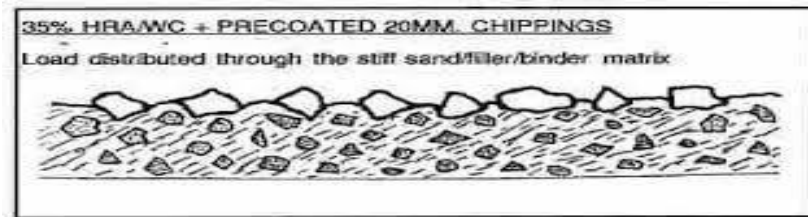
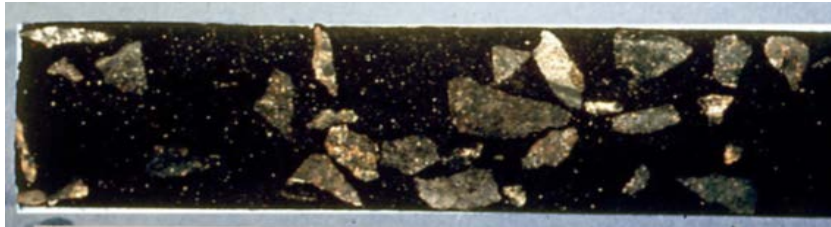


Current Developments With HOT ROLLED ASPHALT

Eddie Winterlich, Transport Infrastructure
Sean Cassidy, Quality Asphalt

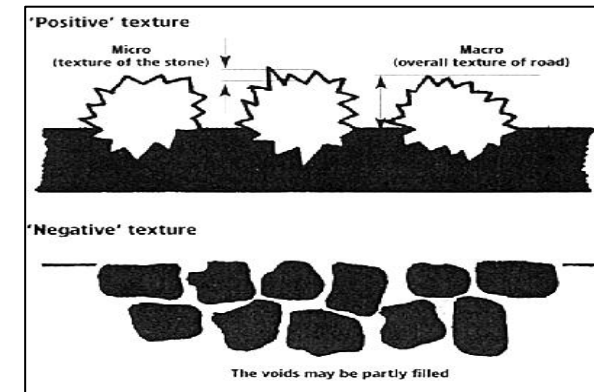
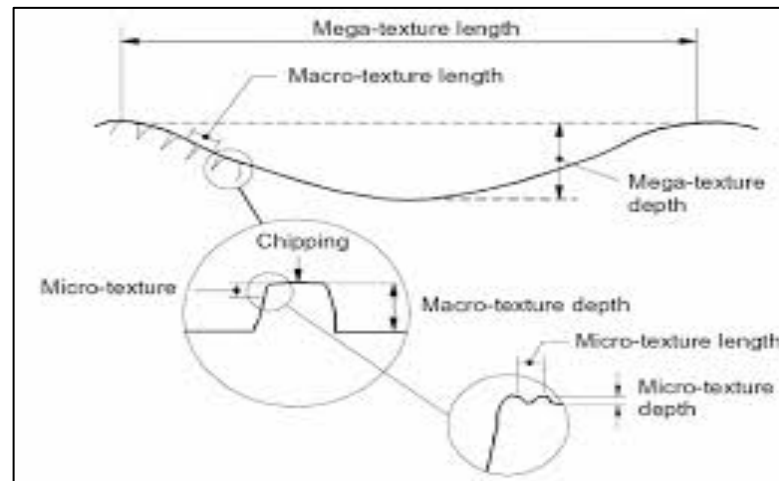
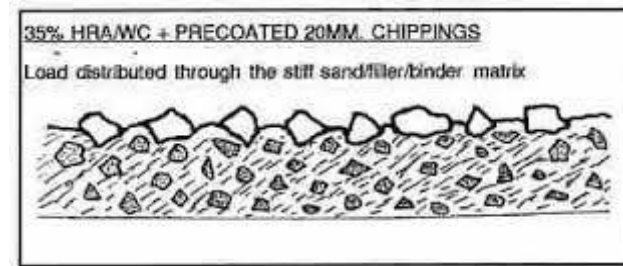
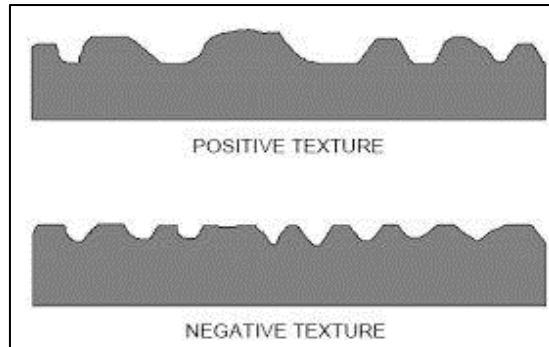
What is Hot Rolled Asphalt?



- Hot rolled asphalt is a very dense mixture containing a mortar of fine aggregate, filler, and bitumen. Coarse aggregate up to 35% is added to 'bulk out' the product.
- In addition Precoated Chippings are spread and rolled into the surface to give a **POSITIVE** Macro and Micro Texture necessary to provide friction for Skidding Resistance.

Positive / Negative Texture

- Cl 10.1.7.1 “the **contractor** shall ensure a uniform rate of spread so that they are rolled into the surface and they are **effectively held** to achieve the initial **positive** texture depth specified in Table 6



- Macro texture is required to assist with the dissipation of surface water and maintain tyre road contact preventing “*dynamic / viscous hydroplaning*”.

