lane	Pos. of Layers	94,0
Northbound (LHS)	Shoulder	
	Outer wheeltrack	
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	80
	Outer wheeltrack	
	Shoulder	
Lane	Pos. of Layers	95,0
Northbound (LHS)	Shoulder	
	Outer wheeltrack	
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	
	Outer wheeltrack	
	Shoulder	
Lane	Pos. of Layers	96,0
Northbound (LHS)	Shoulder	
	Outer wheeltrack	
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	
	Outer wheeltrack	
	Shoulder	

AB1

Colour coding key for AB1

Surface patch - green
Base patch - red
Edge breack - orange
Shoulder build - blue

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

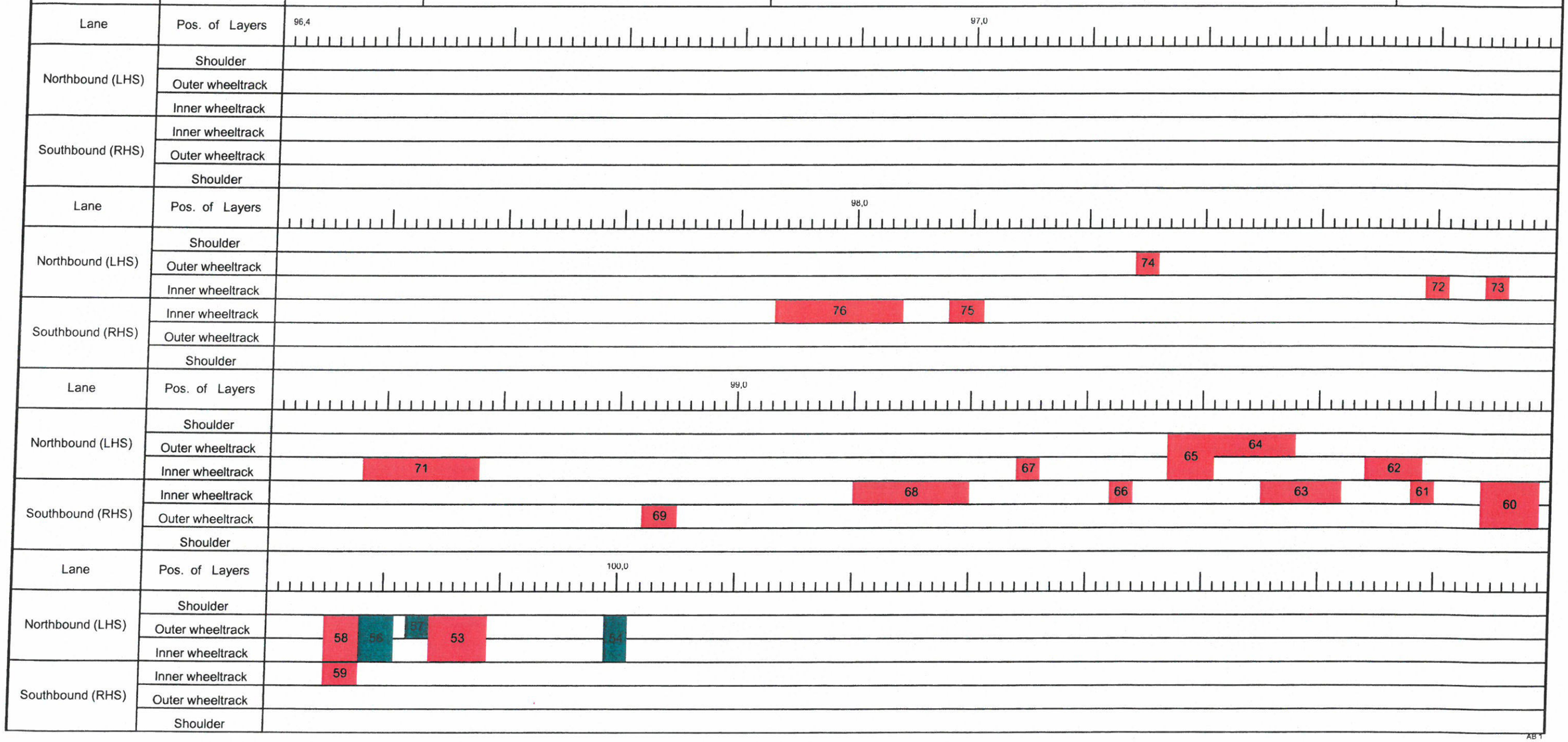
Prepared by : C PHILANDER
Date: 26/02/2018

Approved by:
Date: 23/07/2018

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.12 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
From : 96,4 to 100,8

Form AB 1 (01 / 2001)
Sheet no. 2 of 6



AB 1

Colour coding key for AB1

Surface patch - green
Base patch - red
Edge break - orange
Shoulder build - blue

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg No: 1998/009884/30
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

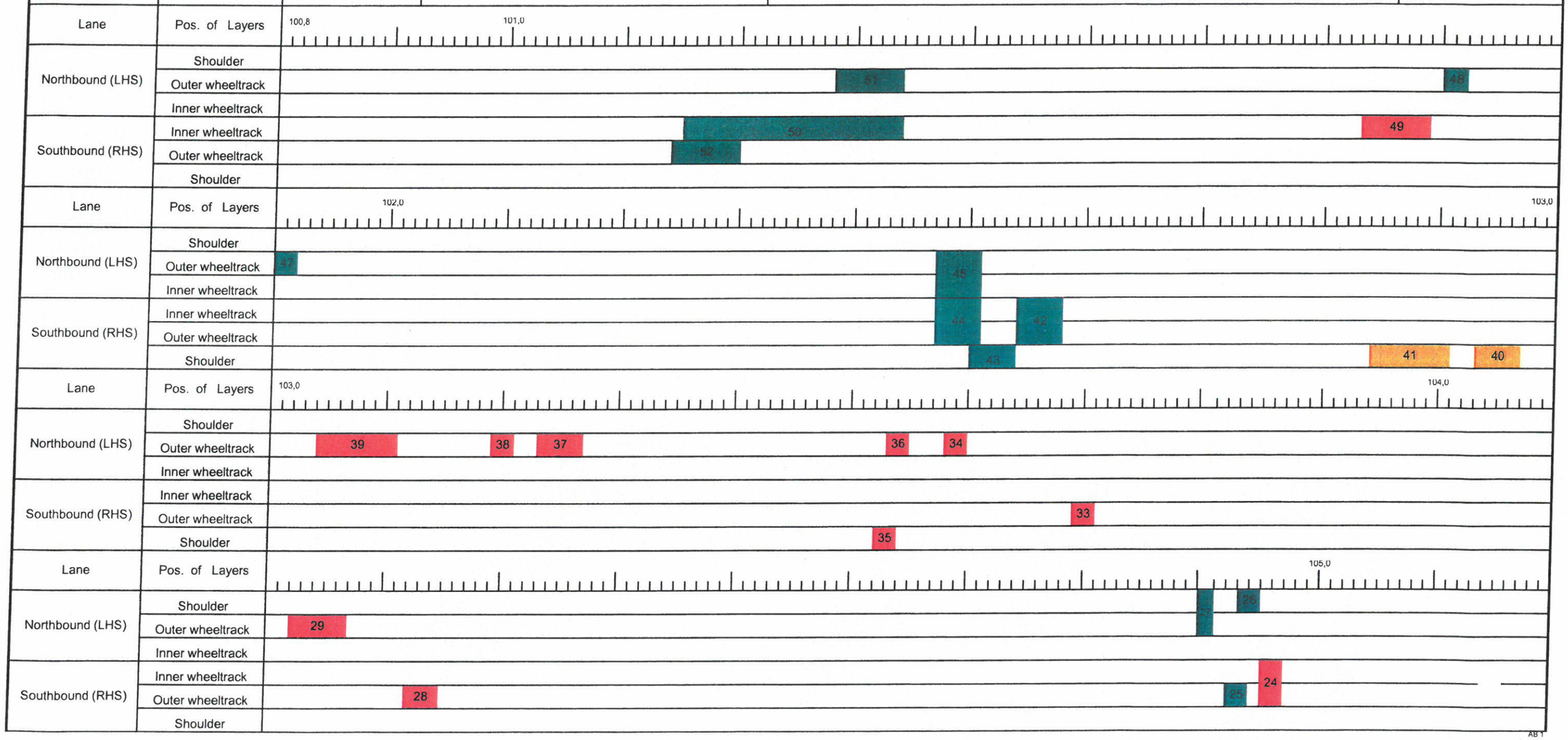
Prepared by : C PHILANDER
Date: 26/02/2018

Approved by:
Date: 23/07/2018

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.12 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
From : 100,8 to 105,2

Form AB 1 (01 / 2001)
Sheet no. 3 of 6



AB 1

Colour coding key for AB1

Surface patch - green
Base patch - red
Edge beack - orange
Shoulder [illegible] - blue

