

# 22<sup>nd</sup> Road Pavement Forum

## HiMA TRIAL REPORT : POST CONSTRUCTION

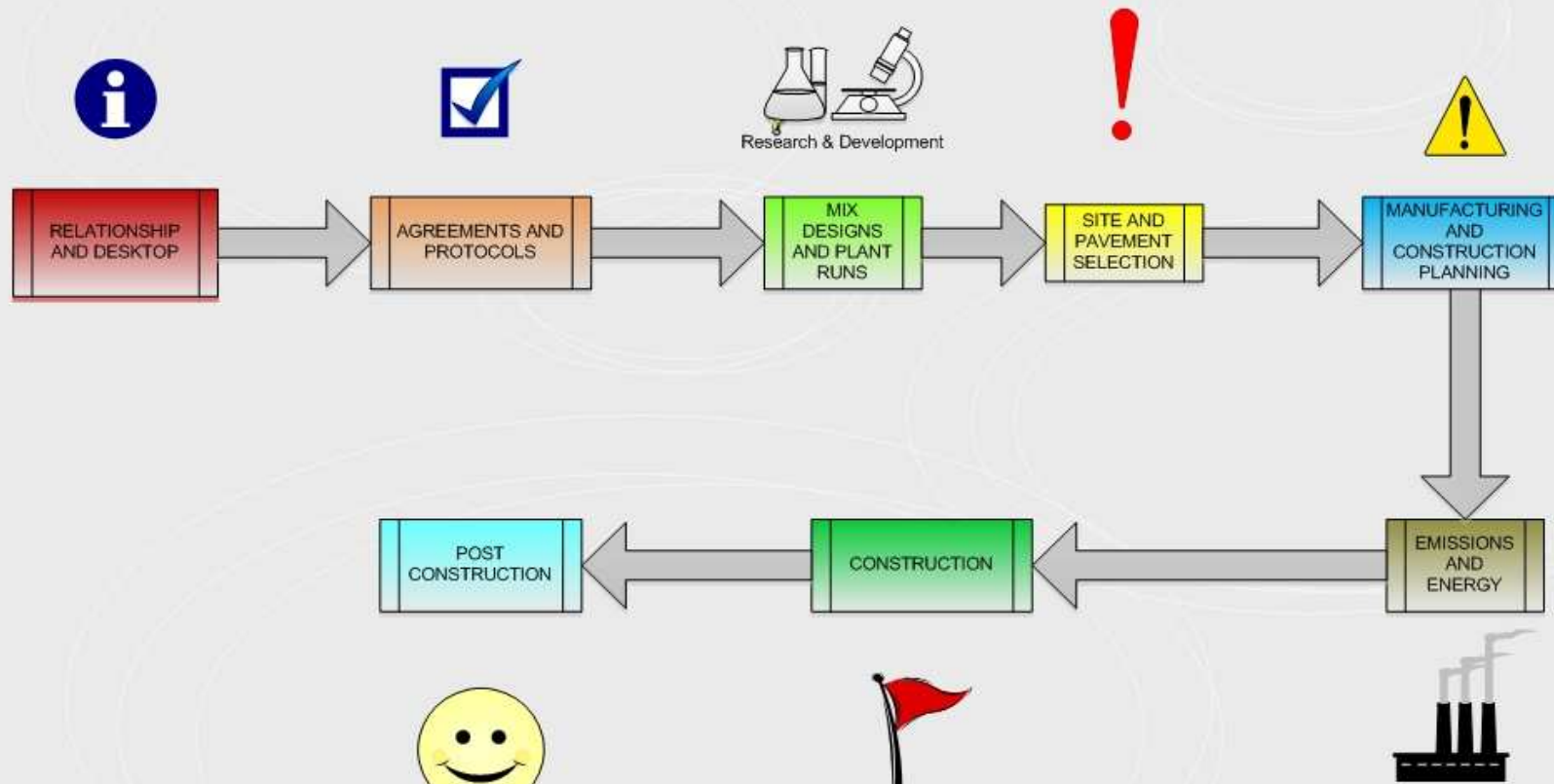
presented by  
**WYNAND NORTJE**  
8 - 9 November 2011