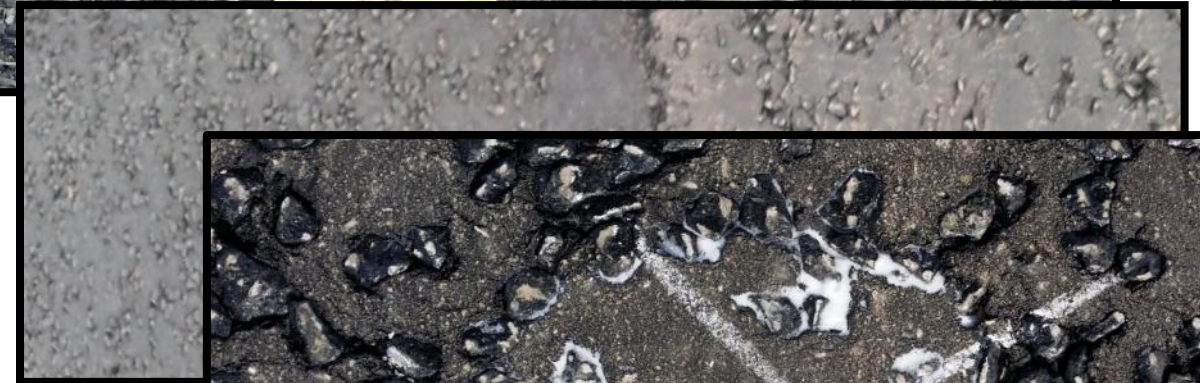
Management of Skid Resistance

- The objective;
“broadly equalise the risk of skidding collisions across the national road network”
- Primarily an Asset Management policy it plays a major role in the Safety of the Network providing
 - Methodology for measuring the performance of the Network.
 - Methodology for assessing and prioritising remedial works at locations that are not performing as expected.



AM/PAV/06045 (HD28/11) Site Investigations

- The Network Survey reveals that HD28 Sites are becoming more frequent even on relatively new schemes where HRA has been installed as the Surface Course
 - Low and Variable PCC spread rates
 - Variable PCC quality – Size and Shape
 - PCC's pushed into the Surface leading to **NEGATIVE** texture and tyre/surface contact with the lower PSV of the mortar constituents

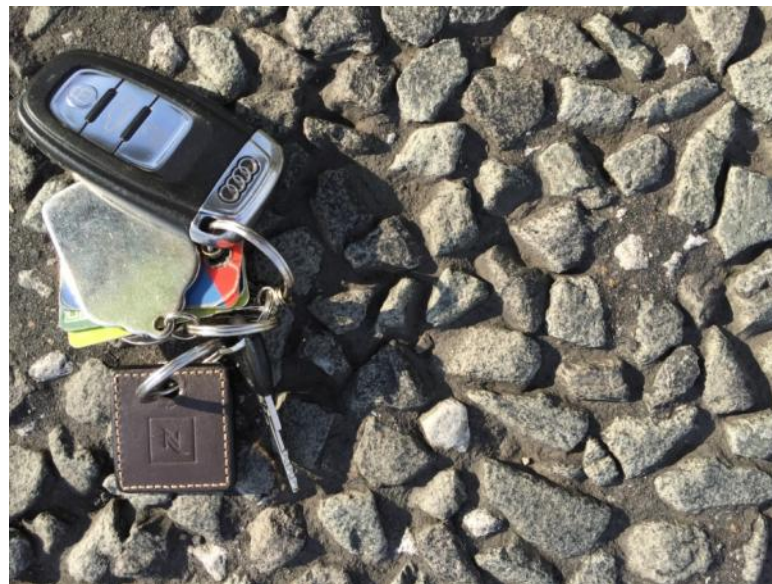


“fit for its intended use and durable for its expected life” (Construction Product Regulations 2013)



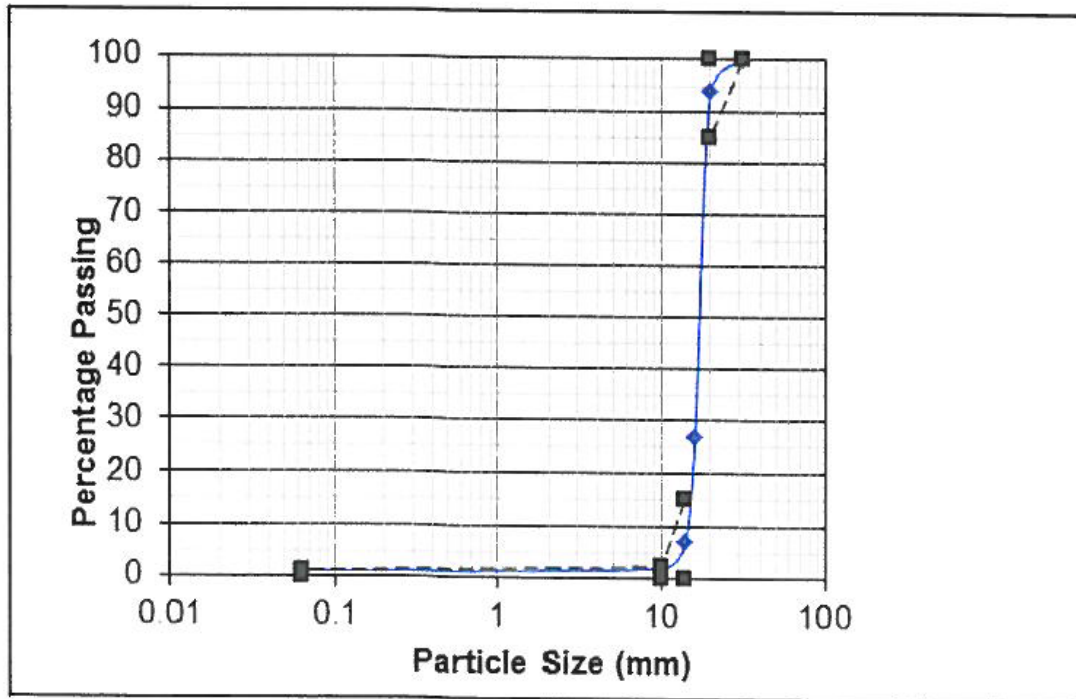
Pre Coated Chippings

- High Polished Stone Value aggregate
- Nominal size 20mm to 14mm
- Coated with ~ 1,5% bitumen



