# Virginia's SMA

## The Evolution of a Cost Effective Mix

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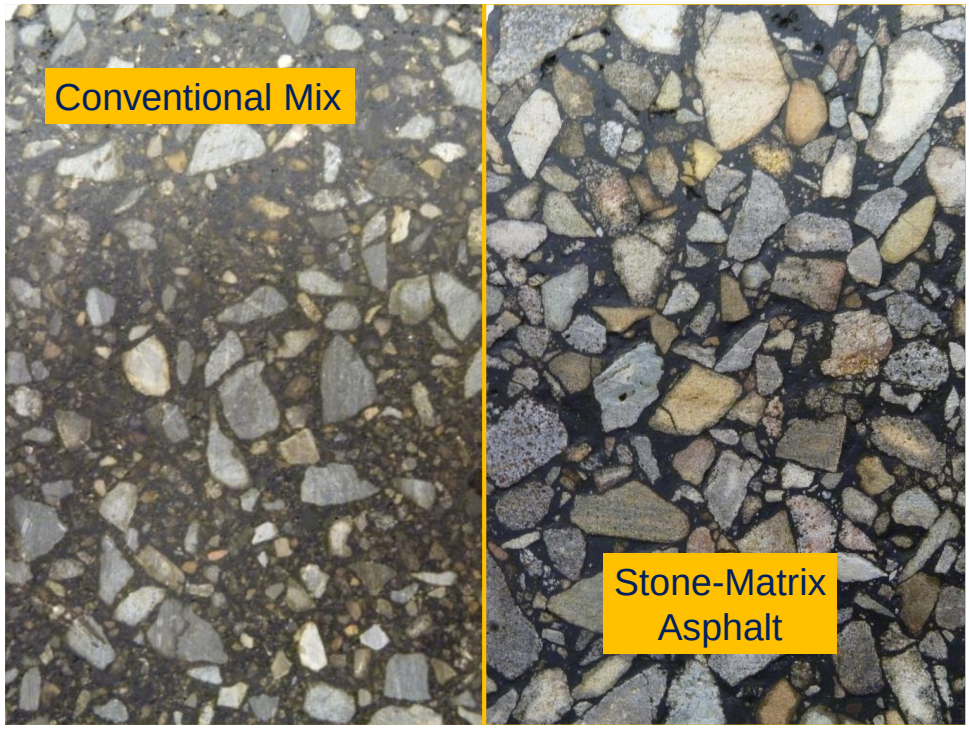
## Overview of Presentation

- Introduction of SMA in Virginia
- Early Installations of SMA
- 2002 SMA Initiative
- Problems Encountered
- SMA Today




# Why SMA?

- 1980's - DOT's struggling with poor performing AC mix
  - Rutting
  - Flushing
- Development of SHRP program to redesign AC mixes

# SMA in Virginia

- 1990 AASHTO Scanning Tour
  - Evaluate European Asphalt Practices
  - Identify new technologies to extend service life
  - Returned with SMA
- 1991 Formation of SMA Technical Working Group
- Virginia and other states installed SMA test sections as result of Scanning Tour

