

# Mississippi DOT – Field Operations Overview of Preservation Treatments

Mark Waits and Rex Eberly  
National Center Pavement Preservation



MICHIGAN STATE  
UNIVERSITY

# Mississippi DOT – Field Operations Overview of *HMA Thin Lifts*

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# Thin Lift Hot-Mix Overlay



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*There are different types of thin lift hot mix asphalt:*

- Dense-Graded Mixes: These are versatile and economical, suitable for general use, and fill voids to improve durability.
- Stone Matrix Asphalt (SMA): Ideal for rut resistance, often used in wheel paths.
- Open-Graded Friction Course (OGFC): Designed to improve friction and reduce splash and noise.
- Performance-Specified Superpave: Offers enhanced performance tailored to climate and traffic conditions.
- Thin Hot Mix Asphalt Overlays: These overlays are placed over existing surfaces and can be placed in lifts as thin as 3/4 inches, requiring smaller aggregates for optimal compaction.

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## *Stone Matrix Asphalt (SMA):*

- *Designed to resist rutting and improve durability by using a structural basis of stone-on-stone contact and a high PG 76-22 asphalt binder content.*
- *Pneumatic-tired rollers shall not be permitted for compacting SMA mixes.*
- 
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## **Stone Matrix Asphalt (SMA):**

- ***A Material Transfer Device must be used.***
- ***Compaction must be achieved before the Mat temperature falls below 250°F***
- ***On the Interstate, an existing SMA lift should be present for the placement of an OGFC layer.***
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## *Open-Graded Friction Course (OGFC):*

- *There are no acceptance testing requirements for field density or smoothness on OGFC pavements.*
- *A PG 76-22 asphalt binder will be used for all OGFC mixtures.*

Performance-Specified Superpave: Offers enhanced performance tailored to climate and traffic conditions.

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## Open-Graded Friction Course (OGFC):

- *Tack coat for OGFC shall be one from the Department's APL under the category "Open Graded Friction Course (OGFC) Asphalt Tack Materials."*
- *Tack Coat for OGFC shall be applied with a distributor spray bar at the applied rate of between 0.10 and 0.14 gallons per square yard.*
- *The tack coat for OGFC should be allowed to break, cool and/or cure until a point in time that the tack coat does not pick-up or track due to traffic from trucks or the paving equipment*
- *Temperature of the mix, surface temperature and the spreader screed is CRITICAL!*
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- **Performance-Specified Superpave: Offers enhanced performance tailored to climate and traffic conditions.**
- ***Specific roadway conditions may warrant unique mix designs***
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# Thin Lift Hot-Mix Overlay

- There are several types of overlays used in pavement construction:
- Dense-Graded Asphalt Overlay: Provides a smooth, durable surface.
  - Stone Matrix Asphalt (SMA): Offers enhanced performance tailored to climate and traffic conditions.
  - Open-Graded Friction Course (OGFC): Designed to improve friction and reduce splash and noise.
  - Performance-Specified Superpave: Offers enhanced performance tailored to climate and traffic conditions.
  - **Thin Hot Mix Asphalt Overlays:** *These overlays are placed over existing surfaces and can be placed in lifts as thin as **3/4 inches**, requiring smaller aggregates for optimal compaction.*
- Section 411.02.2.4—Single Lift Laying Thickness.** *The minimum lift thickness for ultra-thin asphalt pavement shall be 1/2" and the maximum shall not exceed one inch(1").*

# Thin Lift Hot-Mix Overlay

- **Thin Hot Mix Asphalt Overlays: Ultra-Thin Asphalt Pavements (UTAP) are primarily used for one lift to extend the service life and correct minor service defects.**
- Extensively cracked and rutted pavements are not good candidates for UTAP overlays.
- UTAP can be either Ultra-Thin Hot Mix Asphalt (UHMA) and Ultra-Thin Warm Mix Asphalt (UWMA).
- The type asphalt mixture (UHMA or UWMA) is selected by the Contractor, and once selected, must be used throughout the entire project.
- Thin overlays cool very quickly and at times are difficult to compact. The use of warm mix asphalt (WMA) technology for thin overlays is gaining popularity.
- Prior to placement of UTAP, the Contractor shall determine the existing surface Mean Roughness Index at no additional cost to the State. The finished UTAP lift shall have a mean roughness index no greater than that of the existing surface.
- The density requirement for UTAP shall be roll to refusal.
- Daily entries should be made in the Inspector's Daily Report describing locations received from the Project Engineer, instructions given to the Contractor, unusual conditions, and other items of interest.

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# Thin Lift Hot-Mix Overlay

- ▶ ***\*Over 82% of the lane miles of pavement in the US are low volume roads (1000 AADT or less...).***
- ▶ \*Approximately 2/3 of these low volume roads are paved primarily with asphalt mixtures or chip seals.
- ▶ \*Fine-graded, small-NMAS mixes that can be placed in thin layers are a great option for pavement preservation needs because they can be competitive with other pavement preservation options and they can provide good performance.
- ▶ \*For pavement preservation, thinner overlays have a lot of potential to reduce cost and provide a long-lasting surface.