Testing

- Particle Size Distribution (PSD)
- Flakiness Index (FI)
- Macrotexture



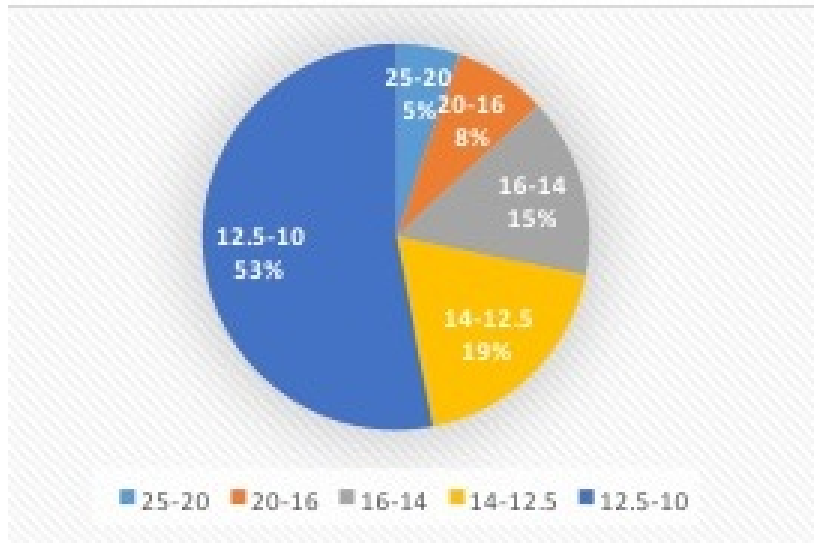
Testing

	Series 900 specification 2011					Series 900 specification 2015				
	AV	MAX	MIN	COUNT	SPEC	AV	MAX	MIN	COUNT	SPEC
PSD										
31.5	100	100	100	32	100	100	100	100	12	100
20	94	98	85	32	90 to 100	94	99	89	12	85 to 100
16	57	58	56	2	-	34	47	23	6	SDV
14	20	28	8	32	0 to 25	9	15	2	12	0 to 15
10	4	6	1	32	-	2	3	1	12	0 to 2
6.3	3	3	1	25	0 to 4					
0.063	1	1.6	0.0	32	0 to 2	1	1.3	0.7	12	0 to 1
Binder content	1.4	1.8	1.1	30	1,2 to 1,8%	1.7	1.8	1.5	12	1,2 to 1,8%
Flakiness	10	13	3	9	FI 15	6	11	3	9	FI 15
Macrotexture	AV	MAX	MIN	COUNT	SPEC	AV	MAX	MIN	COUNT	SPEC
Set of 10	2.0	2.4	1.2	167	max n/a	1.5	1.7	1.4	7	Max 2,0
Individual	2.0	4.4	1.0	120		1.5	2.6	0.9	70	

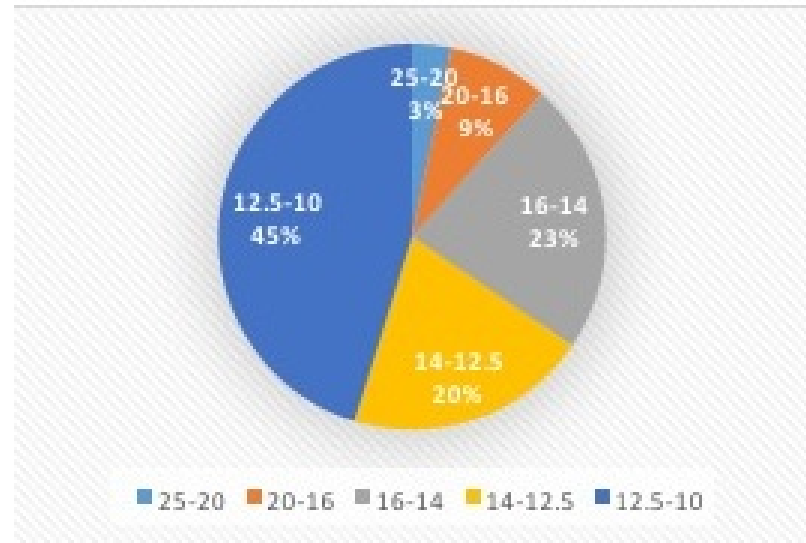
Older versions of BS 594 included a minimum Specified Size - passing 20mm sieve and retained 14mm sieve

Testing

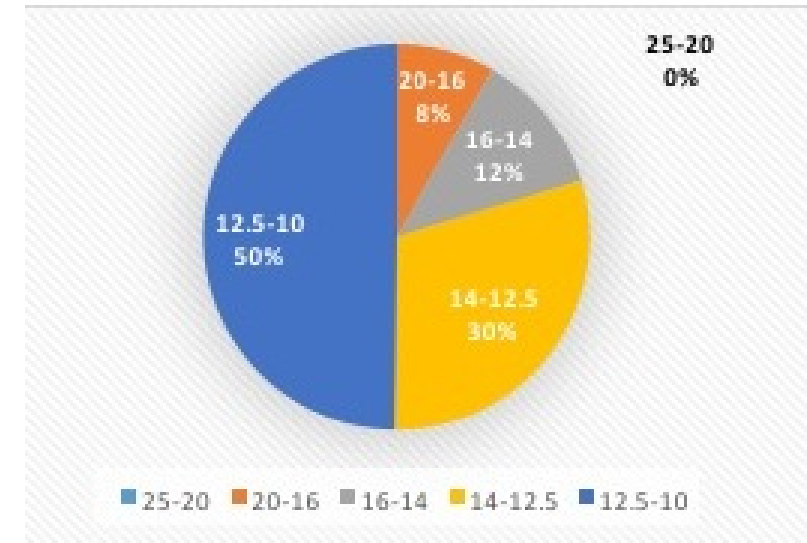
- Shape Index EN 933-4
- Similar to old BS 812 Elongation Index, assessing 'non cubical' particles
- Examples for three samples of Pre Coated Chippings:



Shape Index 15; Flakiness 6



Shape Index 9; Flakiness 6

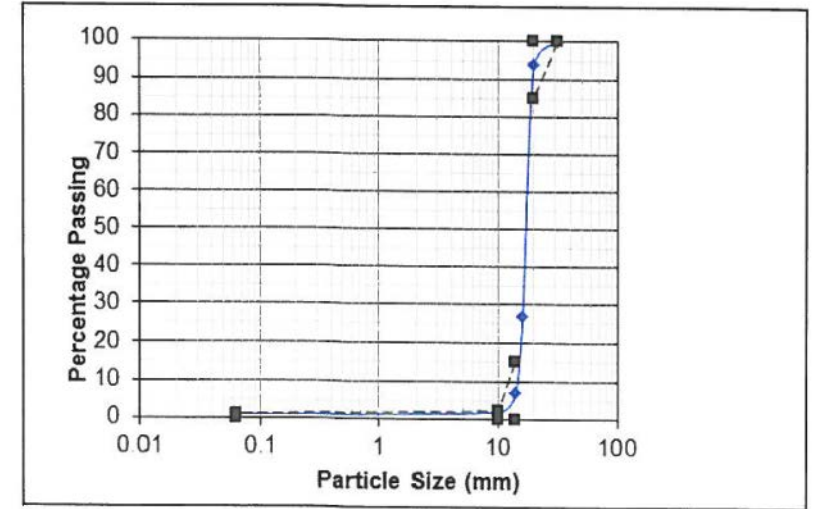
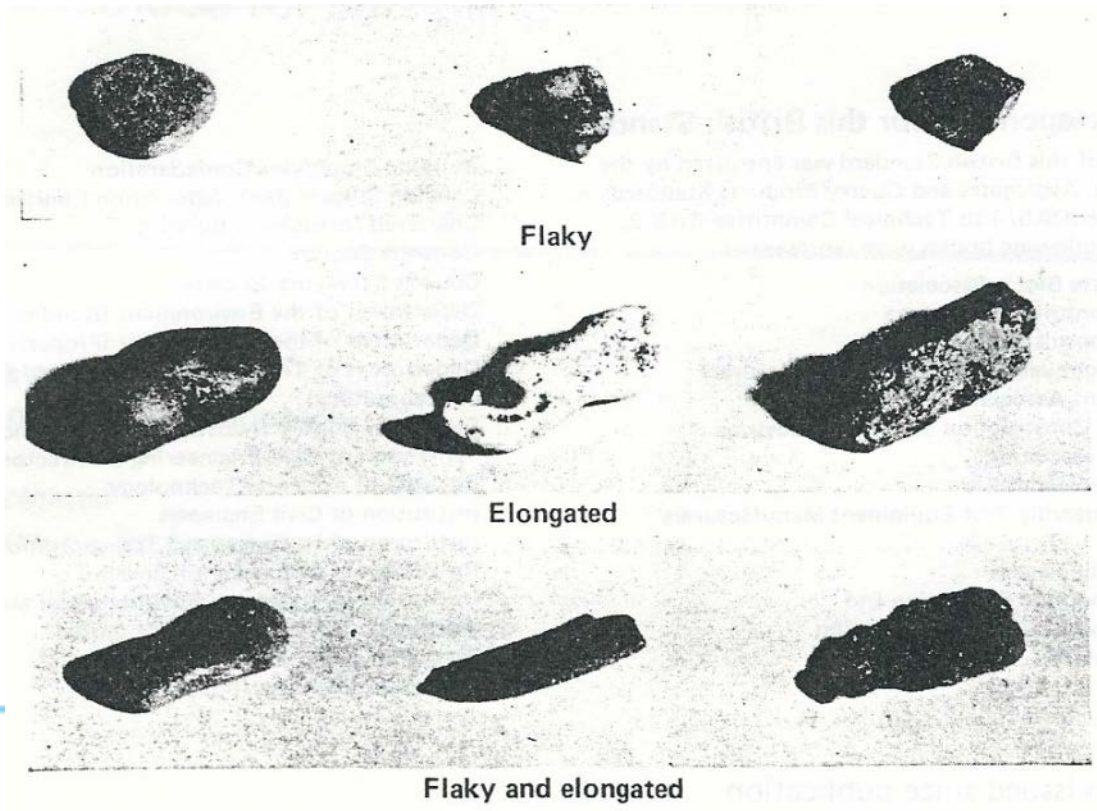


Shape Index 14; Flakiness 8

Specification Enhancements - Testing

Shape Index EN 933-4

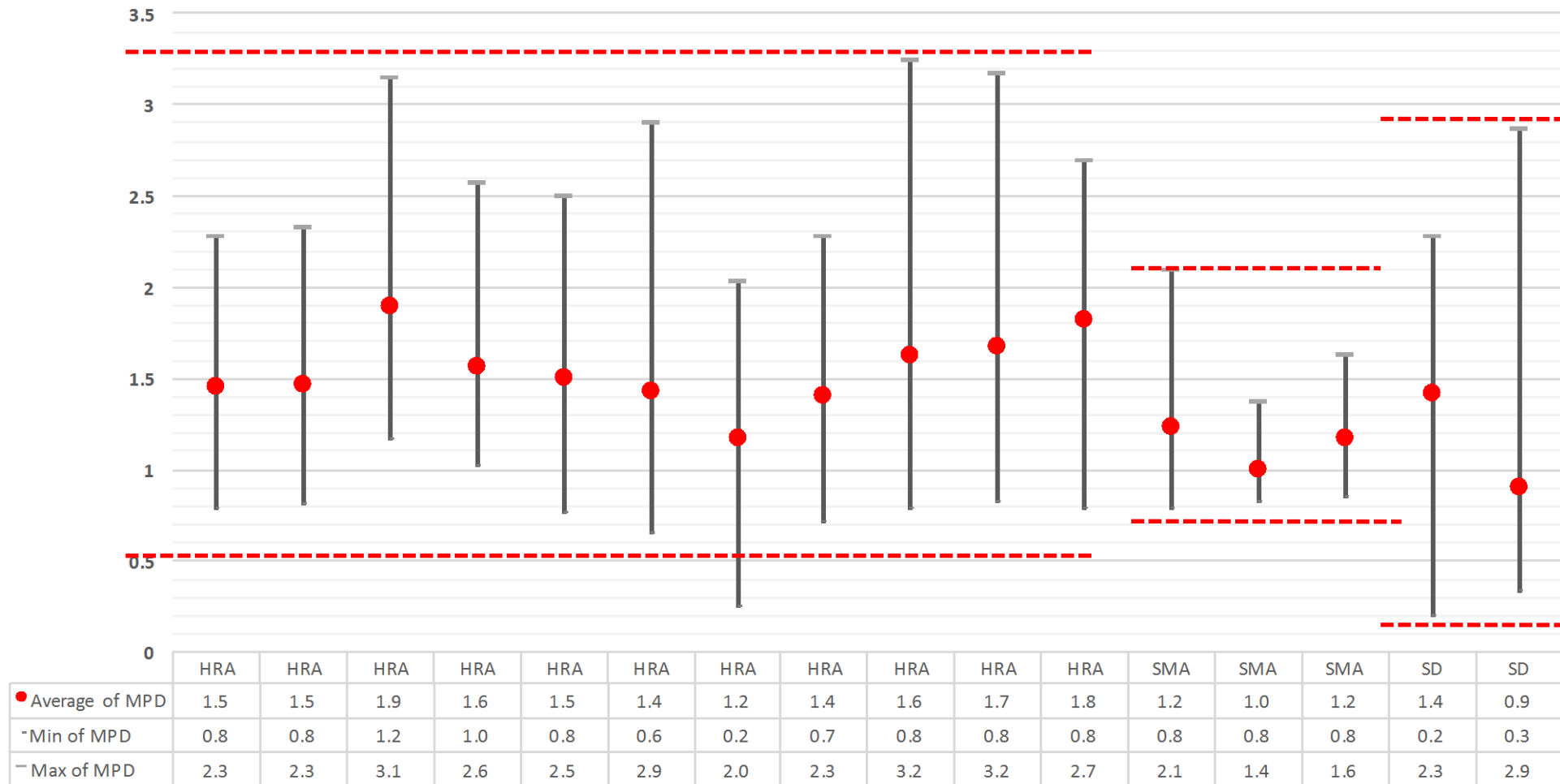
- Review current Particle Size Distribution tolerances
- Research use of Shape Index



