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

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

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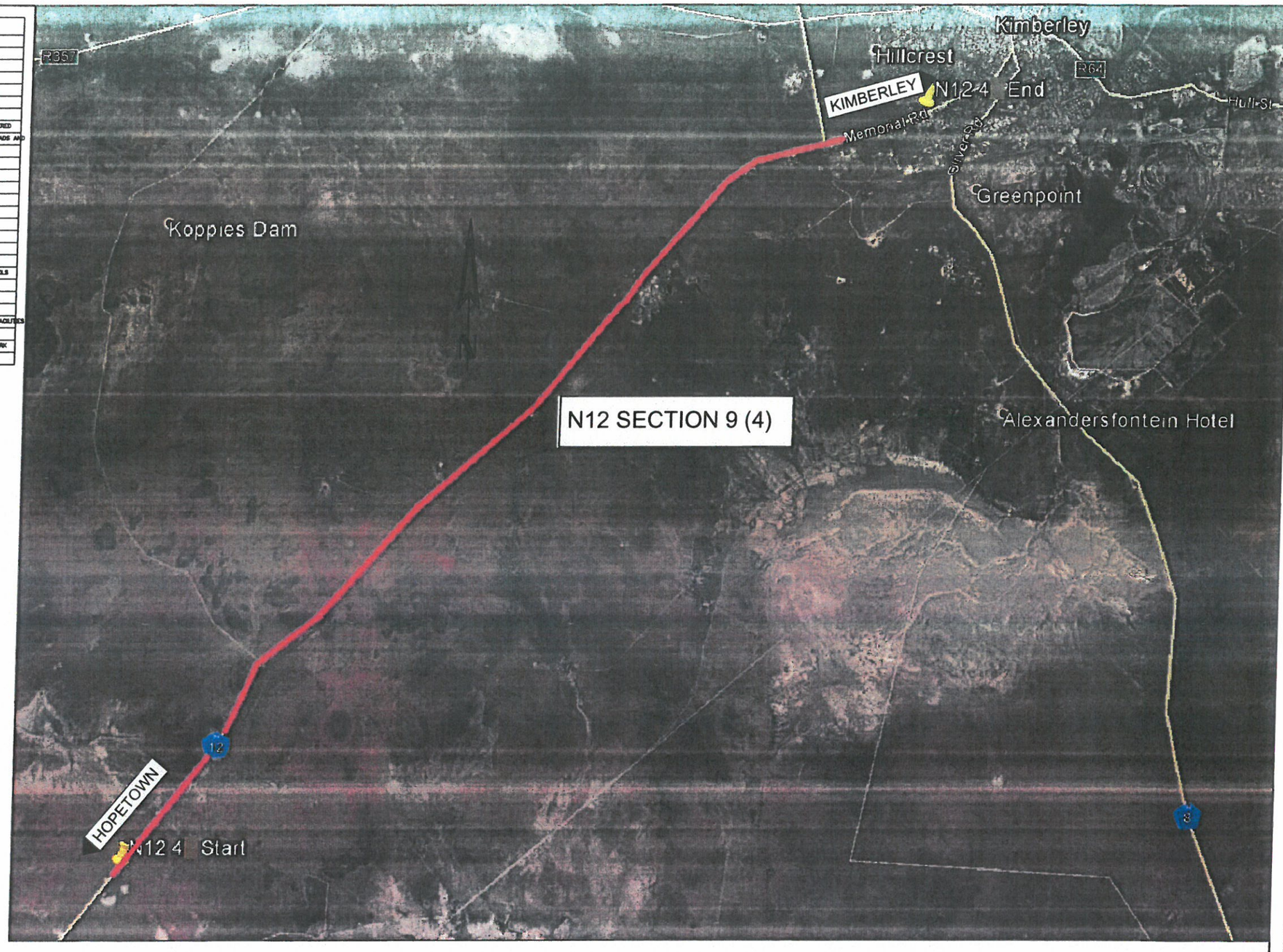
1. LOCALITY PLAN

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)

Rv	DATE	REVISION	DESIGNED
R	22/06/16	SIGNED: FINAL CONSTRUCTION RECORD (AS BUILT)	A. G.EGHORN
R1A	23/06/17	ISSUED FOR CONSTRUCTION	A. G.EGHORN
R	12/06/17	ISSUED FOR TENDER	A. G.EGHORN

CONSTRUCTION RECORD
SUPERVISING CONTRACT ENGINEER
Name: J. DE VILLIERS
Prof. Reg. No.: 20140472
Date: 20/07/2018
SANRAL PROJECT MANAGER
Name: K. PATEL
Date:

Knight Piésold CONSULTING
303, The Colosseum
Cnr. Century Way & Century Blvd
Century City, 7441

DESIGNED BY
NAME: SIGNED BY A. G.EGHORN
Prof. Reg. No.: 20030171
CHECKED BY
NAME: SIGNED BY W. ISAACS
Prof. Reg. No.: 20137001
DRAWN

COUNCIL TANC APPROVAL
SIGNED BY: A. G.EGHORN
Name: A. G.EGHORN
Prof. Reg. No.: 20030171
Date: 27/07/2017
THE ABOVE SIGNATORY CERTIFIES THAT THE DESIGNER AND DRAWER HAVE CONSENTED TO THAT NAME BEING USED FOR THE DRAWING FOR THE PURPOSES OF COUNCIL APPROVAL

HEAD OFFICE
48 Tambotie Avenue
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PO Box 415
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SANRAL

WESTERN REGION
1 Hevenga Street
Oakdale
7530
Private Bag X19
Bellville
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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 DEPUTY NATIONAL SERVICE AGENCY LTE

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 @ A0: 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 01
SANRAL DOC #	3664293	Rev

K312 00497/02-DL/01

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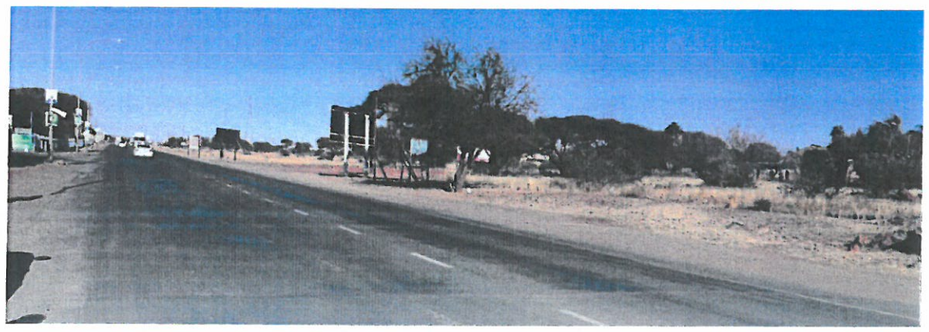
THROUGH BETTER ROADS

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

SANRAL
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Reg.No.1998/009584/30
BUILDING SOUTH AFRICA
THROUGH BETTER ROADS

4. DESIGN

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BUILDING SOUTH AFRICA
THROUGH BETTER ROADS

DESIGN

4.1 D1-Pavement Design

SANRAL SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD BUILDING SOUTH AFRICA THROUGH BETTER ROADS	Prepared by: A.Cleghorn Date 20-Nov-17	Designed by: A. Cleghorn Date 20-Nov-17	**PAVEMENT DESIGN**	Contract: NRA N.012-090-2017/4F Route: National Route 12 Section: 9 from Voetpaddrift (km 92,00) & Kimberley (km 117,50)	Form **D1** -2001 Sheet no. 1 of 1

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
Designer Name: A. Cleghorn
Date: 20/11/2017

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

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

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

DESIGN

4.2 DTS: Texture Slurry Mix Design

THE SOUTH AFRICAN NATIONAL ROADS AGENCY SOC Ltd. Reg. No. 1998/022656/06

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

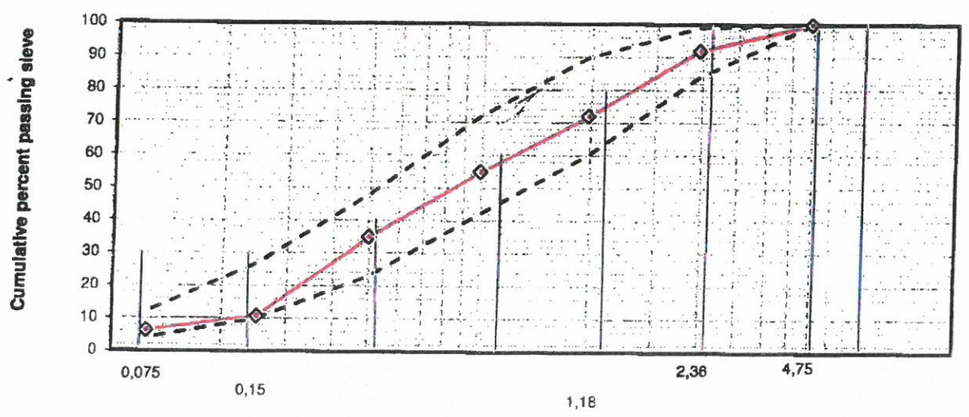
Sample / Monster No.	Nom. Size / Grootte	Type and Source / Tipe en Bron
1	FINE SLURRY - FINE GRADE	Zoutpan Explorations - Windsorton
2	COLTO - (Table B4302/1)	
3		
4		
5		
6		