## HiMA TRIAL REPORT POST CONSTRUCTION

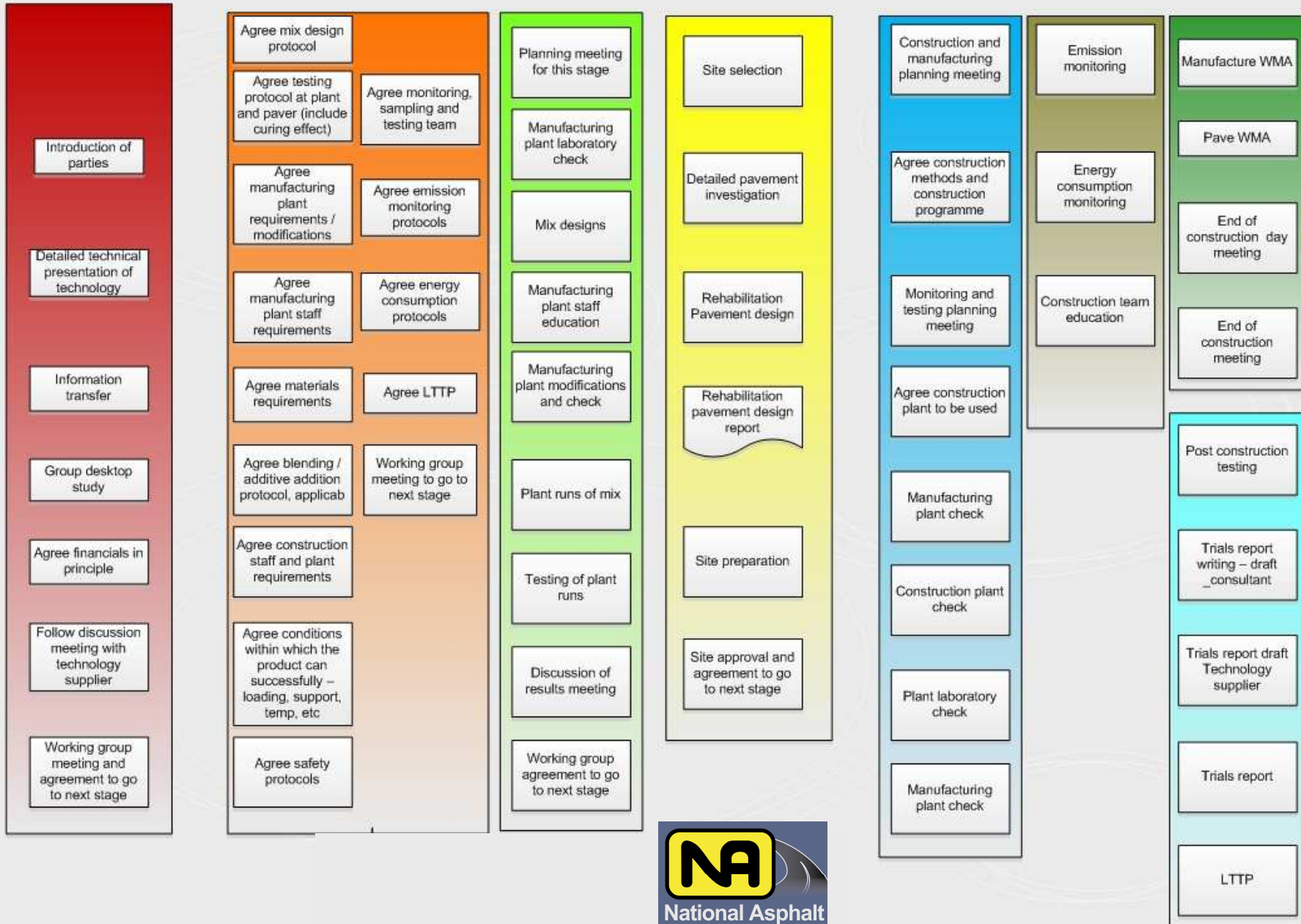
- REPORT ON FIRST HiMA TRIAL MANUFACTURING
- PLANT CALIBRATION
- MIXING PLANT DETAILS
- MATERIALS USED.
- TEST REPORTS
- CONCLUSIONS

