Bituminous Stabilized Materials Guideline

RPF

November 2008

Fenella Long

Today's Presentation

- Where are we?
- Structure of the Guideline
- Highlights from the Guideline
- Review process

Where are we now?

- First draft being reviewed by
  - Authors
  - Sponsors
- Complete by end of November
- Industry review
- Workshop Roadshows in 1st quarter of 2009

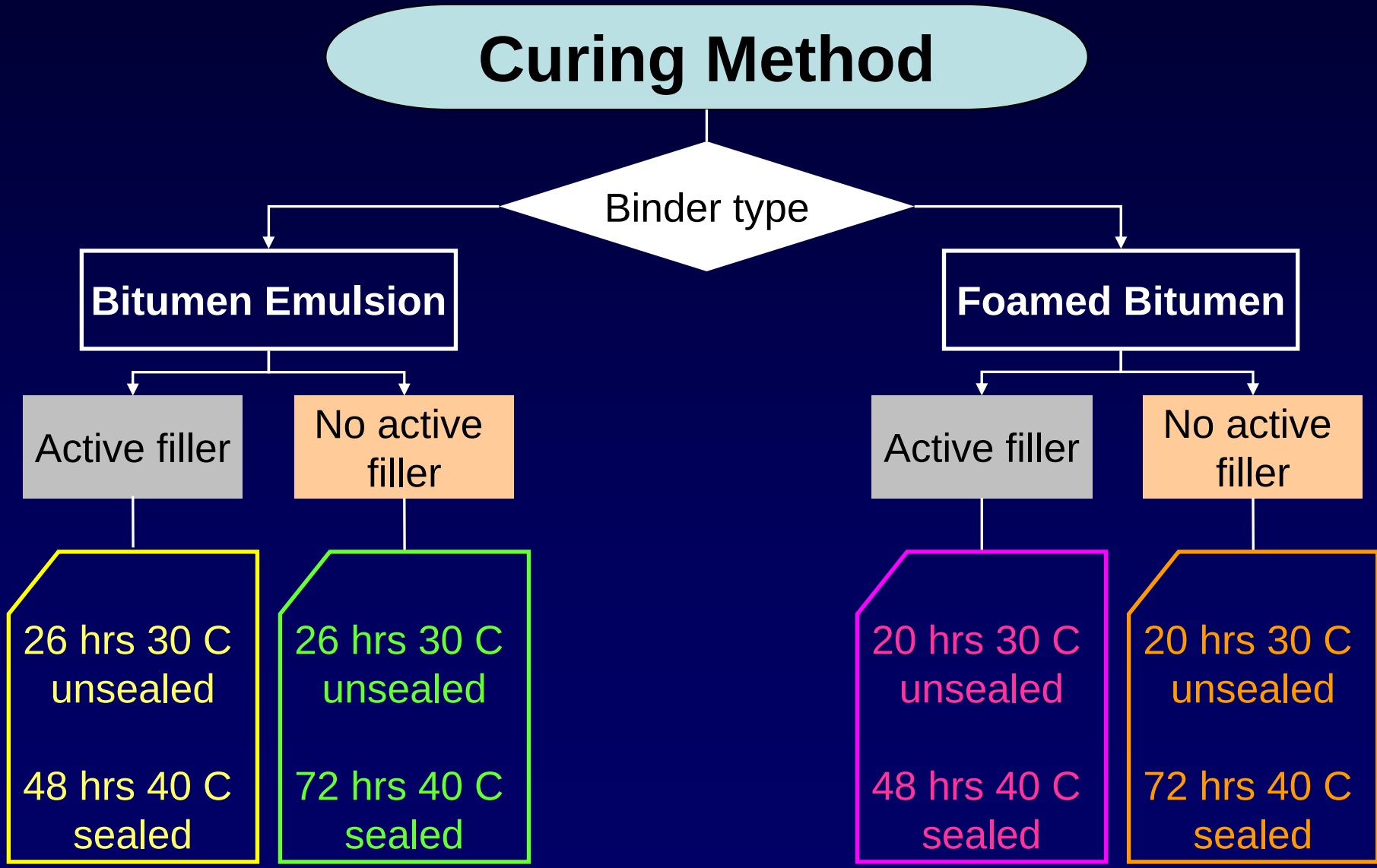
Structure of Guideline

1. Introduction
2. Mix Design
3. Materials Classification
4. Structural Design
5. Construction
6. Risk Assessment

Appendix: Laboratory testing protocols

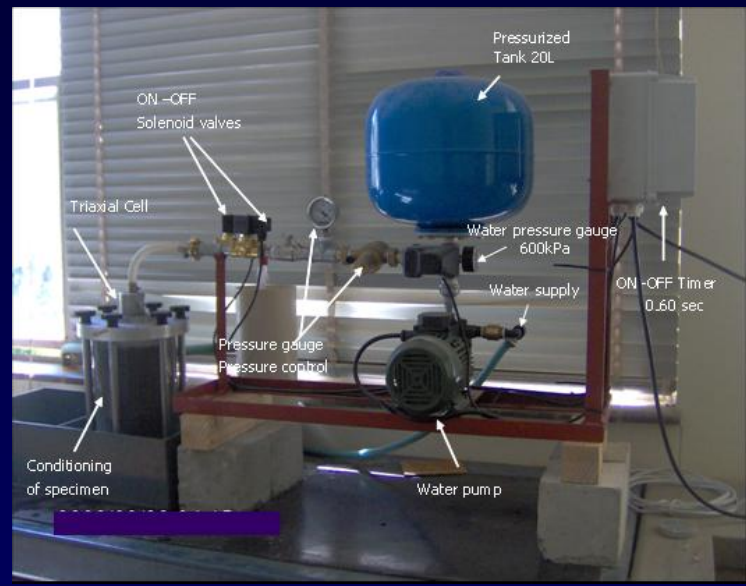
Troubleshooting guide for construction

Highlights: Mix Design



Highlights: Mix Design

- Focus
  - *shear properties*
  - *durability*



- Level 1: *Less than 1 MESA*
  - UCS, ITS, ITS_{wet}
- Level 2: *More than 1 MESA*
  - Triaxial shear properties
  - Wet triaxial testing using MIST apparatus

Highlights: Materials Classification

- BSM1
  - *High shear strength*
  - *Typically used for bases when > 6 MESA*
  - *Well graded crushed stone, RAP*
- BSM 2
  - *Moderate shear strength*
  - *Typically used for bases when < 6 MESA*
  - *Graded natural gravel or RAP*
- BSM 3
  - *Used for bases when < 1 MESA*
  - *Soil gravel*
  - *Needs high binder contents for stabilisation*

