# Ultra Thin Bonded Wearing Course: Best Construction / Application Practices

Rod Birdsall, P.E. 2019 NEPPP Meeting April 10, 2019



# **Presentation Outline**

- Overview of BWC
- Project Selection
- Preparation Prior to Paving
- Construction Practices
- QA/QC
- Successful Projects



# What is Ultrathin Bonded Wearing Course?

BWC is a high performance thin overlay that seals the existing road surface and provides a new, skid-resistant, smooth & thin (typically 5/8" to 3/4") HMA wearing course in one simultaneous operation.





# **BWC Materials**

- Polymer Modified Asphalt Emulsion
  - Readily available
  - Transported by Conventional means
- Gap Graded Hot Mix Asphalt
  - Produced with PG grade, PMA, or AR binders
  - Produced in Conventional Plants
  - Transported by Conventional means
  - Allows for "wicking" of emulsion up into mix
- BWC Placed by specialized spray paver
  - Places heavy polymer modified emulsion tack across full width
  - Emulsion is undisturbed prior to immediate placement of HMA



#### **BWC Cross Section**

# Gap graded mix allows "wicking" of polymer asphalt emulsion up into the mix





# **Spray Paver**





# **Application Rates**

- Polymer Modified Asphalt Emulsion
  - 0.20 gal/sy. ± 0.02 gal/sy
- Gap Graded Hot Mix Asphalt
  - 0.625 inches to 0.75 inches thickness



# **Conventional Paving vs. BWC**

	Conventional Thin HMA Overlay	Bonded Wearing Course
Tack Emulsion Type	Conventional Emulsion	Polymer Modified
Tack Application Rate	0.03 – 0.10 gal/SY	0.18 – 0.22 gal/SY
Tack Residual Asphalt	0.02 – 0.05 gal/SY	0.12 – 0.15 gal/SY
HMA Thickness	1" – 1.5"	0.625"75"
Mix Type	Dense Graded	Gap Graded







# **Project Selection Considerations**

- Program planning and communication
- Scope development and reach
- Good to fair existing pavement condition
- Traffic volume and types
- Required prep work
- Day vs. Night
- Conventional vs. PMA
- Coordination with other operations



# **Preparation Prior to Paving**

- Clean and flush-fill cracks
- Micro-milling as required
- Patch where necessary
- Shim / leveling as required
- Sweep clean
- Remove thermoplastic pavement markings





### **Construction Practices**

- Proper equipment (type and maintenance)
- Trained and experienced crew
- Standard industry best practices for HMA paving
- Consistent material and head in front of screed
- Consistent paver speed
- Uniform emulsion application rates
- Proper rolling techniques
- Seasonal limitations





# **QA/QC** Practices

- Pre-project Quality Control plan
- Material sampling and testing
- Material certifications
- Agency on-site inspection
- Verify material quantities







# Key Components of a QC Plan

- Project Requirements
- Materials Certification
- Equipment Calibration
- Personnel Qualifications
- Construction Process
- Field Monitoring
- Corrective Actions



# **Measuring & Verifying Material Quantities**

• HMA

- Total tons divided by (square yards x .056)
- Ex. 827 tons used

12 ft wide x 16,246 ft long ÷ 9 = 21,661 SY

#### 827 tons / (21,661 SY x .056) = 0.682 inches

#### • Emulsion

- Total gallons divided by square yards
- Ex. 4360 gallons used

12 ft wide x 16,246 ft long ÷ 9 = 21,661 SY

4360 gallons / 21,661 SY = 0.2013 gal/SY



### NH Rt. 3 – Nashua/Merrimac – Paved 2014



1 Week After Paving (2014)

2 Years After Paving (2016)



### NH Rt. 3 – Nashua/Merrimac – Paved 2014



5 Years After Paving (2019)



### MA Rt. 295 Southbound – Paved 2008



Paving in 2008

2 Years After Paving (2010)



### MA Rt. 295 Southbound – Paved 2008



11 Years After Paving (2019)



### MA Rt. 3 NB/SB – Paved 2015



**Bonded Wearing Course Mainline with Fog Seal on the Shoulders** 







# Thank you!

# All States Materials Group®

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