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

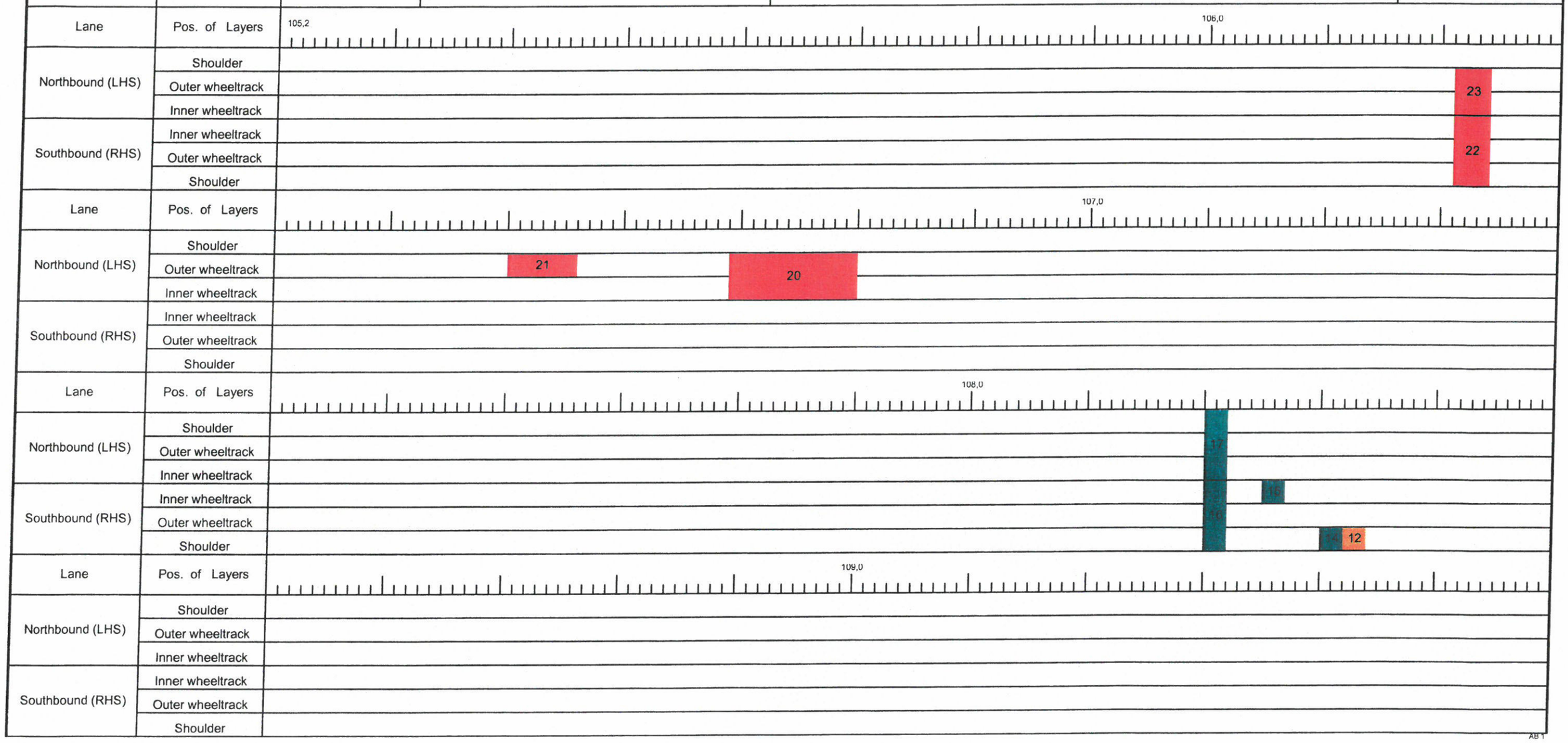
Prepared by : C PHILANDER
Date: 26/02/2018

Approved by:
Date: 23/07/2018

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.12 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
From : 105,2 to 109,6

Form AB 1 (01 / 2001)
Sheet no. 4 of 6



AB1

Colour coding key for AB1

Surface patch - green
Base patch - red
Edge break - orange
Shoulder built - blue

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

Prepared by : C PHILANDER
Date: 26/02/2018

Approved by:
Date: 23/07/2018

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.12 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
From : 109,6 to 114,0

Form AB 1 (01 / 2001)
Sheet no. 5 of 6

Lane	Pos. of Layers	109,6 ... 110,0
Northbound (LHS)	Shoulder	
	Outer wheeltrack	11
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	
	Outer wheeltrack	10
	Shoulder	
Lane	Pos. of Layers	111,0
Northbound (LHS)	Shoulder	6
	Outer wheeltrack	9A
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	
	Outer wheeltrack	9B 8 7
	Shoulder	
Lane	Pos. of Layers	112,0
Northbound (LHS)	Shoulder	5A&B
	Outer wheeltrack	
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	
	Outer wheeltrack	4
	Shoulder	3
Lane	Pos. of Layers	113,0 ... ####
Northbound (LHS)	Shoulder	
	Outer wheeltrack	
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	
	Outer wheeltrack	
	Shoulder	

AB 1

Colour coding key for AB1

Surface patch - green
Base patch - red
Edge breack - orange
Shoulder build - blue

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

Prepared by : C PHILANDER
Date: 26/02/2018

Approved by:
Date: 23/07/2018

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.12 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
From : 114,0 to 117,5

Form **AB 1** (01 / 2001)
Sheet no. 6 of 6

Lane	Pos. of Layers	114,0 ... 115,0
Northbound (LHS)	Shoulder	
	Outer wheeltrack	
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	
	Outer wheeltrack	
	Shoulder	2 ... 1
Lane	Pos. of Layers	116,0
Northbound (LHS)	Shoulder	
	Outer wheeltrack	
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	
	Outer wheeltrack	
	Shoulder	
Lane	Pos. of Layers	117,5
Northbound (LHS)	Shoulder	
	Outer wheeltrack	
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	
	Outer wheeltrack	
	Shoulder	
Lane	Pos. of Layers	117,5
Northbound (LHS)	Shoulder	
	Outer wheeltrack	
	Inner wheeltrack	
Southbound (RHS)	Inner wheeltrack	
	Outer wheeltrack	90
	Shoulder	

AB 1

Colour coding key for AB1

Surface patch - green
Base patch - red
Edge break - orange
Shoulder fault - blue

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

AS-BUILTS

5.2 AB 5: Patching Test Results

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

Prpared by: KJ Hill
Date: 10/12/2017

Approved by :
Date : 23/07/2018

PAVEMENT LAYERS
ASPHALT LAYERS

Contract : NRA N.012 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
Layer : A - E2 patching

From km 114+500
To km 109+600

Form AB5 (02/2015)
Sheet no. 1 of 7

a	Patch number	5A		5B		6		9A		11											
b	LHS - Northbound [offset and SV]	LHS shoulder / 112+662		LHS shoulder / 112+660		LHS shoulder / 111+642		LFW / 110+830		LOWP / 109+650											
c	Date placed (lot no.)	17/10/2017		17/10/2017		17/10/2017		17/10/2017		17/10/2017											
d	Mix and Plant	A-E2 // National Asphalt - Kimberley																			
	Mean / (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	$\bar{x}$	S	$\bar{x}$	S
e	Precoated chips Appl. (kg / m²)																				
f	Layer thickness (mm)	50mm		50mm		50mm		50mm		50mm											
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7											
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3											
i	Binder Content (%)	4,8	0,1	4,8	0,1	4,8	0,1	4,8	0,1	4,8	0,1										
j	Ref density (kg / m³)	2,573	0,005	2,573	0,005	2,573	0,005	2,573	0,005	2,573	0,005										
k	Compaction (%)	94,7		94,7		94,7		94,7		94,7											
l	Marshall Stab. / ITS (kN)	12,7 / 1,1		12,7 / 1,1		12,7 / 1,1		12,7 / 1,1		12,7 / 1,1											
m	Marshall Flow (mm)	3,7	0,9	3,7	0,9	3,7	0,9	3,7	0,9	3,7	0,9										
n	Temp. (Layer) (°C)																				
o	Tackcoat Appl. (Vm²)	0,6		0,6		0,6		0,6		0,6											
p	Prime Appl. (Vm²)	NA		NA		NA		NA		NA											
q	MC before Prime (%)	NA		NA		NA		NA		NA											
r	Design reference																				

a	Patch number	1		2		3		4		7		8		9B		10					
b	RHS - Southbound [offset and SV]	RHS - Bellmouth / 114+466		RHS - shoulder / 114+100		RIWP / 113+684		RIWP / 113+642		RFW / 111+242		ROWP / 111+288		RFW/ 110+830		ROWP+shoulder / 110+050					
c	Date placed (lot no.)	16/10/2017		16/10/2017		16/10/2017		16/10/2017		16/10/2017		16/10/2017		16/10/2017		16/10/2017					
d	Mix and Plant	A-E2 // National Asphalt - Kimberley																			
	Mean / (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				
e	Precoated chips Appl. (kg / m²)																				
f	Layer thickness (mm)	50mm		50mm		50mm		50mm		50mm		50mm		50mm		100mm					
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 64 / 18 / 5,8		100 / 64 / 18 / 5,8		100 / 64 / 18 / 5,8		100 / 64 / 18 / 5,8		100 / 64 / 18 / 5,8		100 / 64 / 18 / 5,8		100 / 64 / 18 / 5,8		100 / 64 / 18 / 5,8					
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 3,8 / 0,8 / 0,6		0,0 / 3,8 / 0,8 / 0,6		0,0 / 3,8 / 0,8 / 0,6		0,0 / 3,8 / 0,8 / 0,6		0,0 / 3,8 / 0,8 / 0,6		0,0 / 3,8 / 0,8 / 0,6		0,0 / 3,8 / 0,8 / 0,6		0,0 / 3,8 / 0,8 / 0,6					
i	Binder Content (%)	4,6	0,2	4,6	0,2	4,6	0,2	4,6	0,2	4,6	0,2	4,6	0,2	4,6	0,2	4,6	0,2				
j	Ref density (kg / m³)	2,582	0,0	2,582	0,0	2,582	0,0	2,582	0,0	2,582	0,0	2,582	0,0	2,582	0,0	2,582	0,0				
k	Compaction (%)	93,5		93,5		93,5		93,5		93,5		93,5		93,5		93,5					
l	Marshall Stab. / ITS (kN)	12,1 / 0,9		12,1 / 0,9		12,1 / 0,9		12,1 / 0,9		12,1 / 0,9		12,1 / 0,9		12,1 / 0,9		12,1 / 0,9					
m	Marshall Flow (mm)	3,2	0,3	3,2	0,3	3,2	0,3	3,2	0,3	3,2	0,3	3,2	0,3	3,2	0,3	3,2	0,3				
n	Temp. (Layer) (°C)																				
o	Tackcoat Appl. (Vm²)	0,6		0,6		0,6		0,6		0,6		0,6		0,6		0,6					
p	Prime Appl. (Vm²)	NA		NA		NA		NA		NA		NA		NA		NA					
q	MC before Prime (%)	NA		NA		NA		NA		NA		NA		NA		NA					
r	Design reference																				

Notes :

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

Prpared by: KJ Hill
Date: 10/12/2017

Approved by :
Date : 23/07/2018

PAVEMENT LAYERS
ASPHALT LAYERS

Contract : NRA N.012 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
Layer : A - E2 patching

