HMA Specifications to Reduce Segregation and Improve Longitudinal Joint Density

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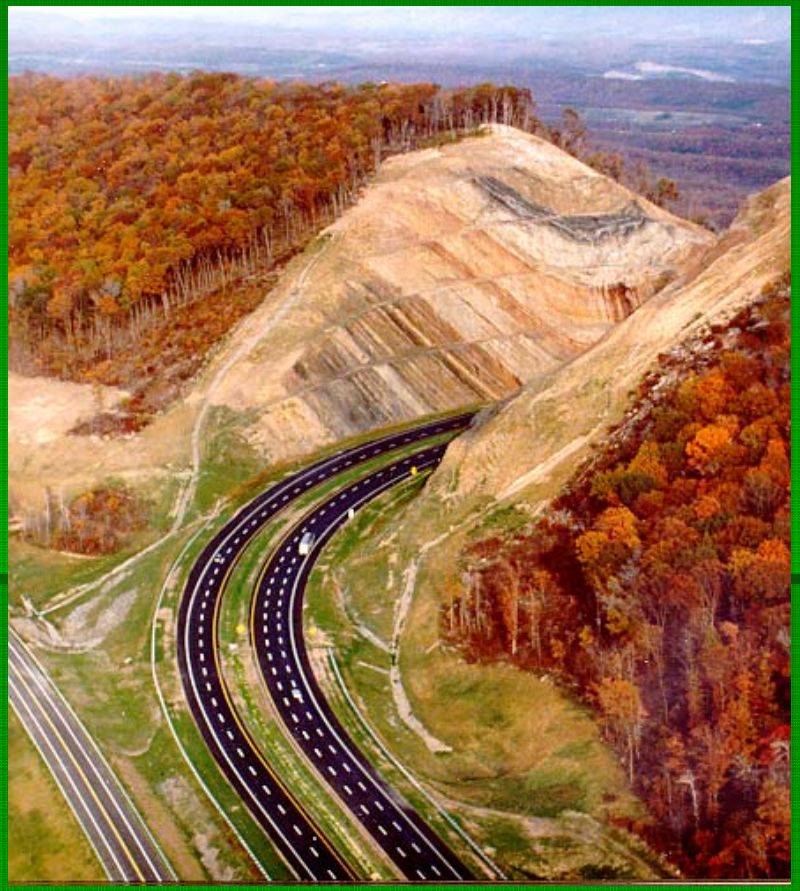
A Driving Force In Asphalt

Need for HMA Quality



- HMA industry is judged on a daily basis
  - Driving public
  - Specifying agencies
- Agencies base pavement type selection (theoretically) on quality and performance
  - LCC

Need for HMA Quality

- Prior to Superpave biggest HMA weakness was rutting under heavy traffic loadings
- Generally accepted Superpave addressed most rutting issues
  - Stone-to-stone contact
  - Coarse & sometimes dry mixes

Need for HMA quality

19mm Superpave Mix

- Consequences of coarse & dry mixes
  - Compaction problems
    - Low density
    - Crushed aggregate
  - Segregation problems
    - Large dry stones roll easily
    - Raveling
  - Poor longitudinal joints

Need for HMA quality

- Low bid system drives contractors to lowest cost mixes
- Coarse dry mixes use lees AC – lower cost

Is there a Need for Change?

Overlay 6 months old
Placed with an MTV

- New Texas DOT Highway Commissioner addressed Texas APA
- Port Authority of New York and New Jersey rehab of of Newark Airport runway
  - Failed after 6 years – segregation and raveling
  - Commissioners' warning

Is there a Need for Change?

- Texas DOT and Texas APA worked together to improve HMA quality
  - Implemented Superpave
  - Copied and implemented Kansas specifications to reduce segregation using density profiles

Texas HMA Density Specifications

- Test strip required to establish roller patterns
- Mat density determined by cores
  - Paraffin or Core-Lok required if water absorption > 2.0%

Texas HMA Density Specifications

- Mat density requirements
- Superpave
  - 91.0% – 97.3% of max theoretical specific gravity
- SMA
  - 92.0% – 97.3% of max theoretical specific gravity

Texas HMA Density Specifications

- Longitudinal joint density requirements
  - Comparison of readings in mat to joint density
    - Mat readings > two feet from edge of mat
    - Joint readings < 8” from joint
  - Nuclear or impedance gauge allowed
  - Four sets of measurements per lot (per day)

Texas HMA Density Specifications

- Longitudinal joint density requirements
  - Nuclear gauge readings
    - Three one minute readings per location
  - Impedance gauge readings
    - Five readings within two inches of each other per location
  - Average all readings per location and record
  - Correlate mat readings to cores

Texas HMA Density Specifications

- Longitudinal joint density requirements
  - Determine differences between mat and corresponding joint readings
  - Joint density must be within 3.0 lbs/cf of mat density
  - Joint density minimum 90% of max theoretical specific gravity

Texas HMA Density Specifications

- Segregation profile requirements
  - Comparison of readings along a 50’ long longitudinal profile line
    - Reading every five feet
  - Frequency
    - Whenever segregation is visible
    - Whenever paver stops
    - At random as directed by engineer

Texas HMA Density Specifications

- Segregation profile requirements
  - Comparison of readings along a 50’ long longitudinal profile line
  - Nuclear gauge readings
    - Three one minute readings per location
  - Impedance gauge readings
    - Five readings within two inches of each other per location

Texas HMA Density Specifications

- Segregation profile requirements
  - Average readings for each location and record
  - Determine average of all ten locations
  - Determine difference between highest and lowest readings
  - Determine difference between average and lowest reading

Texas HMA Density Specifications

- Segregation profile requirements
  - Mixes > 5/8” nominal maximum size
    - Maximum difference highest to lowest 8.0 lbs/cf
    - Maximum difference average to lowest 5.0 lbs/cf