# HiMA TRIAL REPORT POST CONSTRUCTION





# HiMA TRIAL REPORT POST CONSTRUCTION



# PLANT CALIBRATION

- BINDER CONTENT SELECTION DONE AT DESIGN STAGE AFTER PERFORMANCE TEST REPORT.
- 5.7% BEST FATIGUE LIFE – 5.1% BEST DEFORMATION.
- ALL AGREE TO USE 5.3% BEST OF BOTH.
- CALIBRATE THE MIX THROUGH THE PLANT USING A STANDARD BINDER TO ENSURE THE GRADING IS ON DESIGN TARGET 10 to 15 Tonnes
- 100 TON PLANT TRIAL DONE ON BRISTOL ROAD MIXED AT VARIATING BINDER CONTENTS.



# MIXING PLANT DETAILS

DOUBLE DRUM CONTINUOUS TYPE PLANT



# MANUFACTURING PLANT DETAILS

- 140 – 160 TONNES PER HOUR TWIN DRUM
- COUNTER FLOW DRYER
- CONTINUOUS DRUM MIXER
- 3 STORAGE SILOS 130, 85 & 45 TONNES
- 7 BITUMEN STORAGE & MIXING TANKS



## MANUFACTURING

- Bitumen tank temperature 172°C
- Bitumen pot temperature 166°C
- Mixing temperature 174°C
- Dispatch temperature 171°C

## AGGREGATE MOISTURES & TEMPERATURES

- 19.0 – 1.7% .... 17 °C
- 13.2 – 0.5% ... 13 °C
- 9.5 – 2.0% .... 16 °C
- CRUSHER DUST 3.9% ... 16 °C



# HIMA TRIAL REPORT POST CONSTRUCTION

## SPECIALISED ROAD TECHNOLOGIES TEMPERATURE - VISCOSITY RELATIONSHIP

Client : National Asphalt (Pty) Ltd

Report No.: E11187

Project : Hima 20, 10/20 Bitumen

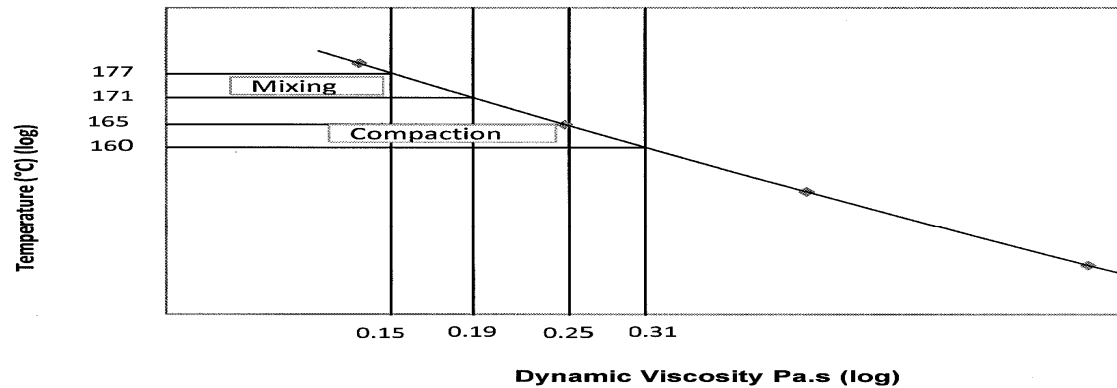
Date : 2011-08-25

Lab Number	Sample Number	Date Sampled	Temperature (°C)	Dynamic Viscosity (Pa.s)
B13450	11/2633	2011-08-15	135	1.101
			150	0.491
			165	0.247
			180	0.137

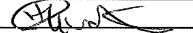
Mixing Temperature Range (°C) : 171 - 177

Compaction Temperature Range (°C) : 160 - 165

### Temperature vs Dynamic Viscosity



Comment: An exponential fit was used.