From km 109+600
To km 104+950

Form **AB5** (02/2015)
Sheet no. 2 of 7

a	Patch number	17		20		21							
b	LHS - Northbound [offset and SV]	LFW / 108+210		LFW / 106+740		LOWP / 106+570							
c	Date placed (lot no.)	17/10/2017		19/10/2017		19-Oct-17							
d	Mix and Plant	A-E2 // National Asphalt - Kimberley											
	Mean / (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
e	Precoated chips Appl. (kg / m²)														
f	Layer thickness (mm)	50mm		100mm		100mm									
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7									
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3									
i	Binder Content (%)	4,8	0,1	4,8	0,1	4,8	0,1								
j	Ref density (kg / m³)	2,573	0,005	2,573	0,005	2,573	0,005								
k	Compaction (%)	94,7		94,7		94,7									
l	Marshall Stab. / ITS (kN)	12,7 / 1,1		12,7 / 1,1		12,7 / 1,1									
m	Marshall Flow (mm)	3,7	0,9	3,7	0,9	3,7	0,9								
n	Temp. (Layer) (°C)														
o	Tackcoat Appl. (Vm²)	0,6		0,6		0,6									
p	Prime Appl. (Vm²)	NA		NA		NA									
q	MC before Prime (%)	NA		NA		NA									
r	Design reference														

a	Patch number	12		14		15		16		18		19		22	24
b	RHS - Southbound [offset and SV]	R edgebreak / 109+355		R edgebreak / 108+310		RH shoulder / 108+305		RFW / 108+220		RIWP / 108+248		RH shoulder / 108+015		RFW / 106+230	RFW / 104+968
c	Date placed (lot no.)	3/11/2017		19/10/2017		19/10/2017		19/10/2017		19/10/2017		19/10/2017		23/10/2017	23/10/2017
d	Mix and Plant	A-E2 // National Asphalt - Kimberley													
	Mean / (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
e	Precoated chips Appl. (kg / m²)														
f	Layer thickness (mm)	50mm		50mm		50mm		50mm		50mm		50mm		100mm	50mm
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7		100 / 62 / 18 / 5,7		100 / 61 / 18 / 5,5	100 / 61 / 18 / 5,5
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3		0,0 / 3,4 / 0,8 / 0,3		0,0 / 2,4 / 1,0 / 0,3	0,0 / 2,4 / 1,0 / 0,3
i	Binder Content (%)	4,8	0,1	4,8	0,1	4,8	0,1	4,8	0,1	4,8	0,1	4,8	0,1	4,7 0,1	4,7 0,1
j	Ref density (kg / m³)	2,573	0,005	2,573	0,005	2,573	0,005	2,573	0,005	2,573	0,005	2,573	0,005	2,558 0,01	2,558 0,01
k	Compaction (%)	94,7		94,7		94,7		94,7		94,7		94,7		95,4	95,4
l	Marshall Stab. / ITS (kN)	12,7 / 1,1		12,7 / 1,1		12,7 / 1,1		12,7 / 1,1		12,7 / 1,1		12,7 / 1,1		11,5 / 1,4	11,5 / 1,4
m	Marshall Flow (mm)	3,7	0,9	3,7	0,9	3,7	0,9	3,7	0,9	3,7	0,9	3,7	0,9	3,0 0,3	3,0 0,3
n	Temp. (Layer) (°C)														
o	Tackcoat Appl. (Vm²)	0,6		0,6		0,6		0,6		0,6		0,6		0,6	0,6
p	Prime Appl. (Vm²)	NA		NA		NA		NA		NA		NA		NA	NA
q	MC before Prime (%)	NA		NA		NA		NA		NA		NA		NA	NA
r	Design reference														

Notes :

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

Prpared by: KJ Hill
Date: 10/12/2017

Approved by :
Date : 23/07/2018

PAVEMENT LAYERS
ASPHALT LAYERS

Contract : NRA N.012 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
Layer : A - E2 patching

From km 106+400
To km 103+200

Form **AB5** (02/2015)
Sheet no. 3 of 7

a	Patch number	23	26	27	29	30	34	36	37
b	LHS - Northbound [offset and SV]	LFW / 106+230	LH shoulder / 104+928	LOWP+ shoulder / 104+908	LOWP / 104+150	LOWP / 104+035	LOWP / 103+580	LOWP / 103+540	LOWP / 103+250
c	Date placed (lot no.)	20/10/2017	20/10/2017	20/10/2017	20/10/2017	20/10/2017	25/10/2017	25/10/2017	25/10/2017
d	Mix and Plant	A-E2 // National Asphalt - Kimberley							
	Mean / (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
e	Precoated chips Appl. (kg / m²)								
f	Layer thickness (mm)	100mm	50mm	50mm	100mm	100mm	50mm	100mm	50mm
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 64 / 18 / 6	100 / 64 / 18 / 6	100 / 64 / 18 / 6	100 / 64 / 18 / 6	100 / 64 / 18 / 6	100 / 68 / 24 / 6	100 / 68 / 24 / 6	100 / 68 / 24 / 6
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 2,1 / 0,5 / 0,2	0,0 / 2,1 / 0,5 / 0,2	0,0 / 2,1 / 0,5 / 0,2	0,0 / 2,1 / 0,5 / 0,2	0,0 / 2,1 / 0,5 / 0,2	0,0 / 1,4 / 0,7 / 0,1	0,0 / 1,4 / 0,7 / 0,1	0,0 / 1,4 / 0,7 / 0,1
i	Binder Content (%)	4,7 0,1	4,7 0,1	4,7 0,1	4,7 0,1	4,7 0,1	4,8 0,0	4,8 0,0	4,8 0,0
j	Ref density (kg / m³)	2,541 0,04	2,541 0,04	2,541 0,04	2,541 0,04	2,541 0,04	2,578 0,008	2,578 0,008	2,578 0,008
k	Compaction (%)	94,7	94,7	94,7	94,7	94,7	93,8	93,8	93,8
l	Marshall Stab. / ITS (kN)	13,7 / 1,2	13,7 / 1,2	13,7 / 1,2	13,7 / 1,2	13,7 / 1,2	11,2 / 1,1	11,2 / 1,1	11,2 / 1,1
m	Marshall Flow (mm)	3,8 0,4	3,8 0,4	3,8 0,4	3,8 0,4	3,8 0,4	3,1 0,2	3,1 0,2	3,1 0,2
n	Temp. (Layer) (°C)								
o	Tackcoat Appl. (Vm²)	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6
p	Prime Appl. (Vm²)	NA	NA	NA	NA	NA	NA	NA	NA
q	MC before Prime (%)	NA	NA	NA	NA	NA	NA	NA	NA
r	Design reference								

a	Patch number	25	28	33	35				
b	RHS - Southbound [offset and SV]	ROWP / 104+930	ROWP / 104+230	ROWP / 103+700	RH shoulder / 103+530				
c	Date placed (lot no.)	23/10/2017	20/10/2017	23/10/2017	26/10/2017				
d	Mix and Plant	A-E2 // National Asphalt - Kimberley							
	Mean / (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
e	Precoated chips Appl. (kg / m²)								
f	Layer thickness (mm)	50mm	100mm	100mm	50mm				
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 61 / 18 / 5,5	100 / 64 / 18 / 6	100 / 61 / 18 / 5,5	100 / 60 / 18 / 5,7				
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 2,4 / 1,0 / 0,3	0,0 / 2,1 / 0,5 / 0,2	0,0 / 2,4 / 1,0 / 0,3	0,0 / 4,1 / 0,8 / 0,2				
i	Binder Content (%)	4,7 0,1	4,7 0,1	4,7 0,1	4,6 0,2				
j	Ref density (kg / m³)	2,558 0,01	2,541 0,04	2,558 0,01	2,551 0,015				
k	Compaction (%)	95,4	94,7	95,4	95,1				
l	Marshall Stab. / ITS (kN)	11,5 / 1,4	13,7 / 1,2	11,5 / 1,4	12,2 / 1,0				
m	Marshall Flow (mm)	3,0 0,3	3,8 0,4	3,0 0,3	3,1 0,3				
n	Temp. (Layer) (°C)								
o	Tackcoat Appl. (Vm²)	0,6	0,6	0,6	0,6				
p	Prime Appl. (Vm²)	NA	NA	NA	NA				
q	MC before Prime (%)	NA	NA	NA	NA				
r	Design reference								

Notes :

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

Prpared by: KJ Hill
Date: 10/12/2017

Approved by :
Date : 23/07/2018

PAVEMENT LAYERS
ASPHALT LAYERS

Contract : NRA N.012 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
Layer : A - E2 patching

From km 103+200
To km 101+150

Form **AB5** (02/2015)
Sheet no. 4 of 7

a	Patch number	38		39		45		47		48		51					
b	LHS - Northbound [offset and SV]	LOWP / 103+196		LOWP / 103+070		LFW / 102+490		LOWP / 101+898		LOWP / 101+808		LOWP / 101+310					
c	Date placed (lot no.)	25/10/2017		25/10/2017		25/10/2017		25/10/2017		25/10/2017		1/11/2017					
d	Mix and Plant	A-E2 // National Asphalt - Kimberley															
	Mean / (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
e	Precoated chips Appl. (kg / m²)																
f	Layer thickness (mm)	50mm		50mm		50mm		50mm		50mm		50mm					
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 68 / 24 / 6		100 / 68 / 24 / 6		100 / 68 / 24 / 6		100 / 68 / 24 / 6		100 / 68 / 24 / 6		100 / 58 / 19 / 6,4					
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 1,4 / 0,7 / 0,1		0,0 / 1,4 / 0,7 / 0,1		0,0 / 1,4 / 0,7 / 0,1		0,0 / 1,4 / 0,7 / 0,1		0,0 / 1,4 / 0,7 / 0,1		0,0 / 3,0 / 0,6 / 0,2					
i	Binder Content (%)	4,8	0,0	4,8	0,0	4,8	0,0	4,8	0,0	4,8	0,0	4,7	0,3				
j	Ref density (kg / m³)	2,578	0,008	2,578	0,008	2,578	0,008	2,578	0,008	2,578	0,008	2,568	0,005				
k	Compaction (%)	93,8		93,8		93,8		93,8		93,8		94,2					
l	Marshall Stab. / ITS (kN)	11,2	/ 1,1	11,2	/ 1,1	11,2	/ 1,1	11,2	/ 1,1	11,2	/ 1,1	12,9	/ 0,9				
m	Marshall Flow (mm)	3,1	0,2	3,1	0,2	3,1	0,2	3,1	0,2	3,1	0,2	5,2	0,3				
n	Temp. (Layer) (°C)																
o	Tackcoat Appl. (Vm²)	0,6		0,6		0,6		0,6		0,6		0,6					
p	Prime Appl. (Vm²)	NA		NA		NA		NA		NA		NA					
q	MC before Prime (%)	NA		NA		NA		NA		NA		NA					
r	Design reference																

