


Construction of Quality Hot Mix Asphalt Pavements - 1 Day Course 



Welcome and Introduction

Greg Harder, P.E.
Regional Engineer
Tully, NY

Bob Horan, P.E.
Senior Regional Engineer
Mechanicsville, Virginia


Welcome and Introductions 

- Thank you for attending our one-day HMA Construction course!
- We will be discussing how to design, produce, place and compact quality asphalt pavements.
- Please participate:
 - Ask questions
 - Make comments
 - Share a story about asphalt pavement construction you were involved with!


Today's Program 

- Morning Session
 - Inspection Principles
 - Materials
 - Mix Design
 - Plants, Production, Hauling
- Lunch Break
- Afternoon Session
 - Laydown
 - Compaction
 - Quality Control / Quality Assurance





The Asphalt Institute 


- **Who we are?**
- **What we do?**

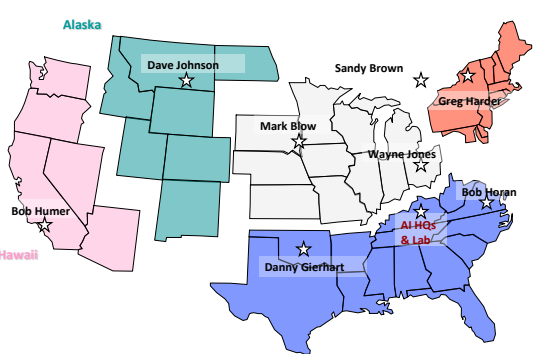


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AI Headquarters Lexington KY 



AI Regional Engineer Offices and User Producer Groups 




Asphalt Institute Mission

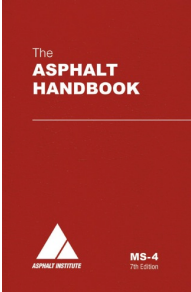


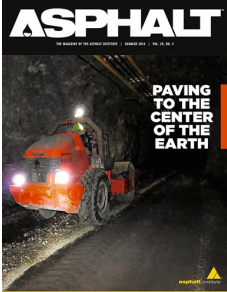
The mission of the Asphalt Institute is to promote the use, benefits and quality performance of petroleum asphalt through:

- Engineering
- Research
- Marketing
- Environmental Development
- Technical Development
- Resolution of issues affecting the industry

AI Regional Engineers write technical manuals and magazine articles








Asphalt Institute Website






Housekeeping




- Restroom Locations
- Please Silence Cell Phones/Pagers
- Handouts / Agenda
- Certificates / Evaluations / PDHs
- Breaks
- Lunch is provided
- Informal Presentations (we encourage questions/ comments)

Course Evaluations



- No evaluations to be completed today
- We will use a web-based survey through "Survey Monkey"
 - Make sure we have your correct e-mail
 - Within a couple of days, you will receive an e-mail requesting that you fill out the evaluation
 - If you complete and submit the evaluation, you will receive a coupon to view one of our recorded webinars on www.asphaltinstitute.org
 - Handout describes procedure to get free recorded webinar

Let's Get Started!



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- 1 Day Course



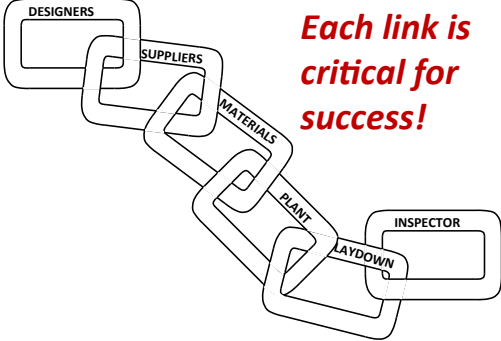
HMA Construction Inspection

Bob Horan, P.E.
Asphalt Institute Regional Engineer
Mechanicsville VA

Inspection on HMA Construction

- Sound inspection practices during construction are vital to obtain quality
- Both agency and contractor responsible
- Process control and acceptance procedures alone will not ensure quality
- Key components of inspection are:
 - Enforcement of specifications
 - Ensure good practices are being used
 - Observation of materials and workmanship

HMA Construction Inspection



Each link is critical for success!

What is Quality?



Definition of Quality for HMA?