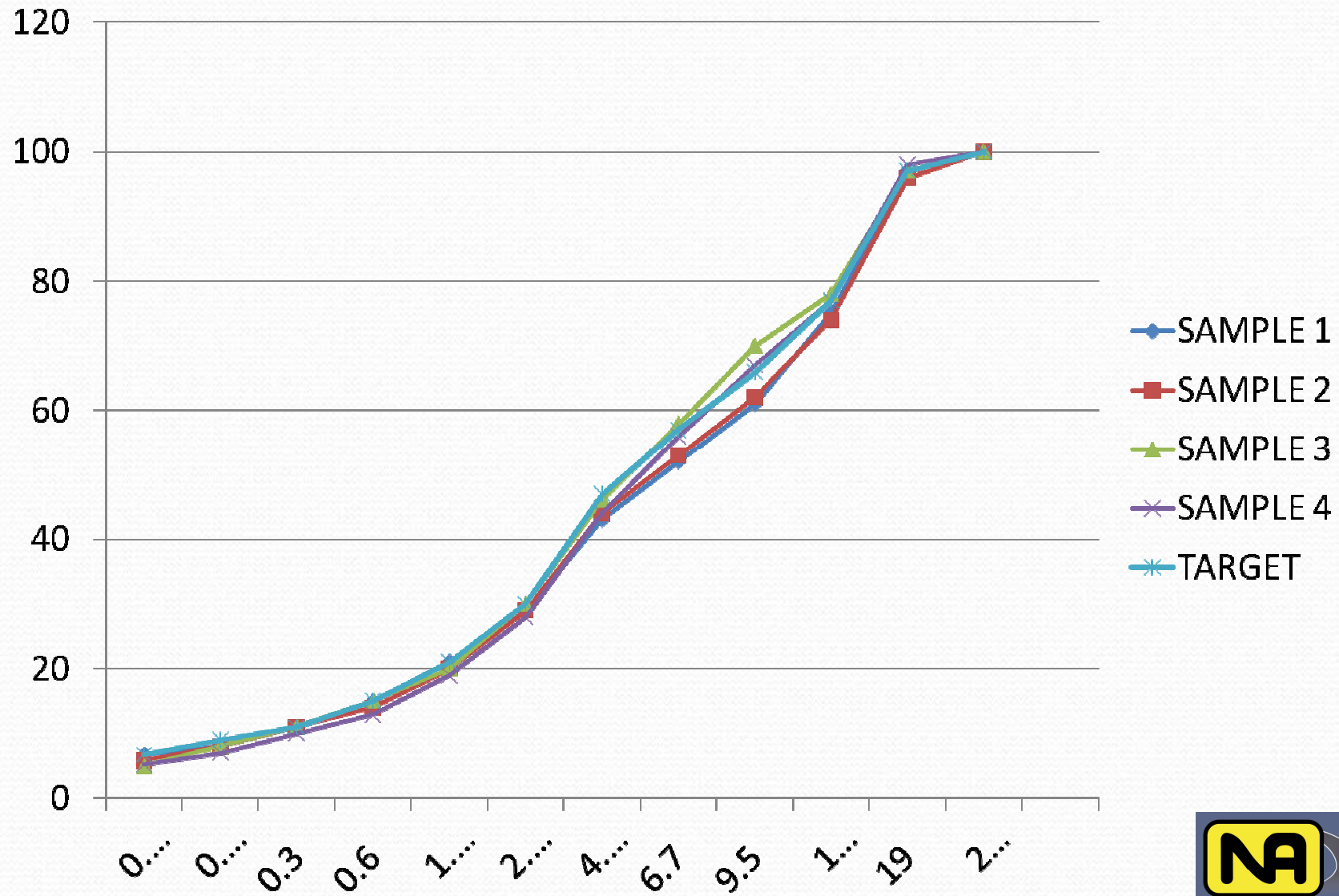
For SRT:   
Lab Manager

# HiMA TRIAL REPORT POST CONSTRUCTION

LABORATORY No.		11/2842	11/2843	11/2844	11/2845					BINDER GRADE	10/20	SPECIFICATION
LOAD No.		Blend 2	Blend 2	Blend 2	Blend 2							
CHAINAGE / POSITION		Lab	Lab	Lab	Lab							
DILIVERY NOTE No :		N/A	N/A	N/A	N/A					DAILY AVE. X <sub>n</sub>	STDV	TARGET GRADING
DATE MIXED		30/Aug/11	30/Aug/11	30/Aug/11	30/Aug/11							
	37.50	100	100	100	100					100	0.003	100.0
	26.50	100	100	100	100					100	0.003	100.0
	19.00	98	98	97	99					98	0.685	0.0
	13.20	79	86	80	84					82	3.402	0.0
	9.50	67	72	68	69					69	1.958	0.0
SIEVE ANALYSIS	6.70	58	59	58	53					57	2.546	52 - 72
	4.75	48	49	50	41					47	4.083	43 - 63
	2.36	31	32	35	23					30	5.153	26 - 42
	1.18	21	22	26	14					21	4.902	0.0
	0.600	16	15	20	9					15	4.547	0.0
	0.300	12	11	16	6					11	3.994	0.0
	0.150	10	8	12	4					8	3.092	0.0
	0.075	7.3	5.4	8.1	3.2					6.0	2.194	5.5 - 7.9
FILLER / BIT. RATIO	(-)	1.329	1.007	1.653	0.598					1.147	0.451	0.0
COARSE AGGREGATE	(%)	49.2	47.9	47.9	73.1					54.5	12.398	0.0
FINE AGGREGATE	(%)	38.3	41.4	39.5	18.5					34.4	10.693	0.0
FILLER CONTENT	(%)	6.9	5.1	7.7	3.0					5.7	2.089	0.0
FIBER CONTENT	(%)											0.0
RICES S.G. ( Max theo dens.)	(kg / m <sup>3</sup> )	2.448	2.455	2.477	2.461					2.460	0.012	N/A
BULK S.G.	(kg / m <sup>3</sup> )											N/A
BITUMEN CONTENT	(%)	5.5	5.4	4.9	5.3					5.3	0.263	0.0
FILM THICKNESS	(µm)											7.5 µm Min
<b>BINDER RICHNESS MODULI (k)</b>		<b>3.6</b>	<b>3.8</b>	<b>3.5</b>	<b>4.1</b>					<b>3.7</b>	<b>0.288</b>	<b>3.4 Min</b>
BINDER ABSORPTION	(%)	0.3	0.4	0.4	0.4					0.4	0.050	0.5 Max
Gyratory VOIDS @ 300	(%)	5.0	3.7	2.4						3.7	1.300	3.0 - 6.0