a	Patch number	40		41		42		43		44		46	49	50
b	RHS - Southbound [offset and SV]	RHS edgebreak / 102+945		RHS edgebreak / 102+885		RFW / 102+560		RH shoulder / 102+520		RFW / 102+490		ROWP / 102+150	RIWP / 101+750	RIWP / 101+200
c	Date placed (lot no.)	23/10/2017		23/10/2017		23/10/2017		23/10/2017		23/10/2017		26/10/2017	26/10/2017	26/10/2017
d	Mix and Plant	A-E2 // National Asphalt - Kimberley												
	Mean / (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
e	Precoated chips Appl. (kg / m²)													
f	Layer thickness (mm)	50mm		50mm		50mm		50mm		50mm		50mm	50mm	50mm
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 61 / 18 / 5,5		100 / 61 / 18 / 5,5		100 / 61 / 18 / 5,5		100 / 61 / 18 / 5,5		100 / 61 / 18 / 5,5		100 / 60 / 18 / 5,7	100 / 60 / 18 / 5,7	100 / 60 / 18 / 5,7
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 2,4 / 1,0 / 0,3		0,0 / 2,4 / 1,0 / 0,3		0,0 / 2,4 / 1,0 / 0,3		0,0 / 2,4 / 1,0 / 0,3		0,0 / 2,4 / 1,0 / 0,3		0,0 / 4,1 / 0,8 / 0,2	0,0 / 4,1 / 0,8 / 0,2	0,0 / 4,1 / 0,8 / 0,2
i	Binder Content (%)	4,7	0,1	4,7	0,1	4,7	0,1	4,7	0,1	4,7	0,1	4,5 0,2	4,5 0,2	4,5 0,2
j	Ref density (kg / m³)	2,558	0,01	2,558	0,01	2,558	0,01	2,558	0,01	2,558	0,01	2,551 0,015	2,551 0,015	2,551 0,015
k	Compaction (%)	95,4		95,4		95,4		95,4		95,4		95,1	95,1	95,1
l	Marshall Stab. / ITS (kN)	11,5	/ 1,4	11,5	/ 1,4	11,5	/ 1,4	11,5	/ 1,4	11,5	/ 1,4	12,2 / 1,0	12,2 / 1,0	12,2 / 1,0
m	Marshall Flow (mm)	3,0	0,3	3,0	0,3	3,0	0,3	3,0	0,3	3,0	0,3	3,1 0,3	3,1 0,3	3,1 0,3
n	Temp. (Layer) (°C)													
o	Tackcoat Appl. (Vm²)	0,6		0,6		0,6		0,6		0,6		0,6	0,6	0,6
p	Prime Appl. (Vm²)	NA		NA		NA		NA		NA		NA	NA	NA
q	MC before Prime (%)	NA		NA		NA		NA		NA		NA	NA	NA
r	Design reference													

Notes :

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

Prpared by: KJ Hill
Date: 10/12/2017

Approved by :
Date : 23/07/2018

PAVEMENT LAYERS
ASPHALT LAYERS

Contract : NRA N.012 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
Layer : A - E2 patching

From km 101+150
To km 99+400

Form **AB5** (02/2015)
Sheet no. 5 of 7

a	Patch number	53		54		56		57		58		62		64		
b	LHS - Northbound	LFW / 99+870		LFW / 99+990		LFW / 99+800		LOWP / 99+818		LFW / 99+760		LIWP / 99+564		LOWP / 99+440		
c	Date placed (lot no.)	2/11/2017		2/11/2017		25/10/2017		2/11/2017		2/11/2017		2/11/2017		2/11/2017		
d	Mix and Plant	A-E2 // National Asphalt - Kimberley														
	Mean / (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
e	Precoated chips Appl. (kg / m²)															
f	Layer thickness (mm)	50mm		50mm		50mm		50mm		50mm		50mm		50mm		
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 62 / 19 / 5,6		100 / 62 / 19 / 5,6		100 / 68 / 24 / 6		100 / 62 / 19 / 5,6		100 / 62 / 19 / 5,6		100 / 62 / 19 / 5,6		100 / 62 / 19 / 5,6		
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 2,9 / 0,6 / 0,3		0,0 / 2,9 / 0,6 / 0,3		0,0 / 1,4 / 0,7 / 0,1		0,0 / 2,9 / 0,6 / 0,3		0,0 / 2,9 / 0,6 / 0,3		0,0 / 2,9 / 0,6 / 0,3		0,0 / 2,9 / 0,6 / 0,3		
i	Binder Content (%)	4,8	0,2	4,8	0,2	4,8	0,0	4,8	0,2	4,8	0,2	4,8	0,2	4,8	0,2	
j	Ref density (kg / m³)	3	0,0	3	0,0	2,578	0,008	3	0,0	3	0,0	3	0,0	3	0,0	
k	Compaction (%)	94,6		94,6		93,8		94,6		94,6		94,6		94,6		
l	Marshall Stab. / ITS (kN)	15,0	/ 1,6	15,0	/ 1,6	11,2	/ 1,1	15,0	/ 1,6	15,0	/ 1,6	15,0	/ 1,6	15,0	/ 1,6	
m	Marshall Flow (mm)	4,4	0,5	4,4	0,5	3,1	0,2	4,4	0,5	4,4	0,5	4,4	0,5	4,4	0,5	
n	Temp. (Layer) (°C)															
o	Tackcoat Appl. (Vm²)	0,6		0,6		0,6		0,6		0,6		0,6		0,6		
p	Prime Appl. (Vm²)	NA		NA		NA		NA		NA		NA		NA		
q	MC before Prime (%)	NA		NA		NA		NA		NA		NA		NA		
r	Design reference															

a	Patch number	52		59		60		61		63						
b	RHS - Southbound	ROWP / 101+168		RIWP / 99+760		RFW / 99+640		RIWP / 99+590		RIWP / 99+490						
c	Date placed (lot no.)	26/10/2017		1/11/2017		2/11/2017		1/11/2017		1/11/2017						
d	Mix and Plant	A-E2 // National Asphalt - Kimberley														
	Mean / (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
e	Precoated chips Appl. (kg / m²)															
f	Layer thickness (mm)	50mm		50mm		50mm		50mm		50mm						
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 60 / 18 / 5,7		100 / 58 / 19 / 6,4		100 / 62 / 19 / 5,6		100 / 58 / 19 / 6,4		100 / 58 / 19 / 6,4						
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 4,1 / 0,8 / 0,2		0,0 / 3,0 / 0,6 / 0,2		0,0 / 2,9 / 0,6 / 0,3		0,0 / 3,0 / 0,6 / 0,2		0,0 / 3,0 / 0,6 / 0,2						
i	Binder Content (%)	4,5	0,2	4,7	0,3	4,8	0,2	4,7	0,3	4,7	0,3					
j	Ref density (kg / m³)	2,551	0,015	2,568	0,005	3	0,0	2,568	0,005	2,568	0,005					
k	Compaction (%)	95,1		94,2		94,6		94,2		94,2						
l	Marshall Stab. / ITS (kN)	12,2	/ 1,0	12,9	/ 0,9	15,0	/ 1,6	12,9	/ 0,9	12,9	/ 0,9					
m	Marshall Flow (mm)	3,1	0,3	5,2	0,3	4,4	0,5	5,2	0,3	5,2	0,3					
n	Temp. (Layer) (°C)															
o	Tackcoat Appl. (Vm²)	0,6		0,6		0,6		0,6		0,6						
p	Prime Appl. (Vm²)	NA		NA		NA		NA		NA						
q	MC before Prime (%)	NA		NA		NA		NA		NA						
r	Design reference															

Notes :

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

Prpared by: KJ Hill
Date: 10/12/2017

Approved by :
Date : 23/07/2018

PAVEMENT LAYERS
ASPHALT LAYERS

Contract : NRA N.012 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
Layer : A - E2 patching

From km 99+400
To km 92+100

Form **AB5** (02/2015)
Sheet no. 6 of 7

a	Patch number	65	67	71	72	73	74	81	84
b	LHS - Northbound	LOWP / 99+440	LIWP / 99+253	LIWP / 98+740	LIWP / 98+600	LIWP / 98+638	LOWP / 98+254	LFW / 92+235	LIWP / 92+245
c	Date placed (lot no.)	2/11/2017	2/11/2017	2/11/2017	2/11/2017	2/11/2017	2/11/2017	3/11/2017	3/11/2017
d	Mix and Plant	A-E2 // National Asphalt - Kimberley							
	Mean / (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
e	Precoated chips Appl. (kg / m²)								
f	Layer thickness (mm)	50mm	50mm	50mm	50mm	50mm	50mm	50mm	50mm
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 62 / 19 / 5,6	100 / 62 / 19 / 5,6	100 / 62 / 19 / 5,6	100 / 62 / 19 / 5,6	100 / 62 / 19 / 5,6	100 / 62 / 19 / 5,6	100 / 65 / 19 / 5,4	100 / 65 / 19 / 5,4
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 2,9 / 0,6 / 0,3	0,0 / 2,9 / 0,6 / 0,3	0,0 / 2,9 / 0,6 / 0,3	0,0 / 2,9 / 0,6 / 0,3	0,0 / 2,9 / 0,6 / 0,3	0,0 / 2,9 / 0,6 / 0,3	0,0 / 0,5 / 0,0 / 0,1	0,0 / 0,5 / 0,0 / 0,1
i	Binder Content (%)	4,8 0,2	4,8 0,2	4,8 0,2	4,8 0,2	4,8 0,2	4,8 0,2	4,7 0,1	4,7 0,1
j	Ref density (kg / m³)	3 0,0	3 0,0	3 0,0	3 0,0	3 0,0	3 0,0	2,557 0,008	2,557 0,008
k	Compaction (%)	94,6	94,6	94,6	94,6	94,6	94,6	95,3	95,3
l	Marshall Stab. / ITS (kN)	15,0 / 1,6	15,0 / 1,6	15,0 / 1,6	15,0 / 1,6	15,0 / 1,6	15,0 / 1,6	10,7 / 1,5	10,7 / 1,5
m	Marshall Flow (mm)	4,4 0,5	4,4 0,5	4,4 0,5	4,4 0,5	4,4 0,5	4,4 0,5	6,0 0,4	6,0 0,4
n	Temp. (Layer) (°C)								
o	Tackcoat Appl. (Vm²)	0,6	0,6	0,6	0,6	0,6	0,6	0,6	0,6
p	Prime Appl. (Vm²)	NA	NA	NA	NA	NA	NA	NA	NA
q	MC before Prime (%)	NA	NA	NA	NA	NA	NA	NA	NA
r	Design reference								

a	Patch number	66	68	69	75	76	80		
b	RHS - Southbound	RIWP / 99+300	RIWP / 99+170	ROWP	RIWP / 98+100	RIWP / 97+960	RFW / 93+995		
c	Date placed (lot no.)	1/11/2017	1/11/2017	1/11/2017	1/11/2017	1/11/2017	3/11/2017		
d	Mix and Plant	A-E2 // National Asphalt - Kimberley							
	Mean / (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
e	Precoated chips Appl. (kg / m²)								
f	Layer thickness (mm)	50mm	50mm	50mm	50mm	50mm	50mm		
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 58 / 19 / 6,4	100 / 58 / 19 / 6,4	100 / 58 / 19 / 6,4	100 / 58 / 19 / 6,4	100 / 58 / 19 / 6,4	100 / 65 / 19 / 5,4		
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 3,0 / 0,6 / 0,2	0,0 / 3,0 / 0,6 / 0,2	0,0 / 3,0 / 0,6 / 0,2	0,0 / 3,0 / 0,6 / 0,2	0,0 / 3,0 / 0,6 / 0,2	0,0 / 0,5 / 0,0 / 0,1		
i	Binder Content (%)	4,7 0,3	4,7 0,3	4,7 0,3	4,7 0,3	4,7 0,3	4,7 0,1		
j	Ref density (kg / m³)	2,568 0,005	2,568 0,005	2,568 0,005	2,568 0,005	2,568 0,005	2,557 0,008		
k	Compaction (%)	94,2	94,2	94,2	94,2	94,2	95,3		
l	Marshall Stab. / ITS (kN)	12,9 / 0,9	12,9 / 0,9	12,9 / 0,9	12,9 / 0,9	12,9 / 0,9	10,7 / 1,5		
m	Marshall Flow (mm)	5,2 0,3	5,2 0,3	5,2 0,3	5,2 0,3	5,2 0,3	6,0 0,4		
n	Temp. (Layer) (°C)								
o	Tackcoat Appl. (Vm²)	0,6	0,6	0,6	0,6	0,6	0,6		
p	Prime Appl. (Vm²)	NA	NA	NA	NA	NA	NA		
q	MC before Prime (%)	NA	NA	NA	NA	NA	NA		
r	Design reference								