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

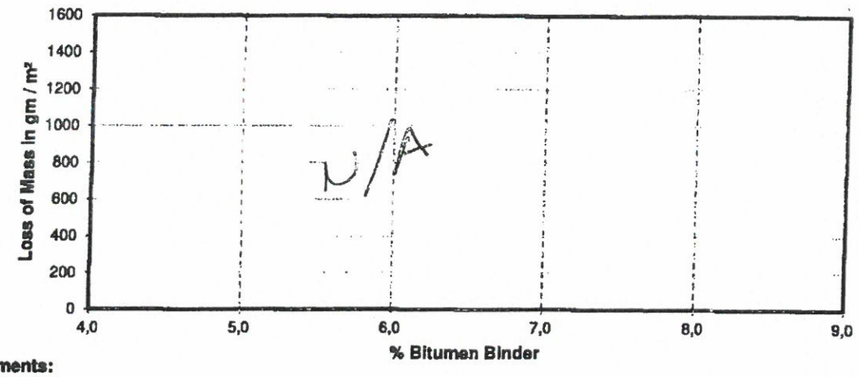


Binder / Bindmiddel

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
Date 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,

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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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 1998/022848/30

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

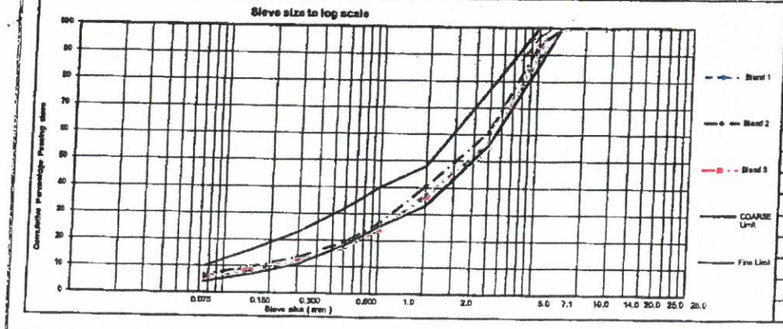
	Sample	Nom. Size	Type	Source
1	1	14.0	Dolerite	Kimberly Raumix
2	2	10.0	Dolerite	Kimberly Raumix
3	3	7.1	Dolerite	Kimberly Raumix
4	4			
5	5	-5.0 Dust	Dolerite	Kimberly Raumix
6	6	-5.0 Blown Dust	Dolerite	Kimberly Raumix
7	7			
8	8			
9	9			

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

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	99	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	58 - 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	25 - 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	0.5	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	2 898	2 948	0	0	0	0	2 941	2 939	2 939	
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]	14.5	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	

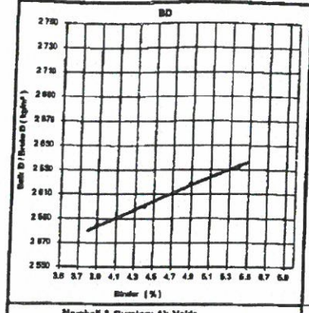
Notes / Notas

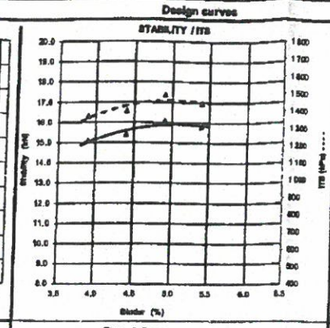
BAILEY BLENDS	B1	B2	B3
% CA LUW	82.0	86.0	90.0
PCS -mm	2.0	2.0	2.0
CA	0.481	0.498	0.498
FA c	0.501	0.487	0.512
FA f			

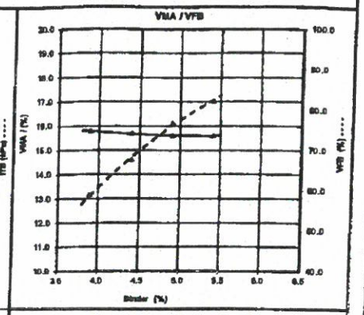
Binder

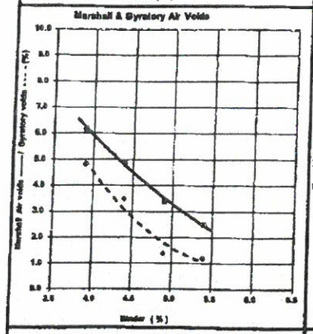
Type	A-E2 + 0.3% Wetfix		PG 76-22 V	Source	CLIFFDALE		
Penetration @ 25°C	EN 1426	N/A	N/A	Dynamic Viscosity @ 165° C	ASTM 4402	0.38	<0.6
Soft. Pt (°C)	ASTM D36	79	65 - 85	Ductility @ 15° C	TG-1 MB4	85	>60
RD		1.030	N/A	Flash Point	ASTM D92	278	>230
Temp. (Mix) (°C)	160 - 175°C			Temp. (Compaction)		142 - 145°C	