Science - Road Surface Profiler

Various Network Sites

Mean Profile Depth



Science - Photography versus Sand?

- 2D and 3D models using photographs
- New ways of measuring giving new insight into texture related issues
- 'Off the shelf' software for modelling



V

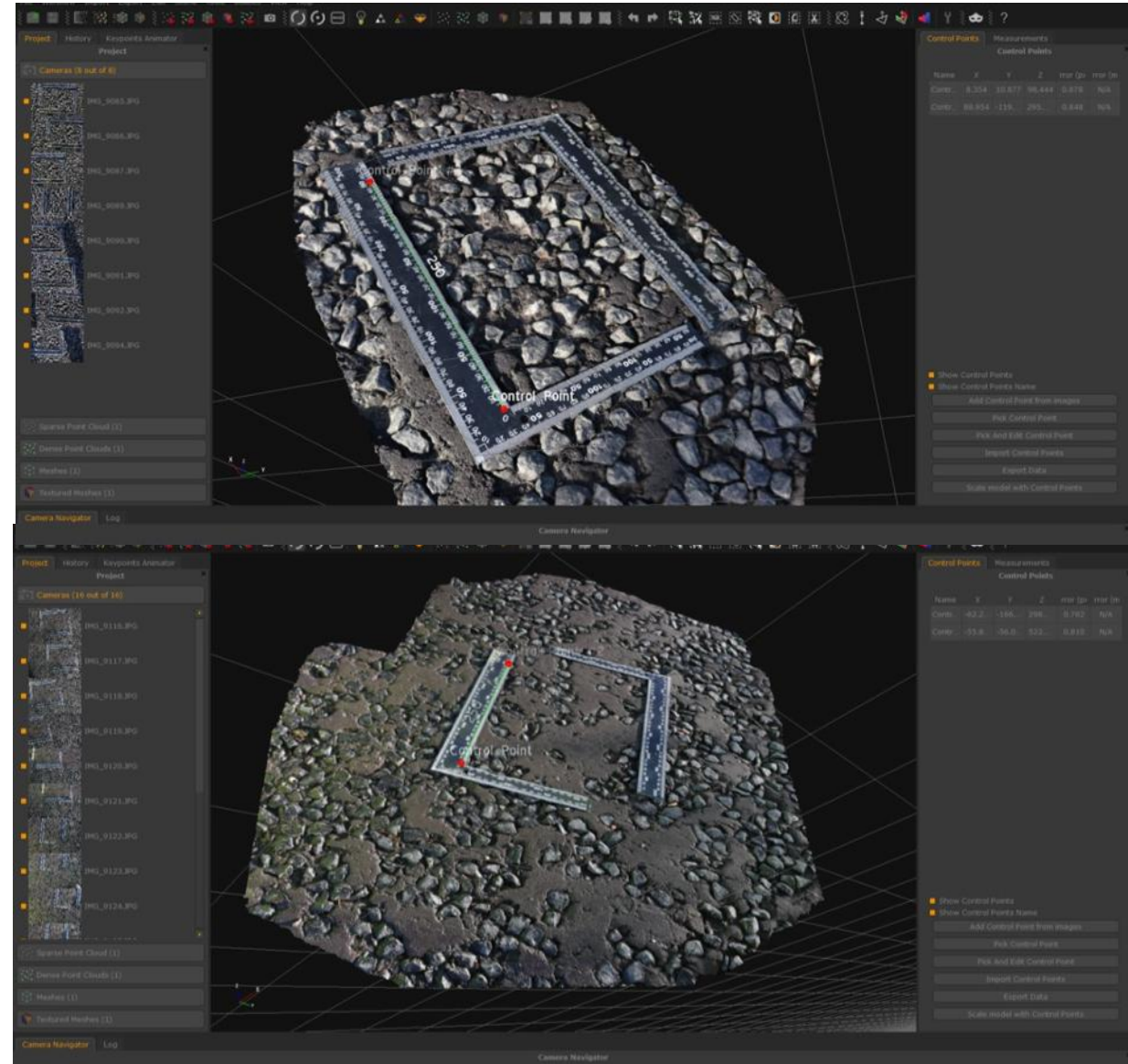


Science - 3D Photography & Modelling

- New HRA
- trafficked for a few weeks - 3D model showing chip loss

- Same site
- 3D model showing a lot of 'mastic'

Is this negative texture?