Notes :

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

Prpared by: KJ Hill
Date: 10/12/2017

Approved by :
Date : 23/07/2018

PAVEMENT LAYERS
ASPHALT LAYERS

Contract : NRA N.012 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
Layer : A - E2 patching

From km 92+100
To km 117+400

Form **AB5** (02/2015)
Sheet no. 7 of 7

a	Patch number	86															
b	LHS - Northbound [offset and SV]	LOWP / 92+090															
c	Date placed (lot no.)	3/11/2017															
d	Mix and Plant	A-E2 // National Asphalt - Kimberley															
	Mean / (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
e	Precoated chips Appl. (kg / m²)																
f	Layer thickness (mm)	50mm															
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 65 / 19 / 5,4															
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 0,5 / 0,0 / 0,1															
i	Binder Content (%)	4,7	0,1														
j	Ref density (kg / m³)	2,557	0,008														
k	Compaction (%)	95,3															
l	Marshall Stab. / ITS (kN)	10,7	/ 1,5														
m	Marshall Flow (mm)	6,0	0,4														
n	Temp. (Layer) (°C)																
o	Tackcoat Appl. (Vm²)	0,6															
p	Prime Appl. (Vm²)	NA															
q	MC before Prime (%)	NA															
r	Design reference																

a	Patch number	87	88	89	90				
b	RHS - Southbound [offset and SV]	ROWP / 92+145	RH shoulder / 92+093	ROWP / 92+085	ROWP / 117+368				
c	Date placed (lot no.)	3/11/2017	3/11/2017	3/11/2017	3/11/2017				
d	Mix and Plant	A-E2 // National Asphalt - Kimberley							
	Mean / (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
e	Precoated chips Appl. (kg / m²)								
f	Layer thickness (mm)	50mm	50mm	50mm	50mm				
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 65 / 19 / 5,4	100 / 65 / 19 / 5,4	100 / 65 / 19 / 5,4	100 / 65 / 19 / 5,4				
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0 / 0,5 / 0,0 / 0,1	0,0 / 0,5 / 0,0 / 0,1	0,0 / 0,5 / 0,0 / 0,1	0,0 / 0,5 / 0,0 / 0,1				
i	Binder Content (%)	4,7 0,1	4,7 0,1	4,7 0,1	4,7 0,1				
j	Ref density (kg / m³)	2,557 0,008	2,557 0,008	2,557 0,008	2,557 0,008				
k	Compaction (%)	95,3	95,3	95,3	95,3				
l	Marshall Stab. / ITS (kN)	10,7 / 1,5	10,7 / 1,5	10,7 / 1,5	10,7 / 1,5				
m	Marshall Flow (mm)	6,0 0,4	6,0 0,4	6,0 0,4	6,0 0,4				
n	Temp. (Layer) (°C)								
o	Tackcoat Appl. (Vm²)	0,6	0,6	0,6	0,6				
p	Prime Appl. (Vm²)	NA	NA	NA	NA				
q	MC before Prime (%)	NA	NA	NA	NA				
r	Design reference								

Notes :

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

AS-BUILTS

5.3 AB 5: Asphalt Overlay Test Results

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

Prpared by: KJ Hill
Date: 17/04/2018

Approved by :
Date : 23/07/2018

PAVEMENT LAYERS
ASPHALT LAYERS

Contract : NRA N.012 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
Layer : A - E2 overlay

From km 117+400
To km 116+600

Form **AB5** (02/2015)
Sheet no. 1 of 3

a	Request No	4/A29		4/A31							
b	LHS - Northbound [offset and SV]	LHS - 117+400 to 116+600 Lane		LHS - 117+400 to 116+600 Shoulder							
c	Date placed (lot no.)	14/03/2018		13/03/2018							
d	Mix and Plant	A-E2 // National Asphalt - Kimberley									
	Mean / (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
e	Precoated chips Appl. (kg / m²)																
f	Layer thickness (mm)	50mm		50mm													
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100 / 57 / 20 / 5,4		99 / 53 / 16 / 6,4													
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,5 / 4,1 / 4,8 / 0,7		0,5 / 1,6 / 0,8 / 0,4													
i	Binder Content (%)	4,9	0,2	4,6	0,1												
j	Ref density (kg / m³)	2 597,7	8,6	2 589,8	8,9												
k	Compaction (%)	93,0		93,8													
l	Marshall Stab. / ITS (kN)	14,4	0,9	16,4	1,0												
m	Marshall Flow (mm)	3,7	0,4	5,0	0,3												
n	Temp. (Layer) (°C)																
o	Tackcoat Appl. (Vm²)	0,6		0,6													
p	Prime Appl. (Vm²)	NA		NA													
q	MC before Prime (%)	NA		NA													
r	Design reference																

a	Request No	4/A27		4/A28							
b	RHS - Southbound [offset and SV]	RHS - 117+400 to 116+600 Lane		RHS - 117+400 to 116+600 Shoulder							
c	Date placed (lot no.)	12/03/2018		13/03/2018							
d	Mix and Plant	A-E2 // National Asphalt - Kimberley									
	Mean / (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
e	Precoated chips Appl. (kg / m²)																
f	Layer thickness (mm)	50mm		50mm													
g	SAI (x) | 14.0 / 5.00 / 0.600 / 0.075	100 / 54 / 19 / 6,9		100 / 59 / 23 / 4,9													
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,5 / 3,8 / 4,8 / 0,5		0,0 / 0,8 / 5,2 / 0,7													
i	Binder Content (%)	4,7	0,2	5,0	0,1												
j	Ref density (kg / m³)	2 590,3	14,1	2 625,2	16,4												
k	Compaction (%)	94,0		93,3													
l	Marshall Stab. / ITS (kN)	16,6	2,0	15,4	0,3												
m	Marshall Flow (mm)	4,7	0,5	3,7	0,3												
n	Temp. (Layer) (°C)																
o	Tackcoat Appl. (Vm²)	0,6		0,6													
p	Prime Appl. (Vm²)	NA		NA													
q	MC before Prime (%)	NA		NA													
r	Design reference																

Notes :

SANRAL SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prpared by: KJ Hill Date: 17/04/2018	Approved by : Date : 23/07/2018	**PAVEMENT LAYERS** **ASPHALT LAYERS**	Contract : NRA N.012 - 090 - 2017/4F Route : N12 Section : 9 Carriageway : Single Layer : A - E2 overlay	From km 115+200 To km 114+500	Form **AB5** (02/2015) Sheet no. 2 of 3

a	Request No	4/A3		4/A4		4/A6		4/A33											
b	LHS - Northbound [offset and SV]	LHS - 115+180 to 115+130		LHS - 115+130 to 115+080		LHS - 115+080 to 114+873		LHS 114+873 to 114+500 / 6.0											
c	Date placed (lot no.)	11/10/2017		12/10/2017		14/10/2017		19/03/2018											
d	Mix and Plant	A-E2 // National Asphalt - Kimberley																	
	Mean / (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	$\bar{x}$	S
e	Precoated chips Appl. (kg / m²)																		
f	Layer thickness (mm)	50mm		50mm		50mm		50mm		50mm									
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	99 / 66 / 19 / 6,4		100 / 63 / 19 / 5,6		100 66 19 6,6		100 60 26 7,0											
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,5 / 1,3 / 0,9 / 0,9		0,0 / 2,7 / 1,0 / 0,6		0,7 0,0 0,0 0,1		0,4 2,3 5,9 1,7											
i	Binder Content (%)	4,9	0,1	4,6	0,1	4,6	0,1	4,6	0,1										
j	Ref density (kg / m³)	2 615,0	22,6	2 600,5	13,4	2 592,5	0,7	2 607,3	11,6										
k	Compaction (%)	95,7		93,8		95,2		93,4											
l	Marshall Stab. / ITS (kN)	11,5 / 1,4		10,7 / 0,7		12,3	1,1	16,2	1,3										
m	Marshall Flow (mm)	3,0	0,1	3,3	0,1	3,3	0,1	4,9	0,4										
n	Temp. (Layer) (°C)																		
o	Tackcoat Appl. (Vm²)	0,6		0,6		0,6		0,6											
p	Prime Appl. (Vm²)	NA		NA		NA		NA											
q	MC before Prime (%)	NA		NA		NA		NA											
r	Design reference																		

a	Request No	4/A3		4/A4		4/A6		4/A32											
b	RHS - Southbound [offset and SV]	RHS - 115+180 to 115+130		RHS - 115+130 to 115+080		RHS - 115+080 to 114+873		RHS 114+873 to 114+500 / 6.0											
c	Date placed (lot no.)	11/10/2017		12/10/2017		14/10/2017		16/3/2018											
d	Mix and Plant	A-E2 // National Asphalt - Kimberley																	
	Mean / (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	$\bar{x}$	S
e	Precoated chips Appl. (kg / m²)																		
f	Layer thickness (mm)	50mm		50mm		50mm		50mm											
g	SAI (x) | 14.0 / 5.00 / 0.600 / 0.075	99 / 66 / 19 / 6,4		100 / 63 / 19 / 5,6		100 66 19 6,6		100 58 21 6,2											
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,5 / 1,3 / 0,9 / 0,9		0,0 / 2,7 / 1,0 / 0,6		0,7 0,0 0,0 0,1		0,4 2,0 2,4 1,8											
i	Binder Content (%)	4,9	0,1	4,6	0,1	4,6	0,1	4,7	0,2										
j	Ref density (kg / m³)	2 615,0	22,6	2 600,5	13,4	2 592,5	0,710	2 598,0	12,4										
k	Compaction (%)	95,7		93,8		95,2		95,3											
l	Marshall Stab. / ITS (kN)	11,5 / 1,4		10,7 / 0,7		12,3	1,1	15,8	1,0										
m	Marshall Flow (mm)	3,0	0,1	3,3	0,1	3,3	0,1	5,1	0,3										
n	Temp. (Layer) (°C)																		
o	Tackcoat Appl. (Vm²)	0,6		0,6		0,6		0,6											
p	Prime Appl. (Vm²)	NA		NA		NA		NA											
q	MC before Prime (%)	NA		NA		NA		NA											
r	Design reference																		