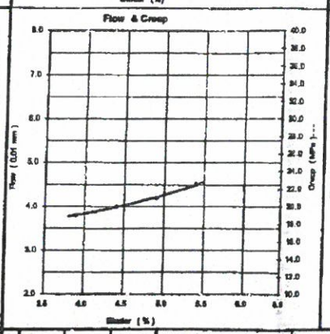
Design curves

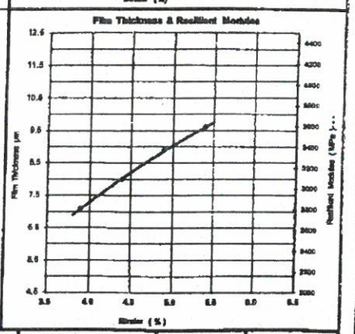












Trial LAB Blends		B1	B2	B3	FINAL LAB DESIGN	4.5	5.0	5.5	Plant Trial			Specification	Proposal / Voorstel	
Binder / Bindmiddel - Total Added	%	5.0	5.0	5.0	4.0	4.5	5.0	5.5	4.3	4.8	5.3			
Binder / Bindmiddel - Total Recovered	%	4.9	5.0	4.9	3.9	4.4	4.9	5.4	4.4	4.8	5.3	N/A	4.4	5.1
Max. / Maks. TRD (Rice)	kg/m³	2 710	2 710	2 720	2 755	2 735	2 710	2 701	2 752	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	1 488	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	%	15.0	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	%	76.7	79.5	77.7	58.9	67.7	75.7	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	6.5 - 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

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

Project Manager

DATE

Materials Specialist

04/10/2017
DATE

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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Reg.No.1998/009584/30
BUILDING SOUTH AFRICA
THROUGH BETTER ROADS

DESIGN

4.4 D4: Final Seal Design

SANRAL

SOUTH AFRICA THROUGH BETTER ROADS

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	3763
% Heavies	14,9	14,9	15,4
Traffic Factor			
ELV / Lane / Day	13573	13573	
Seal Design			
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		Spray 1	Spray 2	Spray 3
Particulars of Aggregate				
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 Neat	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		Layer	
Proportions per 100kg Aggregate or per m³ mix (Dry)		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

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 Design			
Seal Period Month start : Month end :			
Target Texture			
Existing Texture depth			
Average Ball Penetration			
Texture Treatment Yes/No? If Yes - Type?			
Climate Zone			

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

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

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

*Delete if not applicable

Supporting documentation to be supplied with the design form

Consultant Approval

NAME: J.O. CRAIG

PROF. REG. NO.: 910110

DATE: 7-11-2017

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 / SANRAL Materials Specialist: HG Fourie — DATE: 16-11-2017

* Spray rates to include spray tolerance

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5. MATERIALS AS-BUILTS

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg.No.1998/009584/30
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