# HiMA TRIAL REPORT POST CONSTRUCTION

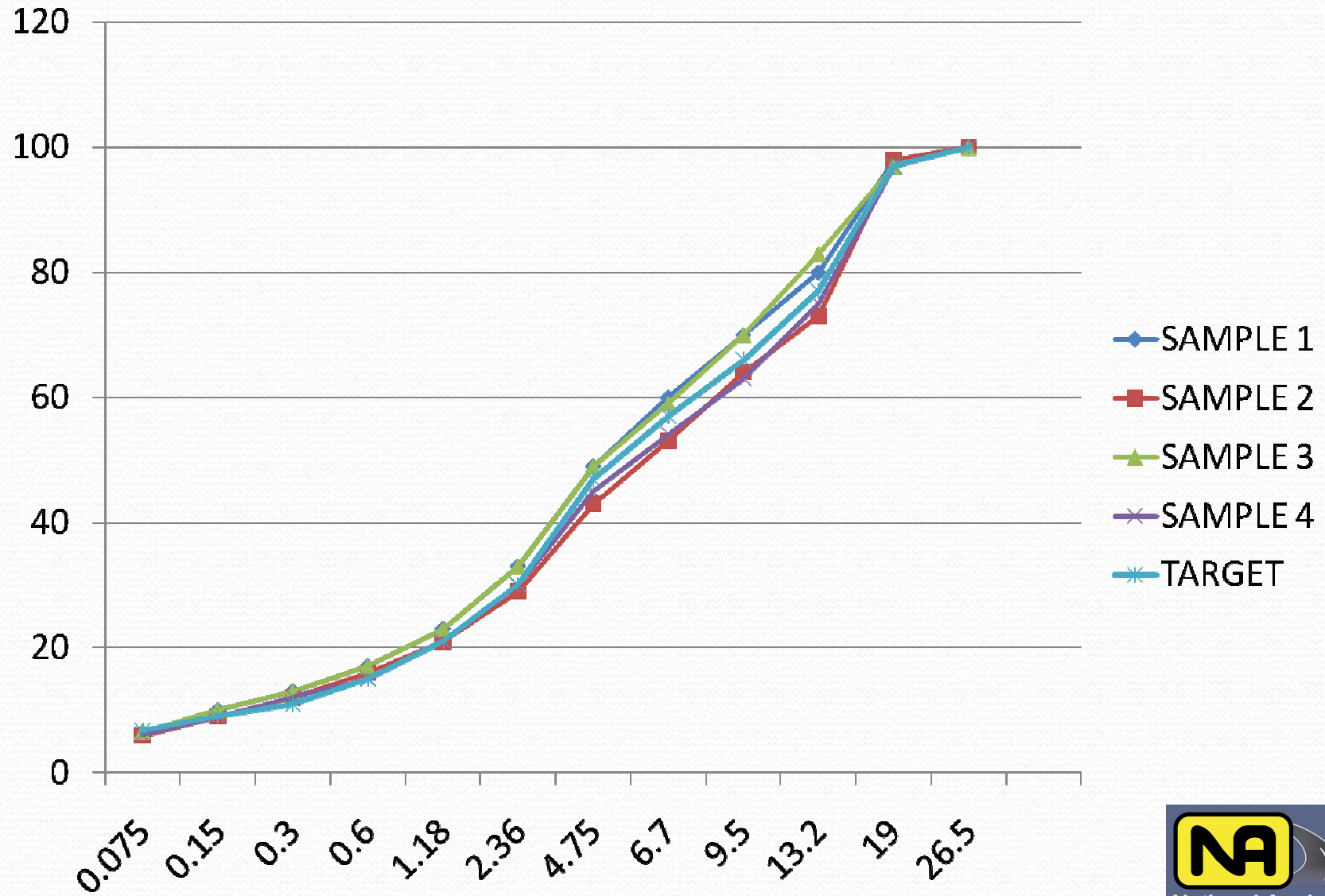


# HiMA TRIAL REPORT POST CONSTRUCTION

LABORATORY No.		11/2963	11/2464	11/2965	11/2966		BINDER GRADE	10/20	SPECIFICATION
LOAD No.		2	6	11	13				
CHAINAGE / POSITION		Plant	Plant	Plant	Plant				
DILIVERY NOTE No :		101720	101727	101736	101739		DAILY AVE.	STDV	TARGET GRADING
DATE MIXED		5/Sep/11	5/Sep/11	5/Sep/11	5/Sep/11	TARGET	Xn		
	37.50	100	100	100	100	<b>100</b>	100	0.037	100.0
	26.50	100	100	100	100	<b>100</b>	100	0.037	100.0
	19.00	98	98	97	97	<b>97</b>	97	0.639	0.0
	13.20	80	73	83	75	<b>77</b>	78	3.848	0.0
	9.50	70	64	70	63	<b>66</b>	66	3.151	0.0
SIEVE	6.70	60	53	59	54	<b>57</b>	57	3.171	52 - 72
ANALYSIS	4.75	49	43	49	45	<b>47</b>	47	2.758	43 - 63
	2.36	33	29	33	30	<b>30</b>	31	1.956	26 - 42
	1.18	23	21	23	21	<b>21</b>	22	1.336	0.0