Notes :

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

Prpared by: KJ Hill
Date: 17/04/2018

Approved by :
Date : 23/07/2018

PAVEMENT LAYERS
ASPHALT LAYERS

Contract : NRA N.012 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
Layer : A - E2 overlay

From km 109+600
To km 112+600

Form **AB5** (02/2015)
Sheet no. 3 of 3

a	Request No	4/A38				4/A39				4/A40									
b	LHS - Northbound [offset and SV]	LHS - 111+900 to 112+600/5.0				LHS - 111+900 to 112+600/10.8				LHS - 109+600 to 110+000/9.5									
c	Date placed (lot no.)	24/03/2018				26/03/2018				27/03/2018									
d	Mix and Plant	A-E2 // National Asphalt - Kimberley																	
	Mean / (x) // Std. Dev. . (s)	$\bar{x}$		s		$\bar{x}$		s		$\bar{x}$		s		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
e	Precoated chips Appl. (kg / m²)																		
f	Layer thickness (mm)	50mm				50mm				50mm				50mm		50mm			
g	SAI (x) | 20.0 / 5.00 / 0.600 / 0.075	100	58	19	5,5	100	58	19	5,9	100	57	18	5,2						
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,5	2,6	1,0	0,6	0,4	1,4	1,9	1,0	0,4	1,7	1,4	0,3						
i	Binder Content (%)	4,6		0,1		4,6		0,1		4,7		0,1							
j	Ref density (kg / m³)	2 605,8		9,9		2 604,8		4,4		2 602,7		6,3							
k	Compaction (%)	94,5				94,2				92,8									
l	Marshall Stab. / ITS (kN)	16,3		1,3		15,9		0,9		16,3		0,6							
m	Marshall Flow (mm)	5,3		0,4		4,7		0,3		5,0		0,4							
n	Temp. (Layer) (°C)																		
o	Tackcoat Appl. (Vm²)	0,6				0,6				0,6				0,6					
p	Prime Appl. (Vm²)	NA				NA				NA				NA					
q	MC before Prime (%)	NA				NA				NA				NA					
r	Design reference																		

a	Request No	4/A34				4/A35				4/A37									
b	RHS - Southbound [offset and SV]	RHS - 111+900 to 112+600/3.7				RHS - 111+900 to 112+600/9.5				RHS - 109+600 to 110+000/9.5									
c	Date placed (lot no.)	20/03/2018				22/03/2018				23/03/2018									
d	Mix and Plant	A-E2 // National Asphalt - Kimberley																	
	Mean / (x) // Std. Dev. . (s)	$\bar{x}$		s		$\bar{x}$		s		$\bar{x}$		s		$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
e	Precoated chips Appl. (kg / m²)																		
f	Layer thickness (mm)	50mm				50mm				50mm				50mm					
g	SAI (x) | 14.0 / 5.00 / 0.600 / 0.075	100	/ 60	/ 23	/ 7,5	100	61	19	7,1	100	60	23	5,0						
h	SAI (s) | 20.0 / 5.00 / 0.600 / 0.075	0,0	/ 2,2	/ 4,8	/ 0,9	0,4	1,4	0,5	0,6	0,0	1,9	2,4	0,8						
i	Binder Content (%)	4,7		0,1		4,7		0,1		4,7		0,2							
j	Ref density (kg / m³)	2 605,3		11,2		2 600,2		6,9		2 598,7		6,200							
k	Compaction (%)	92,8				94,1				93,6									
l	Marshall Stab. / ITS (kN)	17,8	/	0,9		17,7		0,3		16,4		0,9							
m	Marshall Flow (mm)	4,7		0,7		4,6		0,3		5,2		0,5							
n	Temp. (Layer) (°C)																		
o	Tackcoat Appl. (Vm²)	0,6				0,6				0,6				0,6					
p	Prime Appl. (Vm²)	NA				NA				NA				NA					
q	MC before Prime (%)	NA				NA				NA				NA					
r	Design reference																		

Notes :

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

AS-BUILTS

5.4 AB 7: Texture Slurry, Overlay and Double Seal Completion Schedule

SANRAL — BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by:	Approved by:
KJ Hill Date: 6/03/2018	Date: 23/07/2018

SEAL WORK COMPLETION SCHEDULE

Contract :	NRA N.012 - 090 - 2017/4
Route :	N 12
Section :	9
Carriageway:	Single
Seal Type :	20mm & 7mm Doubleseal

From 92 — To Km 94

FORM **AB7** SHEET 1 OF 13

Section (Km)				92.0		93.0		94.0
Date opened to traffic				5/12/2017				
Permeability (l/h)								
Type	Appt.	Strip						
Texture Slurry	Total:	L:	5,8	1.0mm - 1.45 kg/m²		1.0mm - 1.45 kg/m²		1.12mm - 1.73 kg/m²
kg/m2		R:	5,8	1.0mm - 1.45 kg/m²		1.26mm - 1.82 kg/m²	1.26mm - 1.82 kg/m²	
and				9,40%				
% Binder obtained								
	1st							
	(Date)							
Recommended Hot appl. (l/m2)				2.67 l/m²				
Design Tol // Design Tol. (l/m2)				Inclusive				
Total Hot Nett Obtained		L						
		R						
Final Spray	Type // Grad. // Source // Application			50% Cat 65 // TOSAS - Bloemfontein // 0.8 lt/m²				
	Actual obtained	L:	5,8	0,8				
l/m2			3,7	0,8		0,8		
Cold		R:	3,7	0,8		0,8		
Hot	Date / Datum		5,8	0,8				
Aggregate	Type // Grad. // Source // Application			7mm // Grade 1 // Raumix - Kimberley // 8.3 kg/m²				
2nd layer		L:	5,8	8,3				8,3
	Actual obtained		3,7	8,3		8,3		
		R:	3,7	8,3		8,3		
(m2 / m3)			5,8	8,3		8,3		
2nd Spray	Type // Grad. // Source // Application			S-E1 // TOSAS - Bloemfontein // 1.1 lt/m²				
	Actual obtained	L:	5,8	1,1				1,1
l/m2			3,7	1,1		1,1		
Cold		R:	3,7	1,1		1,1		
Hot	Date		5,8	1,1		1,1		
Aggregate	Type // Grad. // Source // Application			20mm // Grade 1 // Raumix - Kimberley // 20.1 kg/m²				
1st Layer		L:	5,8	20,1			20,1	
	Actual obtained		3,7	20,1	20,1	20,1	20,1	20,1
		R:	3,7	20,1	20,1	20,1	20,1	20,1
(m2 / m3)			5,8	20,1	20,1	20,1		20,1
1st Spray	Type // Grad. // Source // Application			S-E1 // TOSAS - Bloemfontein // 1.3 lt/m²				
	Actual obtained	L:	5,8	1,29			1,29	
l/m2			3,7	1,31	1,31	1,31	1,31	
Cold		R:	3,7	1,31	1,31	1,31	1,31	
Hot	Date		5,8	1,32	1,32		1,32	
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: KJ Hill
Date: 6/03/2018

Approved by:
Date: 23/07/2018

SEAL WORK COMPLETION SCHEDULE

Contract : NRA N.012 - 090 - 2017/4
Route : N 12
Section : 9
Carriageway: Single
Seal Type : 20mm & 7mm Doubleseal

From 94 To Km 96

FORM AB7 SHEET 2 OF 13

Section (Km)			94.0			95.0			96.0
Date opened to traffic			5/12/2017						
Permeability (l/h)									
Type	Appt.	Strip							
Texture Slurry kg/m2 and % Binder obtained	Total:	L: 5,8	1.12mm - 1.73 kg/m²	1.12mm - 1.73 kg/m²	1.12mm - 1.73 kg/m²				
		R: 5,8	1.26mm - 1.82 kg/m²	1.26mm - 1.82 kg/m²	1.26mm - 1.82 kg/m²	1.26mm - 1.82 kg/m²			
			9,70%						
	1st (Date)								
Recommended Hot appl. (l/m2)			2.67 l/m²						
Design Tol // Design Tol. (l/m2)			Inclusive						
Total Hot Nett Obtained		L							
		R							
Final Spray	Type // Grad. // Source // Application		50% Cat 65 // TOSAS - Bloemfontein // 0.8 lt/m²						
	Actual obtained	L: 5,8	0,8						
l/m2		3,7	0,8				0,8		
Cold		R: 3,7	0,8	0,82					
Hot	Date / Datum	5,8	0,8	0,8					
Aggregate	Type // Grad. // Source // Application		7mm // Grade 1 // Raumix - Kimberley // 8.3 kg/m²						
2nd layer	Actual obtained	L: 5,8	8,3	8,3			8,3		
		3,7	8,3			8,3			
		R: 3,7	8,3			8,3		8,3	
(m2 / m3)		5,8	8,3			8,3			
2nd Spray	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.1 lt/m²						
	Actual obtained	L: 5,8	1,1	1,1			1,1		
l/m2		3,7	1,1			1,1			
Cold		R: 3,7	1,1			1,11		1,1	
Hot	Date	5,8	1,1			1,12			
Aggregate	Type // Grad. // Source // Application		20mm // Grade 1 // Raumix - Kimberley // 20.1 kg/m²						
1st Layer	Actual obtained	L: 5,8		20,1		20,1			
		3,7	20,1	20,1		20,1	20,1		
		R: 3,7	201	20,1		20,1	20,1		
(m2 / m3)		5,8	20,1	20,1			20,1		
1st Spray	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.3 lt/m²						
	Actual obtained	L: 5,8		1,32		1,32			
l/m2		3,7	1,31	1,31		1,31	1,31		
Cold		R: 3,7	1,31	1,31		1,31	1,31		
Hot	Date	5,8	1,32	1,3			1,31		
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: KJ Hill Date: 6/03/2018

Approved by: Date: 23/07/2018

SEAL WORK COMPLETION SCHEDULE

Contract : NRA N.012 - 090 - 2017/4
Route : N 12
Section : 9
Carriageway: Single
Seal Type : 20mm & 7mm Doubleseal