# Early Installations in Virginia

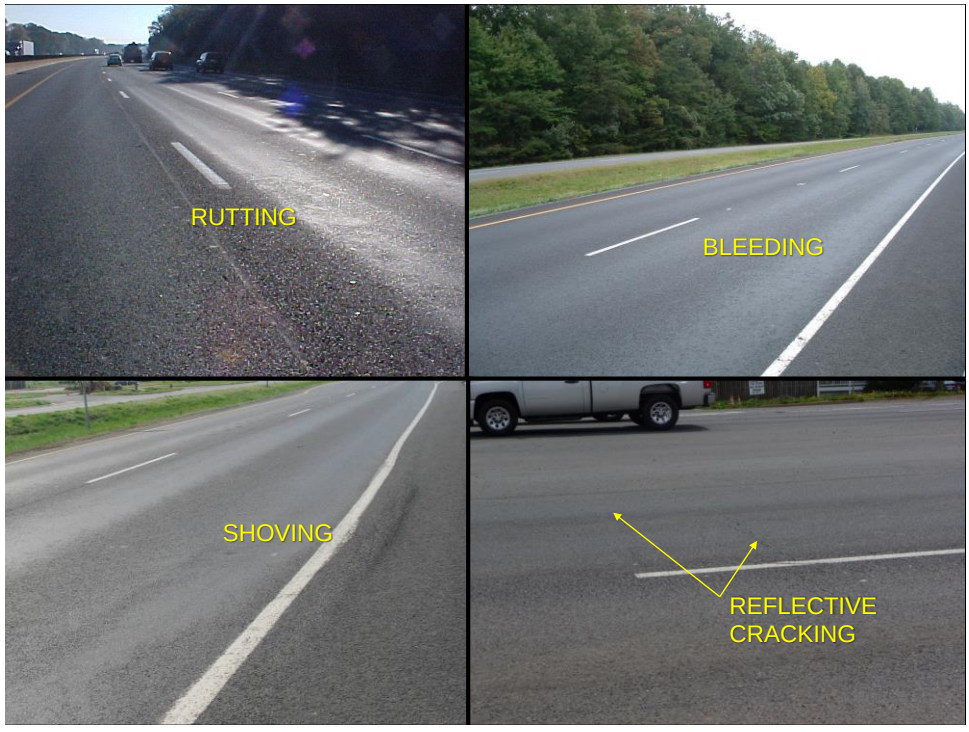
- 1993 Trial Section
- 1994 Trial Section
- 1995 I-95 Installation
- 1995-96 I-81 Installation
- 1997 I-295 Installation
- Isolated Locations on interstates

# Initial SMA Specs

- Designed with Marshall Hammer (75 blow)
- SMA Surface mix equivalent to 12.5 – 16.0 mm NMAS
- Neat and modified binders
- 5.5% + AC content
- Development of SMA Intermediate mix for use with composite pavement

# 2002 SMA Initiative

- Based on initial performance of SMA
- Focused on high traffic locations around state
- SMA specs moved to 75 gyration designs
- Minimum AC contents for each mix
- Introduction of SMA-9.5, SMA-12.5 and SMA-19.0
- Use of SBS polymer modified binders




# Lessons Learned

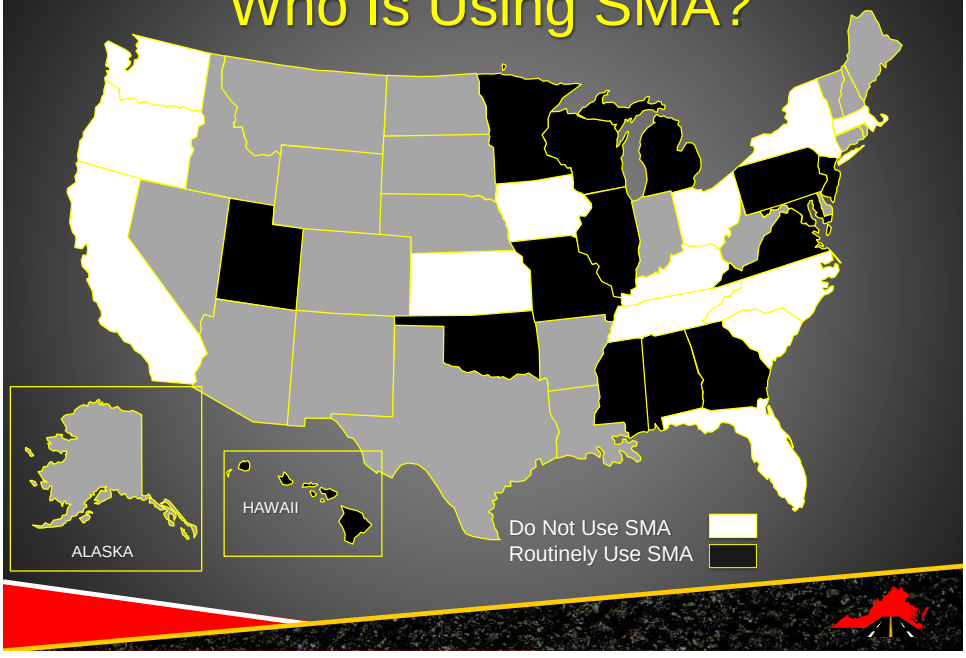
- Mineral filler matters
  - Dry
  - Consistent gradation
- No cellulous fiber, expect bleeding
- One size fits all minimum AC content bad idea
- Polymer modification is worth the cost
- Initial SMA-9.5 gradations all wrong
  - VCA did not work
  - Bailey Method did not work
  - Tight gradation bands on #4 and #8 worked