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

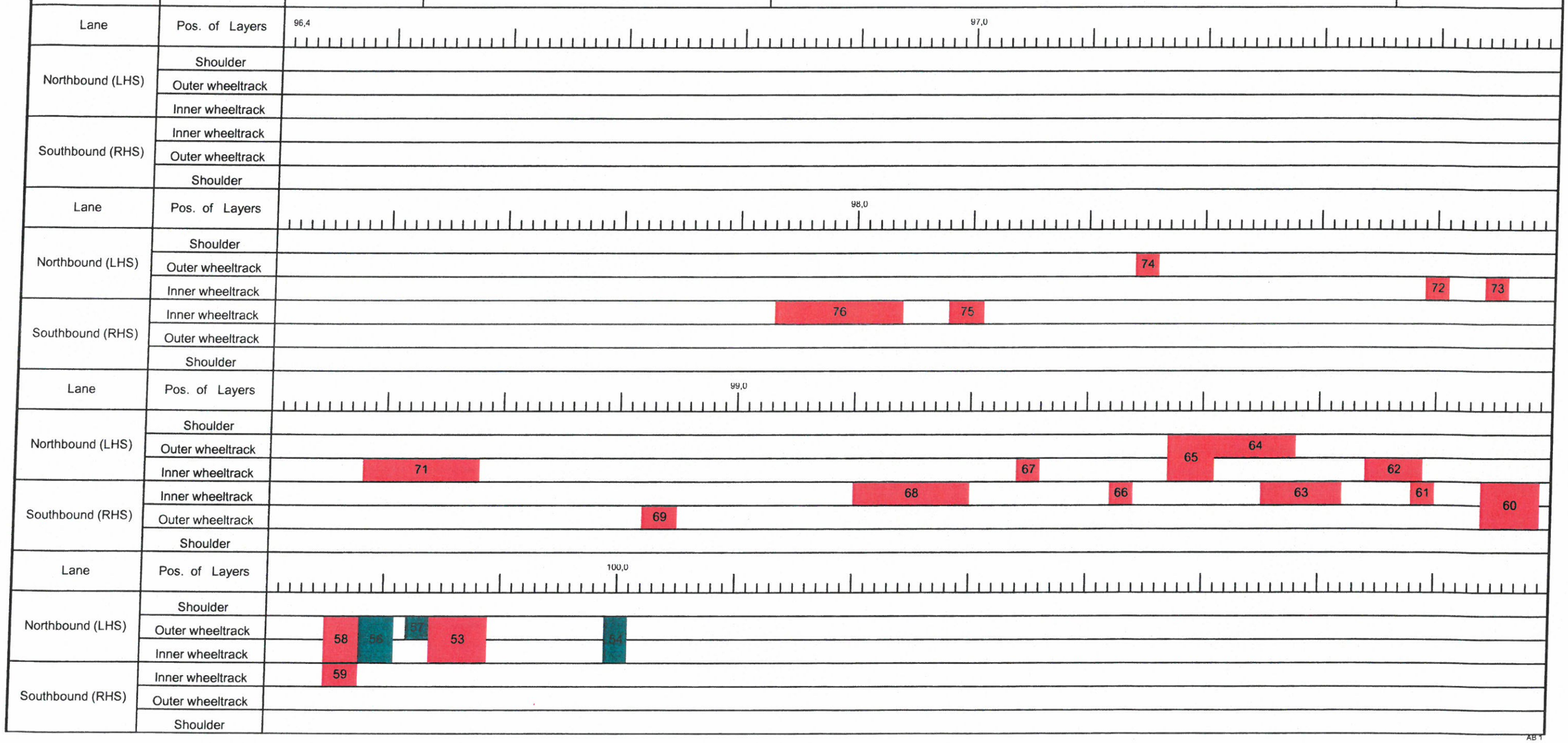
Prepared by : C PHILANDER
Date: 26/02/2018

Approved by:
Date: 23/07/2018

LAYER WORKS COMPLETION SCHEDULE

Contract : NRA N.12 - 090 - 2017/4F
Route : N12
Section : 9
Carriageway : Single
From : 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 breack - orange
Shoulder build - blue