From 96 To Km 98

FORM AB7 SHEET 3 OF 13

Section (Km)			96.0	97.0		98.0
Date opened to traffic			5/12/2017	17/01/2017		
Permeability (l/h)						
Type	Appt.	Strip				
Texture Slurry kg/m2 and % Binder obtained	Total:	L: 5,8	1.12mm - 1.73 kg/m²	1.12mm - 1.73 kg/m²	1.12mm - 1.73 kg/m²	
		R: 5,8	1.26mm - 1.82 kg/m²	1.17mm - 1.69 kg/m²	1.17mm - 1.69 kg/m²	
			10,50%			
	1st (Date)					
Recommended Hot appl. (l/m2)			2.67 l/m²			
Design Tol // Design Tol. (l/m2)			Inclusive			
Total Hot Nett Obtained		L				
		R				
Final Spray	Type // Grad. // Source // Application		50% Cat 65 // TOSAS - Bloemfontein // 0.8 lt/m²			
l/m2 Cold Hot	Actual obtained	L: 5,8	0,8			
		3,7	0,8			
		R: 3,7		0,8	0,8	
	Date / Datum	5,8		0,8		
Aggregate 2nd layer (m2 / m3)	Type // Grad. // Source // Application		7mm // Grade 1 // Raumix - Kimberley // 8.3 kg/m²			
	Actual obtained	L: 5,8	8,3	8,3		
		3,7	8,3	8,3	8,3	
		R: 3,7	8,3	8,3	8,3	
		5,8	8,3	8,3		
2nd Spray l/m2 Cold Hot	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.1 lt/m²			
	Actual obtained	L: 5,8	1,1	1,1		
		3,7	1,1	1,1	1,1	
		R: 3,7	1,1	1,11	1,1	
	Date	5,8	1,12	1,1		
Aggregate 1st Layer (m2 / m3)	Type // Grad. // Source // Application		20mm // Grade 1 // Raumix - Kimberley // 20.1 kg/m²			
	Actual obtained	L: 5,8	20,1	20,1		
		3,7	20,1	20,1	20,1	20,1
		R: 3,7	20,1	20,1	20,1	20,1
		5,8	20,1	20,1		
1st Spray l/m2 Cold Hot	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.3 lt/m²			
	Actual obtained	L: 5,8	1,31	1,3		
		3,7	1,31	1,31	1,31	
		R: 3,7	1,29	1,33	1,31	1,31
	Date	5,8	1,31	1,32		
M C After Prime (x /s)						
Prime (l/m2)	Type // Grad. // Source // Application					
	Actual obtained	m m				
		m m				
		m m				
	Date	m m				
M C After Prime (x /s)						
Section (Km)						

SANRAL — BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by:	Approved by:	SEAL WORK COMPLETION SCHEDULE				FORM
KJ Hill Date: 6/03/2018	Date: 23/07/2018		Contract : NRA N.012 - 090 - 2017/4 Route : N 12 Section : 9 Carriageway: Single Seal Type : 20mm & 7mm Doubleseal	From 98 To Km 100		AB7 SHEET 4 OF 13

| | | | |

SANRAL — BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by: KJ Hill
Date: 6/03/2018

Approved by:
Date: 23/07/2018

SEAL WORK COMPLETION SCHEDULE

Contract : NRA N.012 - 090 - 2017/4
Route : N 12
Section : 9
Carriageway: Single
Seal Type : 20mm & 7mm Doubleseal

From 100
To Km 102

FORM AB7
SHEET 5 OF 13

| | | |

SANRAL
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by:	Approved by:
KJ Hill Date: 6/03/2018	Date: 23/07/2018

SEAL WORK COMPLETION SCHEDULE

Contract :	NRA N.012 - 090 - 2017/4
Route :	N 12
Section :	9
Carriageway:	Single
Seal Type :	20mm & 7mm Doubleseal

From 102 — To Km 104

FORM AB7 SHEET 6 OF 13

Section (Km)			102.0				103.0					104.0
Date opened to traffic			25/11/2017									
Permeability (l/h)												
Type	Appt.	Strip										
Texture Slurry	Total:	L: 5,8	1.27mm - 1.83 kg/m²			1.27mm - 1.83 kg/m²			1.32mm - 1.91 kg/m²			
kg/m2		R: 5,8		1.0mm - 1.45 kg/m²			1.2mm - 1.73 kg/m²			1.45mm - 2.1 kg/m²		
and												
% Binder obtained												
	1st											
	(Date)											
Recommended Hot appl. (l/m2)			2.67 l/m²									
Design Tol // Design Tol. (l/m2)			Inclusive									
Total Hot Nett Obtained		L: 5,8										
		3,7										
		R: 3,7										
		5,8										
Final Spray	Type // Grad. // Source // Application		50% Cat 65 // TOSAS - Bloemfontein // 0.8 lt/m²									
	Actual obtained	L: 5,8	0,8			0,8						
l/m2		3,7	0,8			0,8						
Cold		R: 3,7										
Hot	Date / Datum	5,8										
Aggregate	Type // Grad. // Source // Application		7mm // Grade 1 // Raumix - Kimberley // 8.3 kg/m²									
2nd layer		L: 5,8	8,3					8,3				
	Actual obtained	3,7	8,3			8,3						
		R: 3,7	8,3				8,3			8,3		
(m2 / m3)		5,8	8,3				8,3					
2nd Spray	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.1 lt/m²									
	Actual obtained	L: 5,8	1,1					1,1				
l/m2		3,7	0,92			1,1						
Cold		R: 3,7	1,1				1,1			1,1		
Hot	Date	5,8	1,1				1,1					
Aggregate	Type // Grad. // Source // Application		20mm // Grade 1 // Raumix - Kimberley // 20.1 kg/m²									
1st Layer		L: 5,8	20,1					20,1			20,1	
	Actual obtained	3,7	20,1		20,1			20,1			20,1	
		R: 3,7	20,1		20,1		20,1			20,1		20,1
(m2 / m3)		5,8	20,1		20,1			20,1				20,1
1st Spray	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.3 lt/m²									
	Actual obtained	L: 5,8	1,32					1,32			1,31	
l/m2		3,7	1,3		1,3			1,31			1,3	
Cold		R: 3,7	1,31		1,31		1,31			1,31		1,31
Hot	Date	5,8	1,32		1,32			1,32				1,32
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:					
KJ Hill Date: 6/03/2018	Date: 23/07/2018	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N.012 - 090 - 2017/4 Route : N 12 Section : 9 Carriageway: Single Seal Type : 20mm & 7mm Doubleseal	From 104 To Km 106		FORM AB7 SHEET 7 OF 13

Section (Km)			104.0			105.0						106.0
Date opened to traffic			25/11/2017								5/11/2017	
Permeability (l/h)												
Type	Appt.	Strip										
Texture Slurry kg/m2 and % Binder obtained	Total:	L: 5,8	1.32mm - 1.91 kg/m²			1.32mm - 1.91 kg/m²					1.32mm - 1.91 kg/m²	
		R: 5,8		1.45mm - 2.1 kg/m²			1.45mm - 2.1 kg/m²					1.76 kg/m²
	1st (Date)											
Recommended Hot appl. (l/m2)			2.67 l/m²									
Design Tol // Design Tol. (l/m2)			Inclusive									
Total Hot Nett Obtained		L										
		R										
Final Spray	Type // Grad. // Source // Application		50% Cat 65 // TOSAS - Bloemfontein // 0.8 lt/m²									
l/m2 Cold Hot	Actual obtained	L: 5,8	0,8									0,8
		3,7	0,8									0,8
		R: 3,7										0,8
	Date / Datum	5,8										0,8
Aggregate 2nd layer (m2 / m3)	Type // Grad. // Source // Application		7mm // Grade 1 // Raumix - Kimberley // 8.3 kg/m²									
	Actual obtained	L: 5,8	8,3					8,3				8,3
		3,7			8,3							8,3
		R: 3,7	8,3				8,3					8,3
		5,8				8,3						8,3
2nd Spray l/m2 Cold Hot	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.1 lt/m²									
	Actual obtained	L: 5,8	1,1					1,1				1,1
		3,7			1,1							1,1
		R: 3,7	1,1				1,1					1,1
	Date	5,8				1,02						1,1
Aggregate 1st Layer (m2 / m3)	Type // Grad. // Source // Application		20mm // Grade 1 // Raumix - Kimberley // 20.1 kg/m²									
	Actual obtained	L: 5,8	20,1				20,1					20,1
		3,7	20,1			20,1			20,1			20,1
		R: 3,7		20,1			20,1			20,1	20,1	
		5,8	20,1		20,1			20,1				20,1
1st Spray l/m2 Cold Hot	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.3 lt/m²									
	Actual obtained	L: 5,8	1,31				1,31					1,32
		3,7	1,31			1,31			1,31			1,3
		R: 3,7		1,31			1,31			1,32	1,29	1,28
	Date	5,8	1,32		1,32			1,32				1,36
M C After Prime (x /s)												
Prime (l/m2)	Type // Grad. // Source // Application											
	Actual obtained	m m										
		m m										
		m m										
	Date	m m										
M C After Prime (x /s)												
Section (Km)												

SANRAL — BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by: KJ Hill
Date: 6/03/2018

Approved by:
Date: 23/07/2018

SEAL WORK COMPLETION SCHEDULE

Contract : NRA N.012 - 090 - 2017/4
Route : N 12
Section : 9
Carriageway: Single
Seal Type : 20mm & 7mm Doubleseal

From 106
To Km 108

FORM AB7
SHEET 8 OF 13

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SANRAL BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: KJ Hill Date: 6/03/2018	Approved by: Date: 23/07/2018	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N.012 - 090 - 2017/4 Route : N 12 Section : 9 Carriageway: Single Seal Type : 20mm & 7mm Doubleseal	From 108 To Km 110		FORM AB7 SHEET 9 OF 13