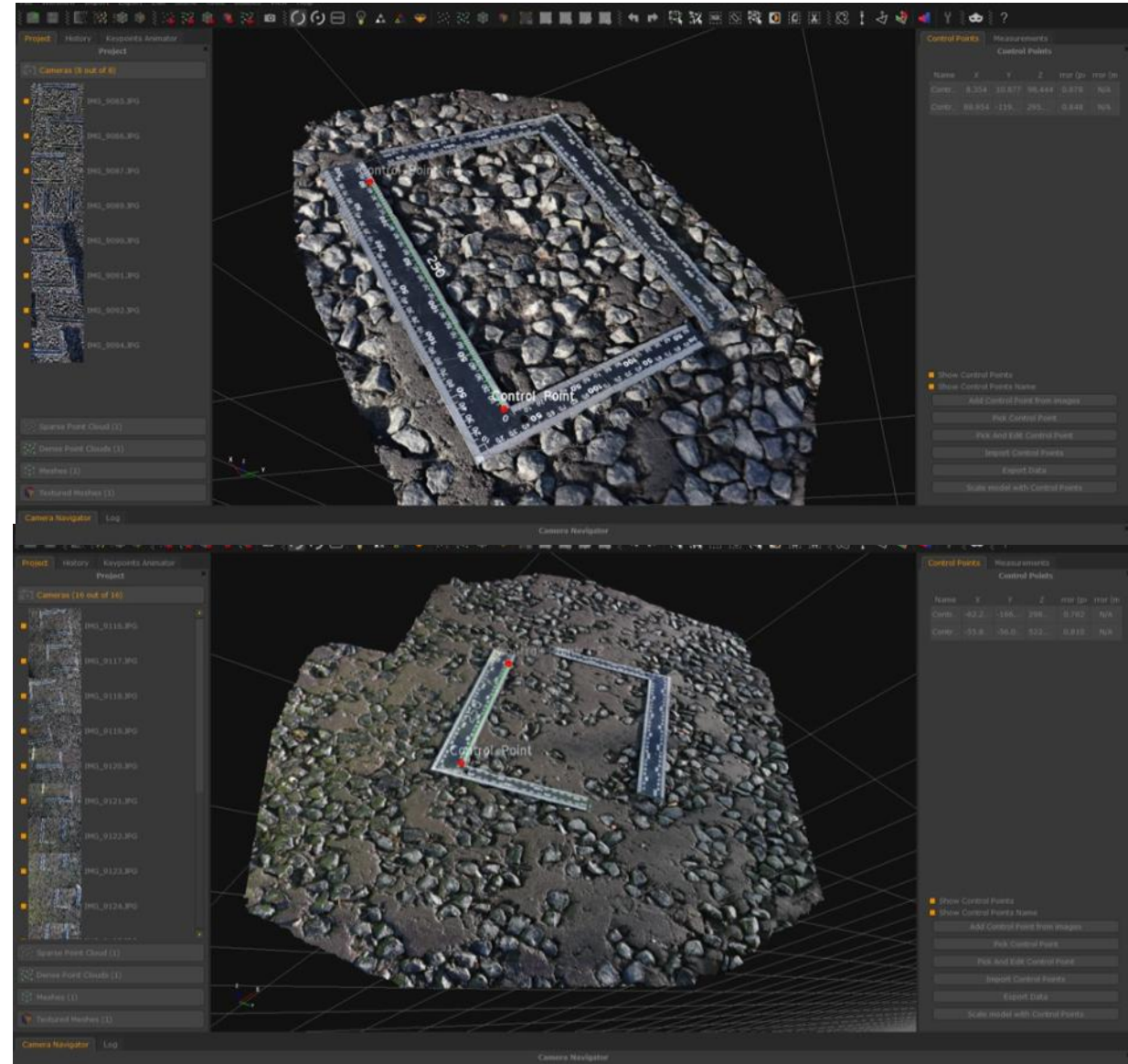


Science - 3D Photography & Modelling

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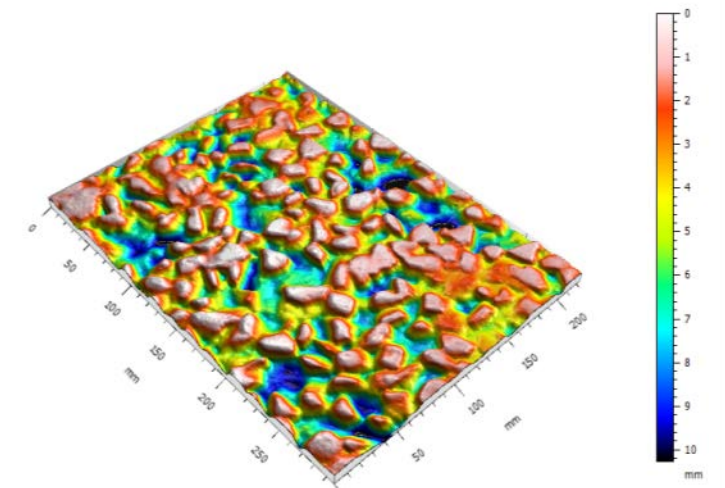
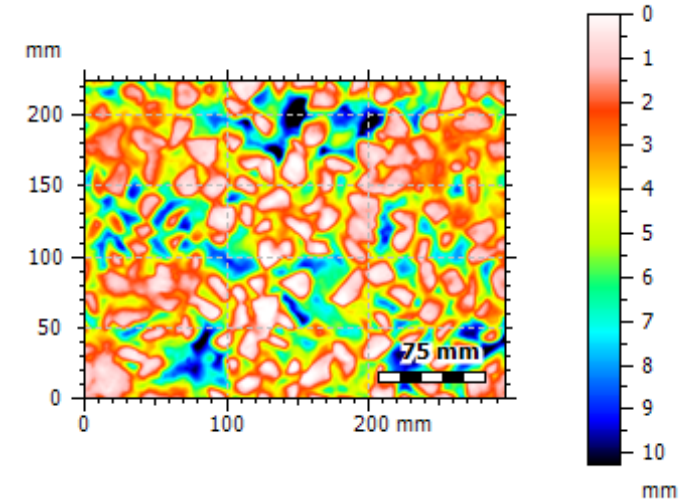
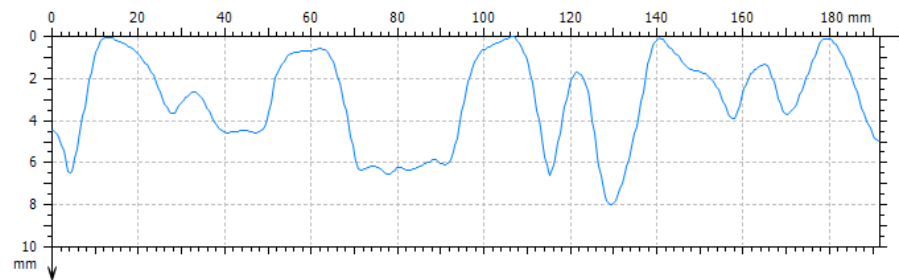
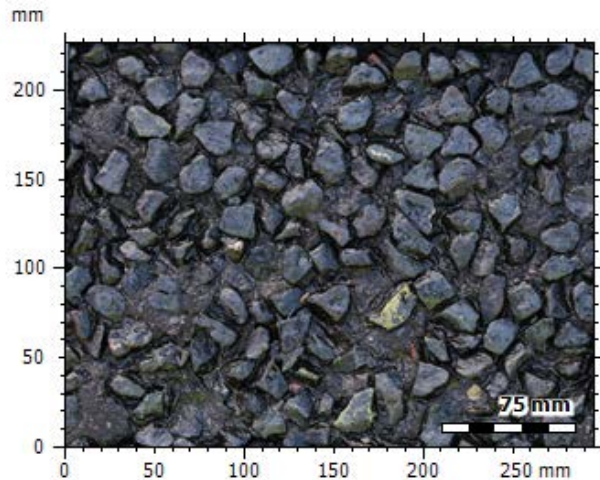
- Same site
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Is this negative texture?