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

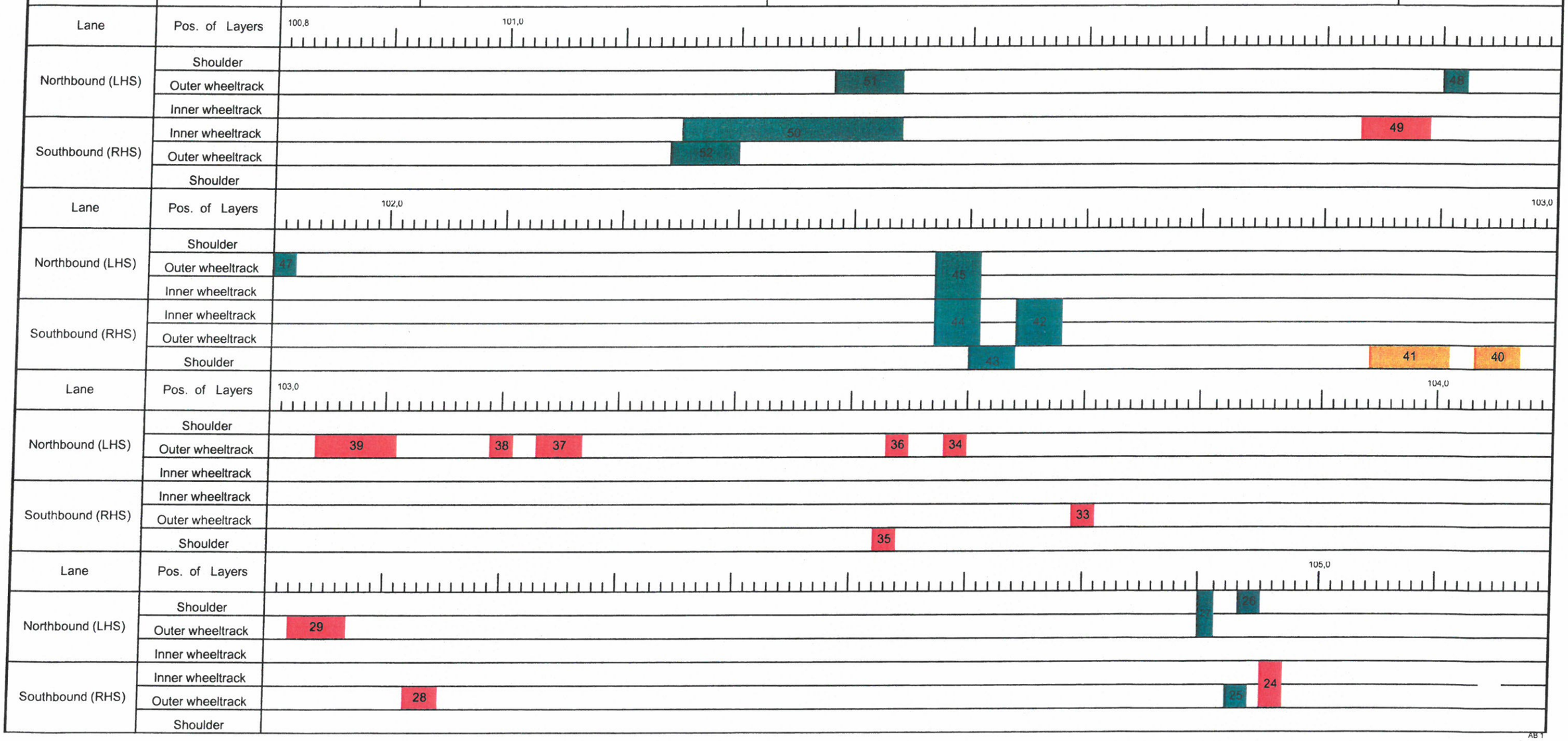
Prepared by : C PHILANDER
Date: 26/02/2018

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 breack - orange
Shoulder patch - blue

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

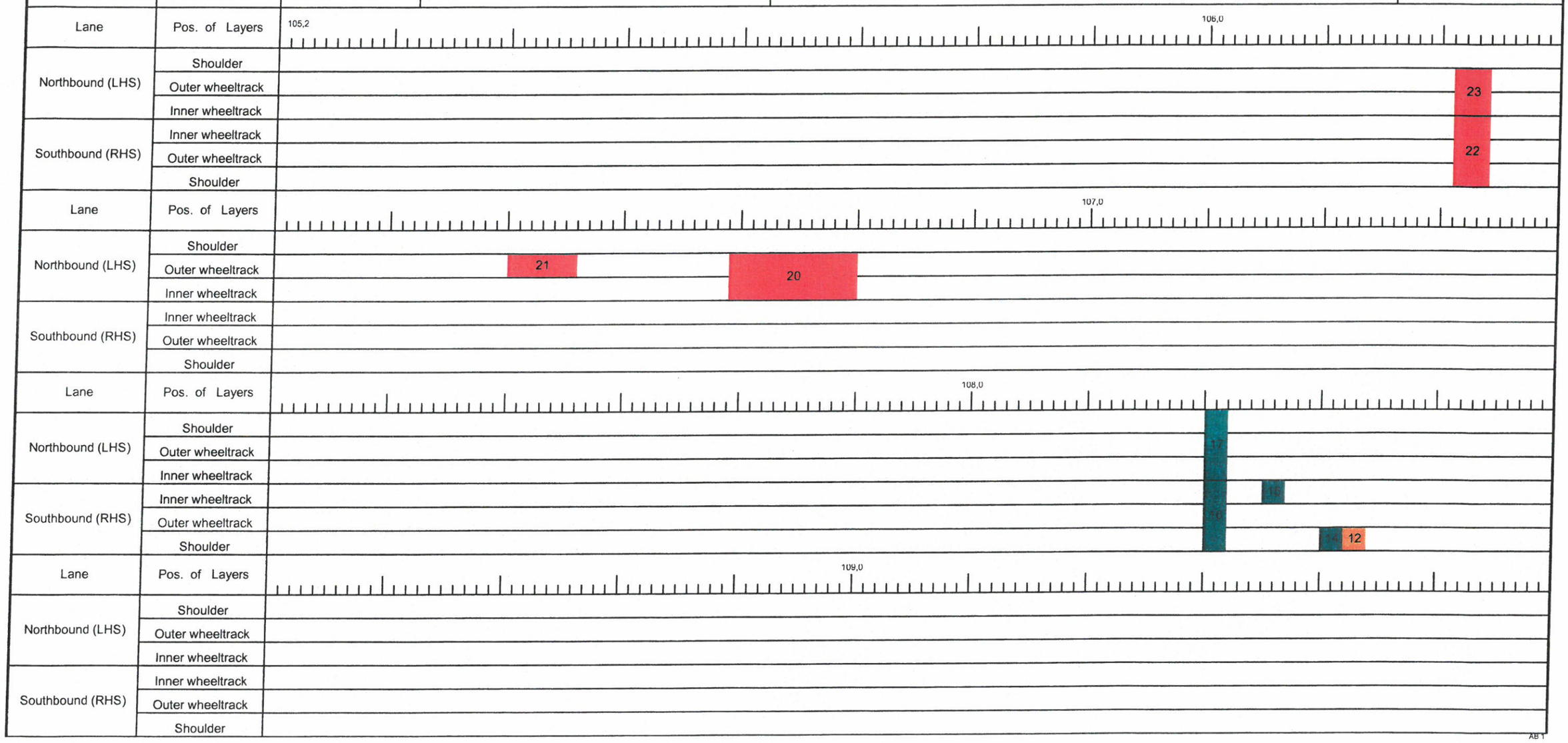
Prepared by : C PHILANDER
Date: 26/02/2018