Section (Km)			108.0			109.0			110.0
Date opened to traffic			5/12/2018			17/01/2018			
Permeability (l/h)									
Type	Appt.	Strip							
Texture Slurry kg/m2 and % Binder obtained	Total:	L: 5,8	1.58mm - 2.28 kg/m²	1.58mm - 2.28 kg/m²	1.58mm - 2.28 kg/m²	1.2mm - 1.73 kg/m²			Overlay
		R: 5,8		1.22mm - 1.76 kg/m²	1.3mm - 1.88 kg/m²				Overlay
			9,30%						Overlay
				9,10%					Overlay
	1st (Date)								
Recommended Hot appl. (l/m2)			2.67 l/m²						
Design Tol // Design Tol. (l/m2)			Inclusive						
Total Hot Nett Obtained		L							Overlay
									Overlay
		R							Overlay
									Overlay
Final Spray	Type // Grad. // Source // Application		50% Cat 65 // TOSAS - Bloemfontein // 0.8 lt/m²						
l/m2 Cold Hot	Actual obtained	L: 5,8	0,8	0,8					Overlay
		3,7	0,81	0,8					Overlay
		R: 3,7	0,8	0,8					Overlay
	Date / Datum	5,8	0,8	0,8					Overlay
Aggregate 2nd layer (m2 / m3)	Type // Grad. // Source // Application		7mm // Grade 1 // Raumix - Kimberley // 8.3 kg/m²						
	Actual obtained	L: 5,8	8,3	8,3					Overlay
		3,7	8,3	8,3					Overlay
		R: 3,7	8,3	8,3					Overlay
		5,8	8,3	8,3					Overlay
2nd Spray l/m2 Cold Hot	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.1 lt/m²						
	Actual obtained	L: 5,8	1,1	1,1					Overlay
		3,7	1,1	1,1					Overlay
		R: 3,7	1,1	1,1					Overlay
	Date	5,8	1,1	1,1					Overlay
Aggregate 1st Layer (m2 / m3)	Type // Grad. // Source // Application		20mm // Grade 1 // Raumix - Kimberley // 20.1 kg/m²						
	Actual obtained	L: 5,8	20,1	20,1					Overlay
		3,7	20,1	20,1	20,1	20,1			Overlay
		R: 3,7	20,1	20,1	20,1				Overlay
		5,8	20,1	20,1					Overlay
1st Spray l/m2 Cold Hot	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.3 lt/m²						
	Actual obtained	L: 5,8	1,3	1,31					Overlay
		3,7	1,31	1,28	1,3	1,3			Overlay
		R: 3,7	1,32	1,3	1,3				Overlay
	Date	5,8	1,31	1,3					Overlay
M C After Prime (x /s)									
Prime (l/m2)	Type // Grad. // Source // Application								
	Actual obtained	m m							
		m m							
		m m							
	Date	m m							
M C After Prime (x /s)									
Section (Km)									

SANRAL BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: KJ Hill Date: 6/03/2018	Approved by: Date: 23/09/2018	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N.012 - 090 - 2017/4 Route : N 12 Section : 9 Carriageway: Single Seal Type : 20mm & 7mm Doubleseal	From 110 To Km 112		FORM **AB7** SHEET 10 OF 13

Section (Km)				110.0		111.0		112.0
Date opened to traffic				24/11/2017				
Permeability (l/h)								
Type	Appt.	Strip						
Texture Slurry	Total:	L:	5,8	1.2mm - 1.73 kg/m²	1.2mm - 1.73 kg/m²	1.2mm - 1.73 kg/m²		Overlay
kg/m2		R:	5,8	1.3mm - 1.88 kg/m²	1.3mm - 1.88 kg/m²	1.3mm - 1.88 kg/m²		Overlay
and				9,40%				Overlay
% Binder obtained				9,10%	9,30%			Overlay
	1st							
	(Date)							
Recommended Hot appl. (l/m2)				2.67 l/m²				
Design Tol // Design Tol. (l/m2)				Inclusive				
Total Hot Nett Obtained		L						Overlay
								Overlay
		R						Overlay
								Overlay
Final Spray	Type // Grad. // Source // Application			50% Cat 65 // TOSAS - Bloemfontein // 0.8 lt/m²				
	Actual obtained	L:	5,8	0,8				Overlay
l/m2			3,7	0,8	0,8			Overlay
Cold		R:	3,7					Overlay
Hot	Date / Datum		5,8					Overlay
Aggregate	Type // Grad. // Source // Application			7mm // Grade 1 // Raumix - Kimberley // 8.3 kg/m²				
2nd layer		L:	5,8	8,3				Overlay
	Actual obtained		3,7	8,3	8,3			Overlay
		R:	3,7	8,3				Overlay
(m2 / m3)			5,8	8,3				Overlay
2nd Spray	Type // Grad. // Source // Application			S-E1 // TOSAS - Bloemfontein // 1.1 lt/m²				
	Actual obtained	L:	5,8	1,1				Overlay
l/m2			3,7	1,1	1,1			Overlay
Cold		R:	3,7	1,1				Overlay
Hot	Date		5,8	1,1				Overlay
Aggregate	Type // Grad. // Source // Application			20mm // Grade 1 // Raumix - Kimberley // 20.1 kg/m²				
1st Layer		L:	5,8	20,1	20,1			Overlay
	Actual obtained		3,7	20,1	20,1	20,1		Overlay
		R:	3,7	20,1	20,1	20,1	20,1	Overlay
(m2 / m3)			5,8	20,1	20,1	20,1	20,1	Overlay
1st Spray	Type // Grad. // Source // Application			S-E1 // TOSAS - Bloemfontein // 1.3 lt/m²				
	Actual obtained	L:	5,8	1,32	1,32			Overlay
l/m2			3,7	1,31	1,31	1,3		Overlay
Cold		R:	3,7	1,31	1,31	1,31	1,31	Overlay
Hot	Date		5,8	1,3	1,31	1,31		Overlay
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: KJ Hill
Date: 6/03/2018

Approved by:
Date: 23/07/2018

SEAL WORK COMPLETION SCHEDULE

Contract : NRA N.012 - 090 - 2017/4
Route : N 12
Section : 9
Carriageway: Single
Seal Type : 20mm & 7mm Doubleseal

From 112
To Km 114

FORM AB7
SHEET 11 OF 13

Section (Km)			112.0		113.0			114.0
Date opened to traffic					24/11/2017			24/11/2017
Permeability (l/h)								
Type	Appt.	Strip						
Texture Slurry	Total:	L: 5,8	Overlay		1.19mm - 1.72 kg/m²		Overlay	1.31mm - 1.87 kg/m²
kg/m2		R: 5,8	Overlay		1.15mm - 1.66 kg/m²		Overlay	1.27mm - 1.84 kg/m²
and		L:	Overlay		8,40%		Overlay	12%
% Binder obtained		R:	Overlay		9,50%.		Overlay	11,30%
	1st (Date)							
Recommended Hot appl. (l/m2)			2.67 l/m²					
Design Tol // Design Tol. (l/m2)			Inclusive					
Total Hot Nett Obtained		L	Overlay				Overlay	
			Overlay				Overlay	
		R	Overlay				Overlay	
			Overlay				Overlay	
Final Spray	Type // Grad. // Source // Application		50% Cat 65 // TOSAS - Bloemfontein // 0.8 lt/m²					50% Cat 65 // TOS.
	Actual obtained	L: 5,8	Overlay		0,8		Overlay	0,8
l/m2		3,7	Overlay		0,8		Overlay	0,8
Cold		R: 3,7	Overlay		0,8		Overlay	0,8
Hot	Date / Datum	5,8	Overlay		0,8		Overlay	0,8
Aggregate	Type // Grad. // Source // Application		7mm // Grade 1 // Raumix - Kimberley // 8.3 kg/m²					7mm // Grade 1 // Ra
2nd layer	Actual obtained	L: 5,8	Overlay		8,3		Overlay	8,3
		3,7	Overlay		8,3		Overlay	8,3
		R: 3,7	Overlay		8,3		Overlay	7,4
(m2 / m3)		5,8	Overlay		8,3		Overlay	7,4
2nd Spray	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.1 lt/m²					S-E1 /
	Actual obtained	L: 5,8	Overlay		1,1		Overlay	1,11
l/m2		3,7	Overlay		1,12		Overlay	1,14
Cold		R: 3,7	Overlay		1,1		Overlay	1,1
Hot	Date	5,8	Overlay		1,1		Overlay	1,1
Aggregate	Type // Grad. // Source // Application		20mm // Grade 1 // Raumix - Kimberley // 20.1 kg/m²					20mm // Grade 1 // R
1st Layer		L: 5,8	Overlay		20,1		Overlay	20,1
	Actual obtained	3,7	Overlay	20,1		20,1	Overlay	20,1
		R: 3,7	Overlay	20,1		20,1	Overlay	19
(m2 / m3)		5,8	Overlay		20,1		Overlay	19
1st Spray	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.3 lt/m²					S-E1 // TOSA
	Actual obtained	L: 5,8	Overlay		1,29		Overlay	1,3
l/m2		3,7	Overlay	1,31		1,3	Overlay	1,31
Cold		R: 3,7	Overlay	1,31		1,3	Overlay	1,31
Hot	Date	5,8	Overlay		1,31		Overlay	1,34
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: KJ Hill Date: 6//03/2018	Approved by: Date: 23/03/2018	**SEAL WORK COMPLETION SCHEDULE**	Contract : NRA N.012 - 090 - 2017/4 Route : N 12 Section : 9 Carriageway: Single Seal Type : 20mm & 7mm Doubleseal	From 114 To Km 116		FORM AB7 SHEET 12 OF 13

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SANRAL
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

Prepared by:	Approved by:
KJ Hill Date: 6//03/2018	Date: 23/07/2018

SEAL WORK COMPLETION SCHEDULE

Contract :	NRA N.012 - 090 - 2017/4
Route :	N 12
Section :	9
Carriageway:	Single
Seal Type :	20mm & 7mm Doubleseal

From 116 — To Km 117+400

FORM AB7 SHEET 13 of 13

Section (Km)			116.6 — 117.0 — 118.0
Date opened to traffic			
Permeability (l/h)			
Type	Appt.	Strip	
Overlay 50mm	Total:	L: 5,8	Overlay
		R: 5,8	Overlay
		L:	Overlay
		R:	Overlay
Recommended Hot appl. (l/m2)			
Design Tol // Design Tol. (l/m2)			
Total Hot Nett Obtained		L	Overlay
		R	Overlay
			Overlay
			Overlay
Final Spray	Type // Grad. // Source // Application		
	Actual obtained	L: 5,8	Overlay
l/m2		3,7	Overlay
Cold		R: 3,7	Overlay
Hot	Date / Datum	5,8	Overlay
Aggregate	Type // Grad. // Source // Application		
2nd layer	Actual obtained	L: 5,8	Overlay
		3,7	Overlay
		R: 3,7	Overlay
(m2 / m3)		5,8	Overlay
2nd Spray	Type // Grad. // Source // Application		
	Actual obtained	L: 5,8	Overlay
l/m2		3,7	Overlay
Cold		R: 3,7	Overlay
Hot	Date	5,8	Overlay
Aggregate	Type // Grad. // Source // Application		
1st Layer	Actual obtained	L: 5,8	Overlay
		3,7	Overlay
		R: 3,7	Overlay
(m2 / m3)		5,8	Overlay
1st Spray	Type // Grad. // Source // Application		
	Actual obtained	L: 5,8	Overlay
l/m2		3,7	Overlay
Cold		R: 3,7	Overlay
Hot	Date	5,8	Overlay
M C After Prime	(x /s)		Overlay
	Type // Grad. // Source // Application		
Prime	Actual obtained	m m	Overlay
		m m	Overlay
(l/m2)		m m	Overlay
	Date	m m	Overlay
M C After Prime	(x /s)		
Section (Km)			