## WHERE IS SMA TODAY?

## Nationally

- Informal poll of SAPA's
  - SMA not globally used in the US
- Barriers or Reasons for Limited Use
  - Initial material costs
  - Bad experience or performance with SMA sections
  - Industry objections
  - Good performance from traditional AC mixes

# Who Is Using SMA?




# Where it is Being Used

- Some DOT's assign higher layer coefficients
- Some DOT's give longer initial and overlay service life
- Almost all SMA uses polymer modified binders
- Common surfaces have 9.5 and 12.5 top sized aggregate

# VA SMA Tonnages & Bid Prices

- 2012
  - 342,000 tons
  - Avg. Bid Price: $109
  - Avg. Surface Mix: $81
- 2013
  - 394,000 tons
  - Avg. Bid Price: $101
  - Avg. Surface Mix: $80
- 2014
  - 517,000 tons
  - Avg. Bid Price: $98
  - Avg. Surface Mix: $78
- 2015
  - 162,600 tons
  - Avg. Bid Price: $99.50
  - Avg. Surface Mix: $77

# Economic Analysis

- Typical cost difference between SMA surface mix and standard Superpave Mix - $20/ton
- Much of the cost is a function of project location, higher binder contents, polymer modified binders, and lower production rates
- Not an Apples to Apples cost comparison!

# Consider

- Average Superpave Mix Cost is $75/ton
- The service life is 12 years
- With a $20/ton SMA premium, how long does SMA need to last to break even?
  - 15 years based on materials costs
  - Less than 15 years when administrative and user costs are considered

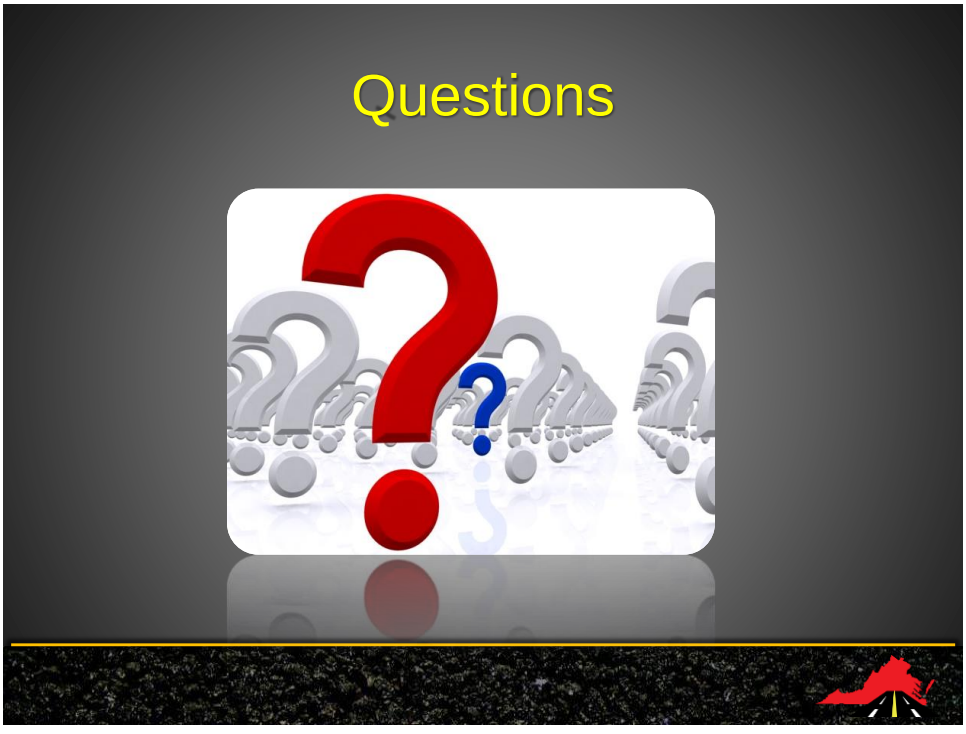
# Virginia Experience

- At least 2 additional years of service life, pavement management data indicates 3 or more years
- Common mix used on interstates and high-volume primary routes
- Recent uses with highly polymer modified binders over composite and jointed concrete pavements
- Very good experience in cities

# Conclusions

- Overall experience with SMA has been excellent
- Isolated failures have been investigated and specifications changed
- Move to almost exclusive use of polymer modified binders


The Juice is Worth the Squeeze!


Questions