Texas HMA Density Specifications

- Segregation profile requirements
  - Mixes < 5/8” nominal maximum size
    - Maximum difference highest to lowest 6.0 lbs/cf
    - Maximum difference average to lowest 3.0 lbs/cf

Texas HMA Density Specifications

- Segregation profile requirements
  - If requirements not met, contractor allowed one opportunity to make changes to production processes
  - If specification not met within 200 linear feet of paving thereafter, job is shut down until contractor demonstrates he can meet requirements

Improving HMA Quality with Specifications

- Is Texas spec working?
  - Noticeable improvement in quality
  - Contractors now pay close attention to segregation and joints
- Texas DOT now looking at spec limits to see if they are tight enough to control segregation
  - Field study

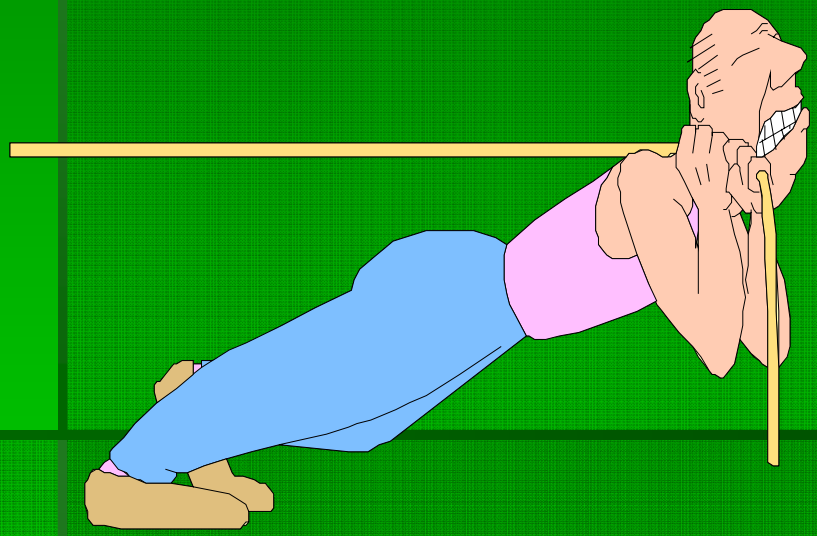
Improving HMA Quality with Specifications

- Our customers demand quality
  - Get in, Get out, Stay out
  - Cannot provide them congestion relief – just don't add to it more often than necessary

Improving HMA Quality with Specifications

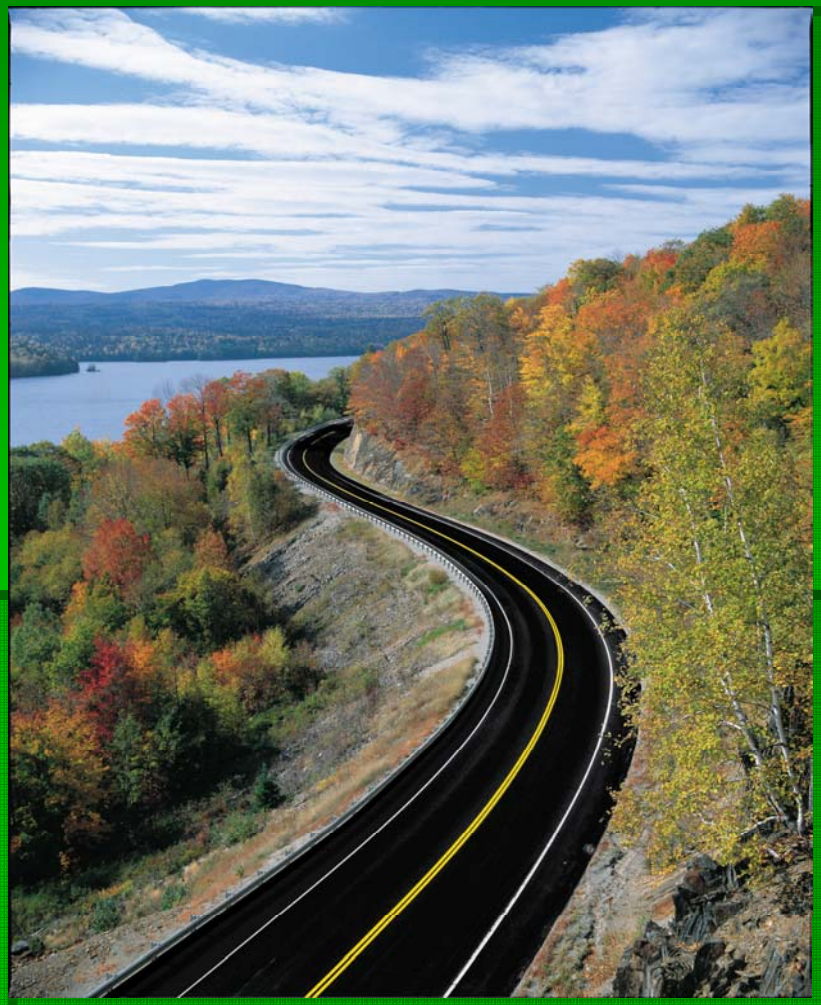
- Human nature to remember failures more readily than successes
  - News stories – TV and papers
  - “Takes years to build a good reputation, but one bad job to lose it”

Improving HMA Quality with Specifications



- Easiest solution is to have all contractors totally committed to quality
- Low bid system makes that very unlikely
- Agencies must write specifications for the contractors not committed to quality
  - Get their attention - $$$$

Improving HMA Quality with Specifications



- HMA industry goal – raise the bar so that most of our jobs are excellent and our worst jobs are “acceptable”