Highlights: Materials Classification

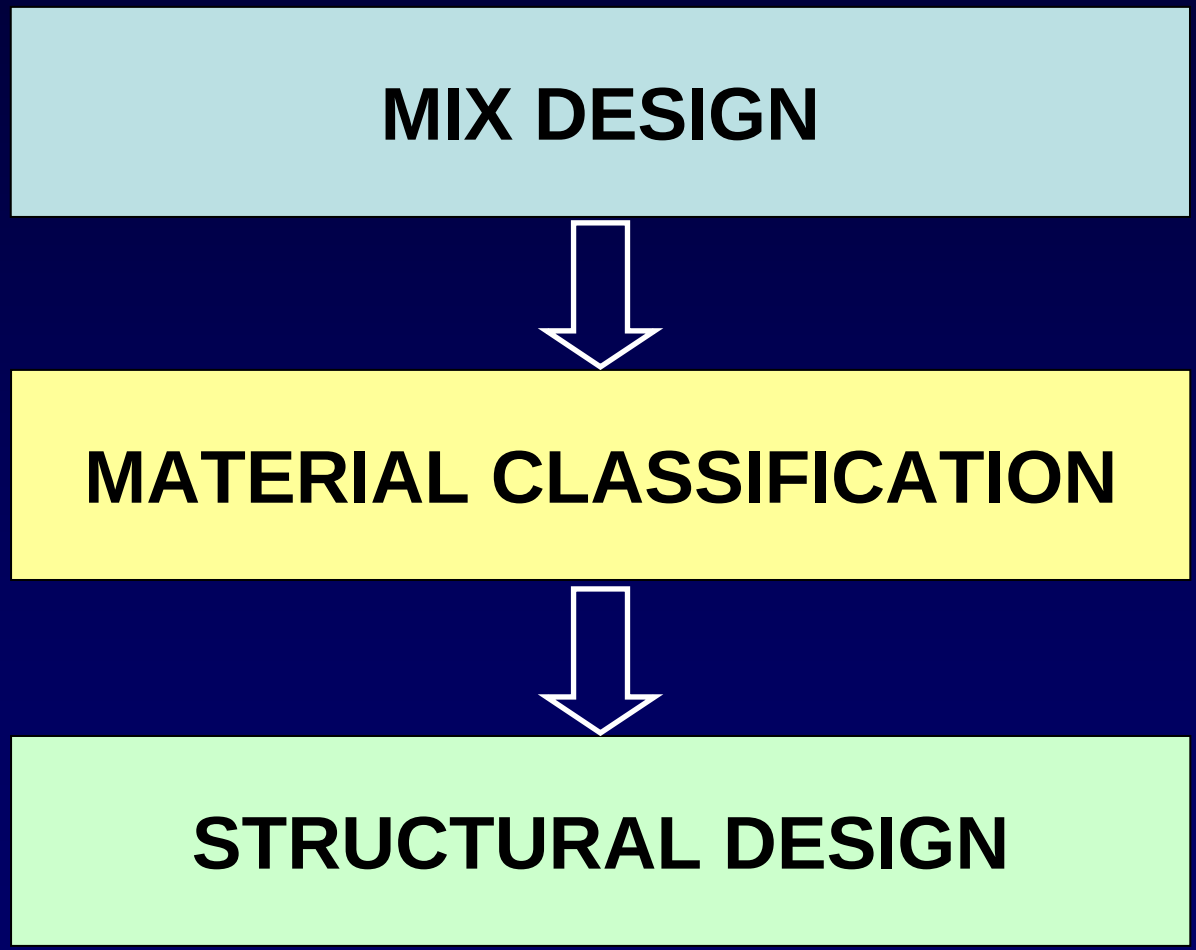
Tests used to classify BSMs

- Parent material
  - Soaked CBR
  - % P 0.075 mm
  - Relative density
  - DCP penetration
  - FWD stiffness
  - PI
  - Relative moisture
  - ACV
  - Fractured faces
  - Grading
  - Grading modulus
  - Durability mill
- Treated Material
  - Cohesion (triaxial)
  - Friction angle (triaxial)
  - ITS; ITS_{wet}
  - UCS
  - MIST

Highlights: Structural Design

- Relies on Material Classes for input
- Pavement Number method for > 1 MESA
- Catalogue for < 1 MESA
- PN method well checked using
  - TRH 4
  - PPIS
  - Road Note 31

Highlights: Flow from Mix Design to Structural Design



Highlights: Construction

- Similarities and differences between BSM-foam and BSM-emulsion clearly highlighted
- Main focus on recycling
  - Conventional plant
  - Recyclers
- Pointers to ensure good quality construction

Highlights: Risk Assessment

- Assesses combined risk introduced by:
  - Marginal decisions / risk factors
  - Design and construction
- Cumulative risk

Category	Risk Factor	Very Low Risk	Low Risk	Medium Risk	High Risk
Pavement Design	What road category is being designed for?	Category A		Category B	
	Where does the design traffic lie on the range of expected traffic?	At or above upper limit	Upper quarter of range	Third quarter of range	At or below middle of range
	How was overloading accounted for in the design traffic calculations?	Special extra analysis	Implicit in calculations	Not taken into account	
	How was traffic information obtained?	Surveyed for this project	From recent survey	PMS Data	
	Has a similar design been used with success for this traffic demand?	Definitely	Possibly	Don't know	New technique
	Is there a risk of the road being flooded?	None	Unlikely	Small risk	Definite Risk
	Are there paved shoulders?	Yes, in all areas	In some areas	None	
	Parts of the road situated on low embankments (< 300 mm above terrain)	None	Small percentage	Large Percentage	Mostly
	Parts of the road situated over wetland area	None	Small percentage	Large Percentage	Mostly
	Relative quality of drainage	Highest standard	Acceptable	Marginal	Substandard
Materials: Coarse Aggregate	Coarse aggregate mechanical strength	Very High	High	Fair	Poor
	Coarse aggregate hardness	Very High	High	Fair	Poor