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# Thin Lift Hot-Mix Overlay

- ▶ ***\*Asphalt mixtures using 4.75 mm NMAS aggregates have been successfully used for low volume roads.***
- ▶ These mixtures have been shown to be resistant to rutting and have low permeability if compacted to 12% air voids or less.
- ▶ 4.75 mm mixtures can be properly placed and compacted in thinner sections and are ideal for areas needing thin surface preservation.
- ▶ 4.75 mm mixes have also been shown to perform well at the NCAT test track where the mix was subjected to high traffic volume.

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# Thin Lift Hot-Mix Overlay

- ▶ ***\*There are projects where using thinner sections would be acceptable as long as the thinner sections can be properly placed and compacted. Using smaller NMAS mixtures, such as 4.75 mm mixtures, will allow for proper placement and compaction of these thinner overlays.***

- ▶ \*There are a number of ways to reduce the cost of asphalt mixtures without reducing the expected performance. Some of these methods include using thinner overlays with smaller NMAS mixes and using RAP, RAS, and WMA
- ▶ Additional savings can be realized by proper use of RAP, RAS, and WMA. Using the finer portion of fractionated RAP produces a material (high asphalt content and high minus 200 material) that is ideally suited for 4.75 mm mixtures.

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- ▶ ***\*This paper, NCAT Report 13-05, has offered a number of approaches to reduce the cost of asphalt mixtures used for low volume roads and pavement preservation.***
- ▶ Adopting these options should be done in a way that ensures the contractor and the government agency have the opportunity to gain the knowledge to be successful. Adopting too much too fast can lead to construction or performance issues for early projects that can stifle progress.

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# Ultra Thin Bonded Wearing Course – UTBWC

- ▶ Ultra-Thin Bonded Wearing Course (UTBWC) is designed for use as a high-performance ultra-thin overlay which seals the existing road surface and provides a skid-resistant, smooth, and thin ( $\frac{3}{4}$  inch) gap graded hot mix asphalt wearing course in a single operation.



# Ultra Thin Bonded Wearing Course – UTBWC

- ▶ This Pavement Preservation treatment is ideal for structurally sound asphalt or concrete pavements which are exhibiting signs of surface oxidation, raveling, cracking, or minor rutting.
- ▶ High Polymer emulsion is sprayed on the surface prior to the application of the HMA.





# Ultra Thin Bonded Wearing Course – UTBWC

Inspectors should:



# Ultra Thin Bonded Wearing Course – UTBWC

## Inspectors should:

- ▶ Verify the pavement surface is clean. Prior to application, the surface should be swept with a rotary broom.
- ▶ The surface profile of the existing pavement should be smooth. Any rough surface may reflect through the ultrathin bonded wearing course. Micro milling may be used to correct minor surface irregularities.
- ▶ Cracks greater than  $\frac{1}{4}$  in. should be sealed prior to application. The overband method should not be used as this can reflect through to the finished pavement surface.
- ▶ Manhole covers, drains, catch basins, and utility services must be covered with construction paper or roofing felt prior to application.

# Ultra Thin Bonded Wearing Course – UTBWC

## Inspectors should:

- ▶ Verify the need for a material transfer vehicle (MTV) to allow the paver to operate continuously without stopping, which minimizes the following; Truck waiting time at the paving site, Aggregate segregation, Temperature differentials
- ▶ Ensure that the paving machine is well maintained and in good working order, including the following: • Auger • Screed • Conveyor • Hopper wings
- ▶ Verify the tracks are properly adjusted.
- ▶ **Verify that the nozzles on the spray bar are free of clogs and that the spray bar is applying a uniform coat of emulsion on the pavement.**
- ▶ Confirm that emulsion is within the required application temperature range.

# Ultra Thin Bonded Wearing Course – UTBWC

## Inspectors should:

- ▶ Verify that the application rate meets project specifications.
- ▶ Verify that the spray bar is applying the emulsion membrane to the same width as the screed extension.
- ▶ The emulsion membrane application rate should be adjusted according to the surface being covered. More **absorbent or textured asphalt pavement requires more emulsion**, so the application rate is increased. Smooth or flushed asphalt pavement requires less emulsion, so the application rate is decreased.
- ▶ Concrete pavement surface requires less emulsion than an asphalt pavement surface.

# Go to the NCPP's Pavement Preservation Checklist Series

[www.pavementpreservation.org/pavement-home/pavement-preservation-checklist-series-2019/](http://www.pavementpreservation.org/pavement-home/pavement-preservation-checklist-series-2019/)



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## PAVEMENT PRESERVATION CHECKLIST SERIES 2019

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# Questions?