	0.600	17	16	17	15	<b>15</b>	16	1.042	0.0
	0.300	13	12	13	12	<b>11</b>	12	0.873	0.0
	0.150	10	9	10	9	<b>9</b>	9	0.367	0.0
	0.075	6.4	5.9	6.5	6.0	<b>6.7</b>	6.3	0.335	5.5 - 7.9
FILLER / BIT. RATIO	(-)	1.307	1.166	1.302	1.298		1.268	0.068	0.0
COARSE AGGREGATE	(%)	48.4	54.1	48.2	67.0		54.4	8.818	0.0
FINE AGGREGATE	(%)	40.6	35.1	40.5	22.6		34.7	8.466	0.0
FILLER CONTENT	(%)	6.1	5.6	6.2	5.7		5.9	0.294	0.0
FIBER CONTENT	(%)								0.0
RICES S.G. ( Max theo dens.)	(kg / m³)	2.464	2.468	2.465	2.476		2.468	0.005	N/A
BULK S.G.	(kg / m³)								N/A
BITUMEN CONTENT	(%)	4.9	5.1	5.0	4.6		4.9	0.216	0.0
FILM THICKNESS	(µm)								7.5 µm Min
BINDER RICHNESS MODULUS	(k)	3.2	3.3	3.2	3.3		3.2	0.044	3.4 Min
BINDER ABSORPTION	(%)	0.2	0.4	0.3	0.2		0.3	0.096	0.5 Max
GYRATORY VOIDS @ 45	(%)	5.3			6.3		5.8	0.707	3.0 - 6.0