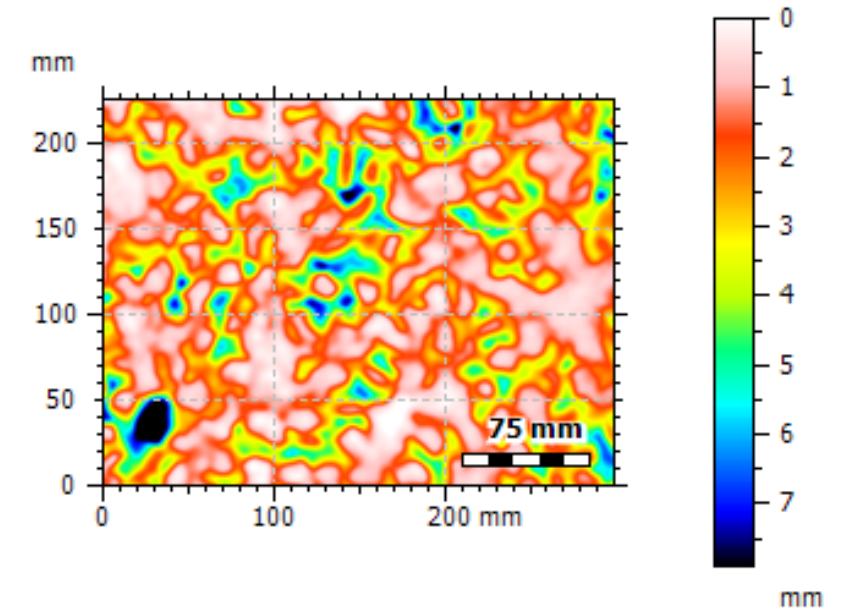
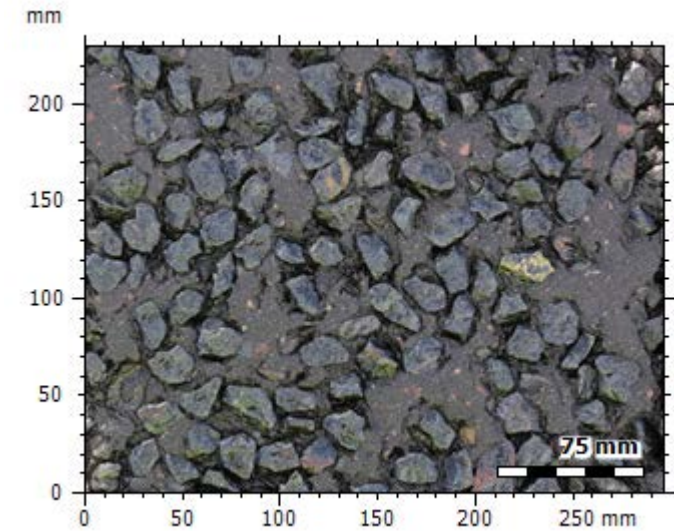
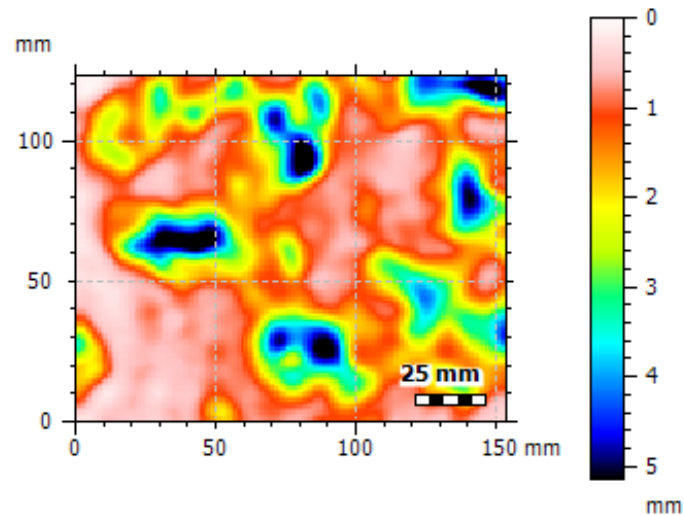
Science - 3D Photography & Modelling

- 3D model shows depth into the surface
- Positive texture obvious in 3D model
- Chips standing above level of mastic
- 2D section shows depth of texture