Approved by:
Date: 23/07/2018

LAYER WORKS COMPLETION SCHEDULE

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

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



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
BUILDING SOUTH AFRICA THROUGH BETTER ROADS

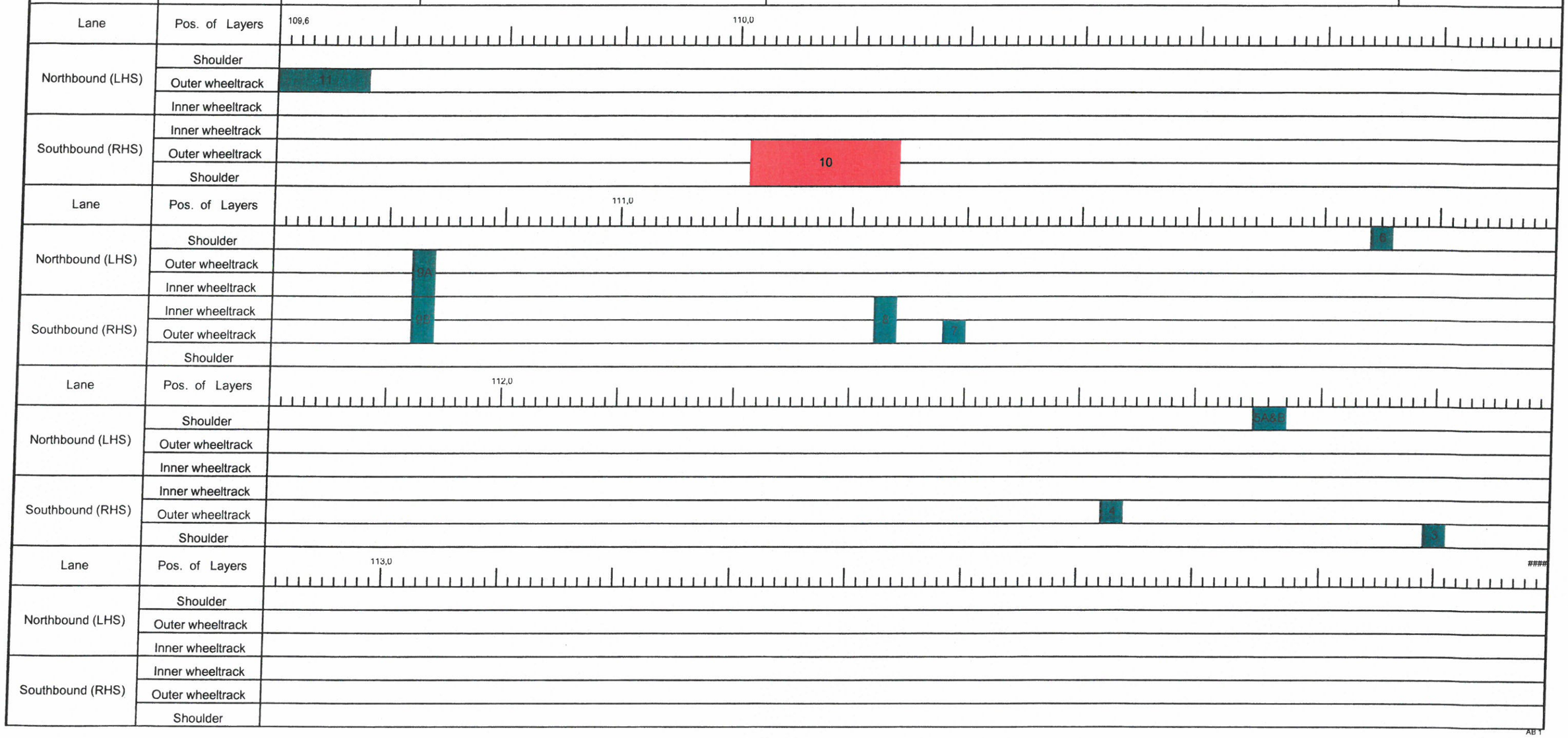
Prepared by : C PHILANDER
Date: 26/02/2018