# HiMA TRIAL REPORT POST CONSTRUCTION

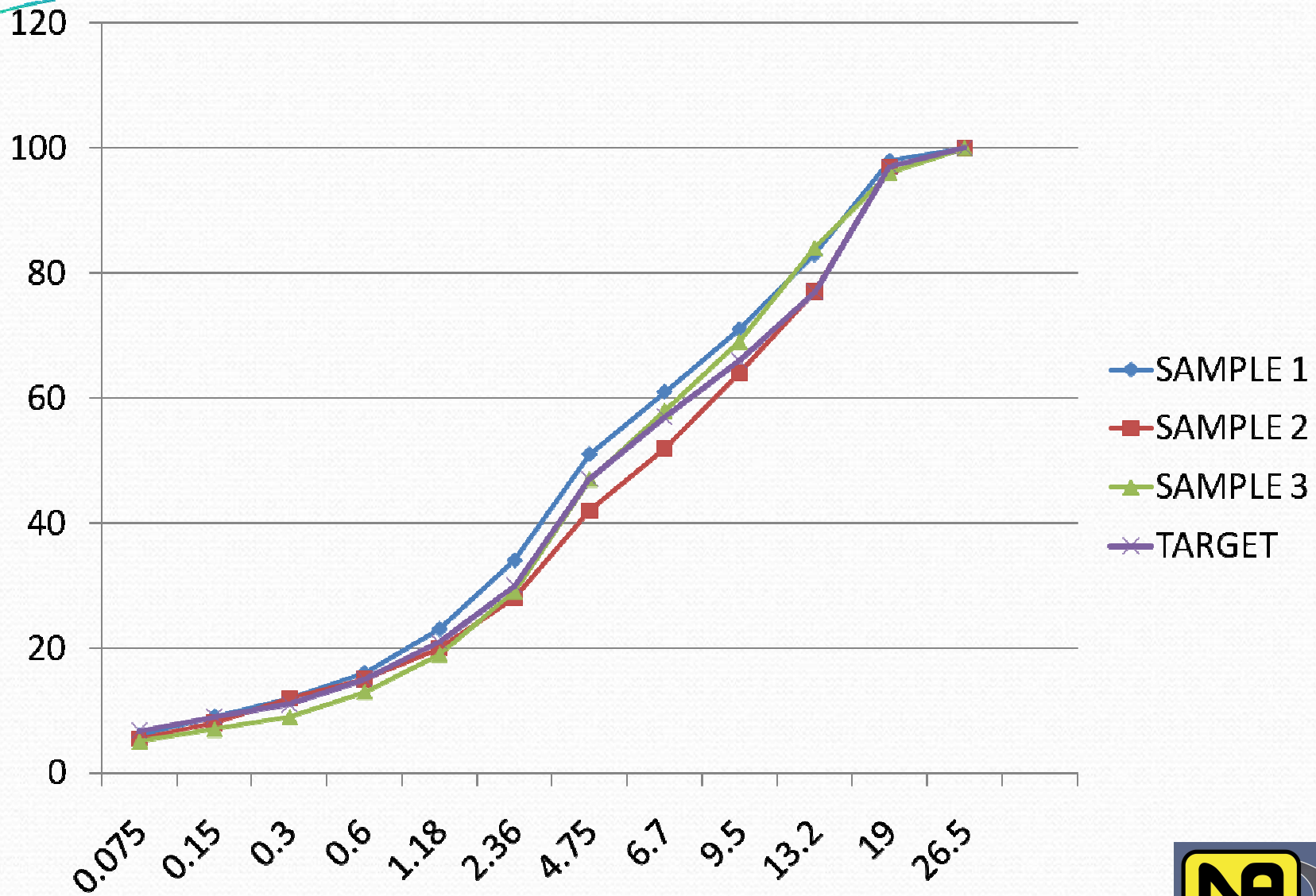


# HiMA TRIAL REPORT POST CONSTRUCTION

LABORATORY No.		11/2991	11/2992	11/2993		BINDER GRADE	10/20	SPECIFICATION
LOAD No.		2	6	10				
CHAINAGE / POSITION		Plant	Plant	Plant				
DILIVERY NOTE No :		101870	101875	101882		DAILY AVE.	STDV	TARGET GRADING
DATE MIXED		6/Sep/11	6/Sep/11	6/Sep/11	TARGET	Xn		
	37.50	100	100	100	<b>100</b>	100	0.044	100.0
	26.50	100	100	100	<b>100</b>	100	0.044	100.0
	19.00	98	97	96	<b>97</b>	97	0.871	0.0
	13.20	83	77	84	<b>77</b>	81	3.885	0.0
	9.50	71	64	69	<b>66</b>	67	3.154	0.0
SIEVE ANALYSIS	6.70	61	52	58	<b>57</b>	57	3.706	52 - 72
	4.75	51	42	47	<b>47</b>	47	3.506	43 - 63
	2.36	34	28	29	<b>30</b>	30	2.441	26 - 42
	1.18	23	20	19	<b>21</b>	21	1.739	0.0
	0.600	16	15	13	<b>15</b>	15	1.414	0.0
	0.300	12	11	9	<b>11</b>	11	1.109	0.0
	0.150	9	8	7	<b>9</b>	8	0.875	0.0
	0.075	6.0	5.5	5.1	<b>6.7</b>	5.8	0.677	5.5 - 7.9
FILLER / BIT. RATIO	(-)	1.200	1.165	0.990		1.118	0.113	0.0
COARSE AGGREGATE	(%)	47.0	55.2	50.4		50.9	4.120	0.0
FINE AGGREGATE	(%)	42.3	34.8	39.4		38.8	3.782	0.0
FILLER CONTENT	(%)	5.7	5.2	4.9		5.3	0.404	0.0
FIBER CONTENT	(%)							0.0
RICES S.G. ( Max theo dens.)	(kg / m³)	2.470	2.485	2.461		2.472	0.012	N/A
BULK S.G.	(kg / m³)							N/A
BITUMEN CONTENT	(%)	5.0	4.7	5.2		5.0	0.252	0.0