- How do we define quality?
 - Meets agency mixture specifications
 - Meets agency density specifications
 - Smooth riding surface
 - Uniform texture and appearance
 - Obtains expected service life
 - **Long lasting asphalt pavement**

Long Lasting Pavement?



HMA Inspection

- **Responsibilities**
 - Represent the owner's interests
 - Keep daily construction diary
 - Monitor ambient air and mat temperatures
 - Track tonnage with truck tickets
 - Calculate yield
 - Monitor compaction with nuclear or non-nuclear gauge
 - Observe materials and workmanship
 - Make sure that good practices are being used

Routine Duties of Inspector

- Usually spelled out in specifications
 - Checking yield/thickness of materials being placed
 - Adhering to weather and temperature limitations
 - Checking mix and mat temperature
 - QC testing of mat density during compaction
 - Acceptance testing of final density

Temperature and Weather Limitations

Most agencies specify minimum surface temperatures on which to lay, as shown in the example below:

Lift Thickness, in	Min. Surface Temp., °F
> 3	40
2 - 3	45
< 2	50

Monitoring Temperatures

Min. and Max. Mix Temperatures

Most agencies specify minimum mix temperatures.

Most agencies specify minimum mix temperatures around 250°F for neat (unmodified) binders and perhaps higher for some modified binders

Warm Mix Asphalt temperatures may be OK at significantly lower temperatures!

Temperature and Weather Limitations


Why does it matter if the mix is too cool?

Because the mix stiffens as it cools. This makes it difficult, if not impossible, to obtain proper roadway compaction of the mix if the mix arrives on the job too cool.

Proper roadway compaction is probably THE most important factor in determining the longevity of the roadway. Every effort must be made to obtain the target roadway density during the compaction process.

Temperature and Weather Limitations asphalt institute

What about maximum mix temperature?



Most agencies specify maximum mix temperatures around 325°F (often a little higher for mixes with polymerized binders)

Temperature and Weather Limitations asphalt institute

Why does it matter if the mix is too hot?

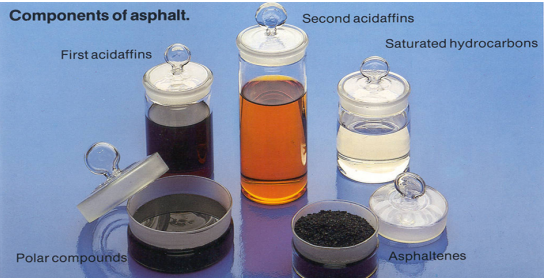
Because the lighter fractions of the asphalt binder evaporate at high temperatures.

This makes the remaining binder stiffer, and causes early aging of the binder. Aged binder tends to be more brittle, and more susceptible to cracking.

Temperature and Weather Limitations asphalt institute


What do you think happens to the light fractions of the binder when it is overheated?

Components of asphalt.



Density Acceptance/Quality Control asphalt institute

Measuring Density




Using cores..... or a nuclear density gauge

Materials and Workmanship asphalt institute


- **Materials**
 - Mix binder content, gradation and volumetrics
 - Mix Temperature (not too high and not too low)
 - Aggregate coating
 - Segregation in truck
- **Workmanship**
 - Transfer of mix to paver
 - Placement
 - Segregation during placement
 - Compaction

Watch for Segregation! asphalt institute




Truck-end segregation is caused by segregation in the truck transferred through the paver.

Make sure the trucks are being loaded in multiple drops!



Best Practices?



- Hauling
 - Provide a steady flow of material to the paving operation
 - Deliver mix at consistent and correct temperature
- Paving
 - Continuous operation (keep paver moving)
- Compaction
 - Compact mix when it is hot!


Surface Prep - Good Practice?




Poor Tack Application





Inspection on HMA Construction




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Terminology







- HMA = Hot Mix Asphalt
- WMA = Warm Mix Asphalt
- QC/QA = Quality Control/Quality Assurance
- Binder = liquid asphalt, asphalt, asphalt cement
- Good practice = established procedures that have been shown to result in quality

QUESTIONS?



Good Reference Materials on the Topic:

- MS-2:** Mix Design Methods 
- SP-2:** Superpave Mix Design 
- MS-4:** The Asphalt Handbook 
- MS-22:** HMA Construction 

<http://www.asphaltinstitute.org>