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



AB1

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 breack - orange
Shoulder fault - blue

SANRAL
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LTD
Reg.No.1998/009584/30
BUILDING SOUTH AFRICA
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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	$\bar{x}$	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	$\bar{x}$	$\bar{x}$ 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 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
Reg.No.1998/009584/30
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	$\bar{x}$ 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	$\bar{x}$ 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
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
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	$\bar{x}$	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	$\bar{x}$	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: 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 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
		R:	3,7	20,1	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	1,29		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

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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 96 To Km 98

FORM AB7 SHEET 3 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 98 — To Km 100

FORM AB7 SHEET 4 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 100 — To Km 102

FORM AB7 — SHEET 5 OF 13

Section (Km)			100.0			101.0			102.0
Date opened to traffic			17/01/2017			25/11/2017			
Permeability (l/h)									
Type	Appt.	Strip							
Texture Slurry	Total:	L: 5,8	1.91 kg/m²		1.27mm - 1.83kg/m²		1.27mm - 1.83 kg/m²		
kg/m2		R: 5,8		1.6mm - 2.28 kg/m²		1.24mm - 1.79 kg/m²		1.1mm - 1.59 kg/m²	
and									
% Binder obtained			10,00%						
	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	0,8					
l/m2		3,7	0,8	0,8			0,9		
Cold		R: 3,7	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			8,3		
	Actual obtained	3,7	8,3	8,3		8,3		8,3	
		R: 3,7	8,3	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	1,11			1,11		
l/m2		3,7	1,1	1,1		1,1		1,1	
Cold		R: 3,7	1,1	1,1			0,8	1,1	
Hot	Date	5,8	1,11	0,92					
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	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	1,31	1,32			1,32		
l/m2		3,7	1,31 1,33	1,31		1,31	1,31	1,3	
Cold		R: 3,7	1,31	1,31		1,31	1,31	1,3	
Hot	Date	5,8	1,31	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 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:	SEAL WORK COMPLETION SCHEDULE				
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 104 To Km 106		FORM AB7 SHEET 7 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 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						
	Actual obtained	L: 5,8	0,8	0,8					Overlay
l/m2		3,7	0,81	0,8					Overlay
Cold		R: 3,7	0,8	0,8					Overlay
Hot	Date / Datum	5,8	0,8	0,8					Overlay
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					Overlay
		3,7	8,3	8,3					Overlay
		R: 3,7	8,3	8,3					Overlay
(m2 / m3)		5,8	8,3	8,3					Overlay
2nd Spray	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.1 lt/m²						
	Actual obtained	L: 5,8	1,1	1,1					Overlay
l/m2		3,7	1,1	1,1					Overlay
Cold		R: 3,7	1,1	1,1					Overlay
Hot	Date	5,8	1,1	1,1					Overlay
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					Overlay
		3,7	20,1	20,1	20,1	20,1			Overlay
		R: 3,7	20,1	20,1	20,1				Overlay
(m2 / m3)		5,8	20,1	20,1					Overlay
1st Spray	Type // Grad. // Source // Application		S-E1 // TOSAS - Bloemfontein // 1.3 lt/m²						
	Actual obtained	L: 5,8	1,3	1,31					Overlay
l/m2		3,7	1,31	1,28	1,3	1,3			Overlay
Cold		R: 3,7	1,32	1,3	1,3				Overlay
Hot	Date	5,8	1,31	1,3					Overlay
M C After Prime	(x /s)								
Prime	Type // Grad. // Source // Application								
	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: 23/09/2018	**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		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	Actual obtained	L: 5,8	Overlay	20,1	Overlay	20,1	
		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
Final Spray	Type // Grad. // Source // Application		Overlay
	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)			