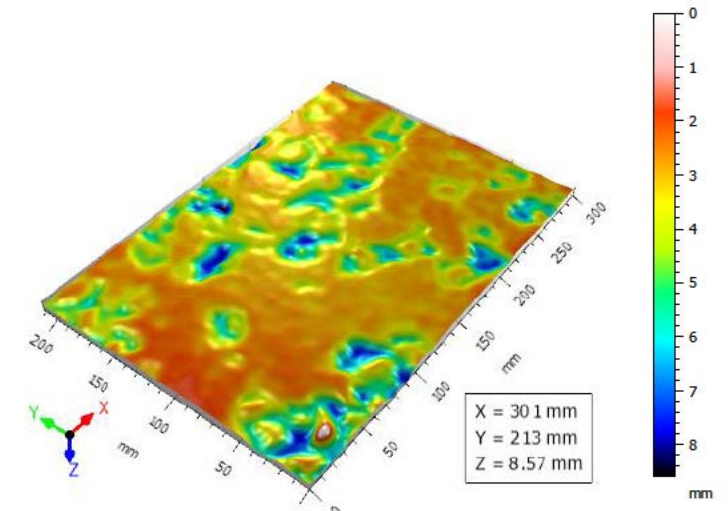
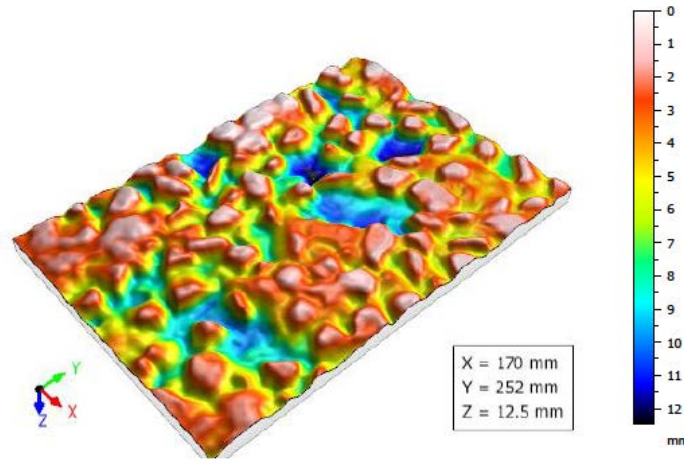
Science - 3D Photography & Modelling

- Chips pushed into the mastic
- Surface of mastic same height as chips
- Pockets of trapped water
- Blue coloured pockets of negative texture



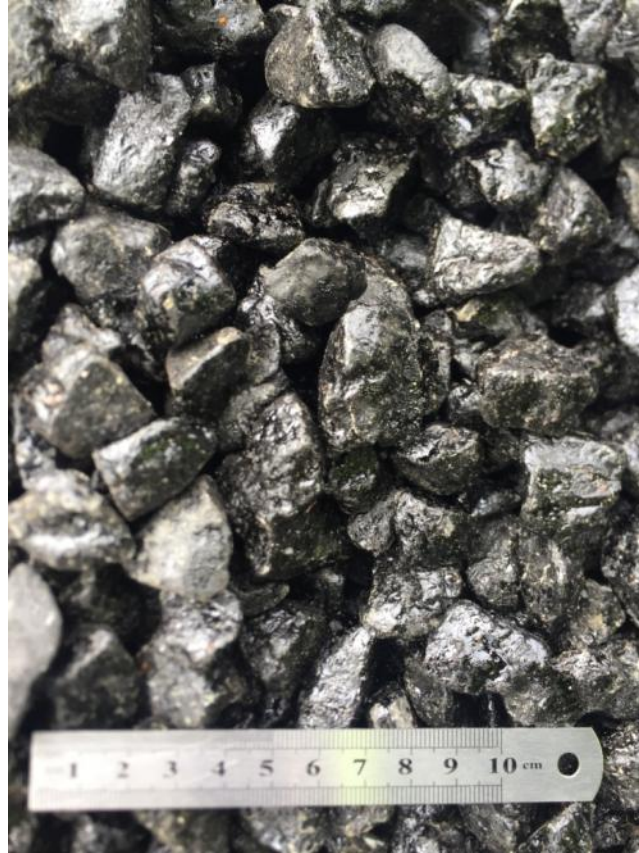
Specification Enhancements - Science

- Further develop use of 3D photography, modelling & Road Surface Profiler for analysis of surface texture and characteristics
- Encouraging results to date – looking for additional sites to evaluate



Workmanship & Best Practice

Condition of pre coated chippings



Workmanship & Best Practice

Experience of chipping teams - lost in recent times

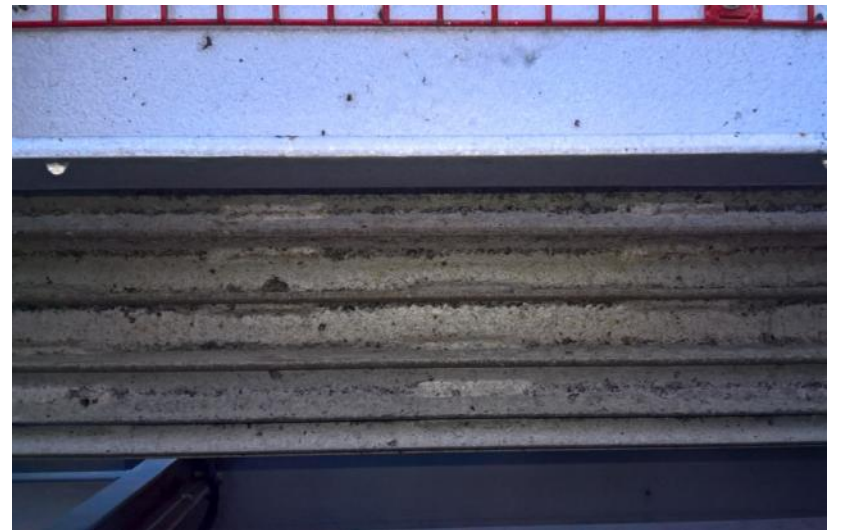


Workmanship & Best Practice



Specification Enhancements - Workmanship

- Chip spreader maintenance
- Calibration & Evenness of rate of spread



Specification Enhancements - Workmanship

Specific method statements to address:

- Transport & Storage of chippings
- Cleanliness of stockpiles on site
- Trial strips with specific plant, mixtures and chippings



Acknowledgements

- Highway Testing Laboratory – Dermot Leonard, Simon Grealish
 - Pavement Management Services - Brian Mulry, Ray McGowan, Rory Donnellan
 - University of Ulster – David Woodward, Philip Millar
 - Tarmac - Tim Smith
 - Kilsaran – Seán Keohane
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