	Coarse aggregate durability	Very High	High	Fair	Poor
	Percentage of uncrushed coarse aggregate	0 to 5%	5 to 15%	15 to 40%	> 40%
	Likelihood of undesirable impurities	None	Can occur	Likely	Certain
Materials: Fines	Plasticity Index of material passing the 0.075 mm sieve	< 4	4 to 8	8 to 12	>12
	Percentage of material passing the 0.075 sieve	5 to 9%	3 to 5% or 10 to 12%	0 to 3% or 12 to 15%	>15%
	Risk of expansive fines	None	Can occur	Likely	Certain
	Likelihood of a high percentage of non-cohesive alluvial fines	None	Can occur	Likely	Certain
	Prevalent location of grading within the specified grading limits	Middle of envelope	Coarse side of envelope	Fine side of envelope	Sometimes outside envelope
Materials: Mix Design	Variability of material sources and material quality	Single controlled source	Single uncontrolled source	Possibly two sources	To or more sources
	Is the source material one of those listed as being problematic?	No, not at all	Possibly	Yes	
	How many mix designs has designer completed (HMA and BSM materials)?	More than five	Two to five	One	None
	Sophistication of mix design process (HMA and BSM Materials)	Performance Based Tests	Indicator Tests	Mainly experience	No mix design
Construction	How many projects has the contractor completed using this technique?	More than five	Two to five	One	None
	How many projects has the Site Agent completed using this technique?	More than five	Two to five	One	None
	What is the relative quality of site testing procedures and facilities?	Highest standard	Acceptable	Questionable	Infrequent testing
	Will the contractor be allowed to construct trial sections?	Yes		No	
	How often will the Resident Engineer be on site?	Permanently		Part-time	No Resident Engineer
	How many projects of this nature has the Resident Engineer worked on?	More than five	Two to five	One	None/No Resident Engineer
	What is the likelihood of heavy rain during the construction period?	Very Unlikely	Unlikely	Likely	Certain
	Are there permeable or semi-permeable surfacings involved?	No		Yes	
	Will there be an incentive to achieve highest possible density?	Yes		No	

Review

- Need review panel representative of industry

- If you'd like to participate, contact
  - Fenella Long flong@modsys1.com
  - Les Sampson lsampson@iafrica.com