FILM THICKNESS	(µm)							7.5 µm Min
BINDER RICHNESS MODULUS	(k)	3.3	3.4	3.6		3.4	0.135	3.4 Min
BINDER ABSORPTION	(%)	0.4	0.4	0.3		0.4	0.058	0.5 Max
GYRATORY VOIDS @ 45	(%)	7.1		8.5		7.8	0.990	3.0 - 6.0



# HiMA TRIAL REPORT POST CONSTRUCTION



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## REPORT NO.: E11303

The test results are as follows:

Lab No	Sample No	Sample Description	Date Sampled	Voids After 45 Gyration (%)	Softening Point (R&B) (°C)	Penetration @ 25°C (1/10 mm)
B13821	11/2841	10/20 Bitumen	2011-08-30	-	59.0	29
B13822	11/2928		2011-09-02	-	64.0	20
B13823	11/2940	HIMA in Hot Box	2011-09-03	9.5	-	-
B13824	11/2942		2011-09-03	9.5	-	-

Attached, please find two "Gyratory Compaction Graphs", depicting the test results.

We wish to thank you for your valued support. Should you require any further information, please feel free to contact us.

Yours faithfully



Hennie Loots  
Branch Manager

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# CONCLUSIONS

- NO COATING PROBLEMS EXPERIENCED.
- CONSISTANT MIXING AND SUPPLY TEMPERATURES.
- POTENTIAL EXISTS FOR IMPROVEMENT ON AGGREGATE PACKING.
- HIGHER BINDER CONTENTS.
- SHOULD TRIAL THE HiMA 14.
- OVERALL THIS WOULD BE A VERY GOOD MIX WITH POTENTIAL ON A NUMBER OF APPLICATIONS.

THANK YOU

