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# Ultrathin Bonded Wearing Course



# Ultrathin Bonded Wearing Course Checklist

This checklist is one in a series created to guide State and local highway preservation/maintenance and inspection staff on the use of innovative pavement preservation techniques.

FHWA uses its partnerships with different pavement preservation organizations including American Association of State Highway and Transportation Officials, and State and local transportation agencies to promote pavement preservation.

To obtain other checklists or to find out more about pavement preservation, contact your local FHWA division office or check the following FHWA Web page:

[www.fhwa.dot.gov/pavement/preservation/resources.cfm](http://www.fhwa.dot.gov/pavement/preservation/resources.cfm)

Other valuable resources on pavement preservation:

- [www.roadresource.org](http://www.roadresource.org)
- [www.fp2.org](http://www.fp2.org)
- [www.tsp2pavement.pavementpreservation.org](http://www.tsp2pavement.pavementpreservation.org)

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# Preliminary Responsibilities

## Document Review

- Project specifications
- Construction sequence
- Traffic control plan
- Construction manual
- Mix design
- Material safety data sheets
- Applicable Occupational Safety and Health Administration (OSHA) safety requirements
- Certification requirements
- Contractor quality control (QC) plan

## Project Review

- Verify that the pavement is a good candidate for an ultrathin bonded wearing course.
  - Ensure the existing pavement has a uniform cross section.
  - Limit existing rutting to less than ½ in. in depth.
  - Investigate whether cracking is present, and if so, determine the type, amount, and severity of existing cracks. Pavements must be structurally sound with no fatigue (alligator) cracking or potholes.

- Determine whether other pavement distresses exist such as raveling, polished aggregate, and bleeding or flushing.
- Verify that any drainage deficiencies have been corrected.
- Review the average daily traffic and percentage of commercial vehicles for traffic control plan.
- Review project plans, specifications, and estimated quantities.
- Based on the existing pavement condition, determine whether the treatment is cost-effective.

## **Materials Checks**

- Verify that materials including asphalt binder, aggregate(s), and emulsion membrane are from approved sources.
- Asphalt binder is performance graded consistent with environmental and traffic factors.
- The lift thickness should be described in the specification for the gap graded course aggregate mixture specified.
- Aggregate(s) meet required skid resistance value.
- Mix is produced by an approved hot-mix plant.
- The mix design meets project specifications.
- The mixture has been tested for moisture susceptibility.
- Asphalt content, air voids, and gradation are within the job mix formula (JMF) tolerances.

# Pre-Application Inspection Responsibilities

## Pavement Surface Preparation

- ❑ 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. Micromilling may be used to correct minor surface irregularities.
- ❑ Cracks greater than ¼ 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.

## Equipment Inspections

### Cold Feed

- ❑ Aggregate stockpiles are clearly marked, separated, and free of contamination.
- ❑ Aggregate cold feeds have been calibrated.
- ❑ All cold feed gates and belts are in working order.

### **Asphalt Storage Tank**

- The asphalt storage tank is capable of keeping the asphalt temperature within the required specification range.

### **Hot-Mix Plant**

- The plant is properly calibrated, and the scales have been checked.
- The plant has been certified by the agency.
- The plant meets all environmental requirements.
- Production rates have been determined versus various aggregate moistures to provide a mix free of moisture.
- Temperature gauges and asphalt flow meter have been checked for accuracy.
- Mixing times have been established to assure the aggregate will be thoroughly coated with the asphalt binder.
- The plant is capable of providing the completed mix at the proper gradation, asphalt content, and temperature, and within the required timeframe.

### **Surge/Storage Silo (If Applicable)**

- The maximum mix storage time has been established to avoid drain down.



## Trucks

- Truck beds and bodies are clean and free of any deleterious material.
- Trucks are equipped (if required) with tarpaulins that meet state or local regulations.
- Trucks are properly maintained free of oil or hydraulic fluid leaks.

## Paving Unit (Spray Paver)

- 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.

## Rollers

- A sufficient number of steel drum rollers of adequate size are available to achieve the desired compaction. Typically two steel drum rollers are used to seat the mixture.
- Water spray bars, wetting pads, and scraping bars are working on all rollers to avoid material buildup.
- Approved asphalt release agents are available. Note: Do NOT use diesel fuel to clean roller drums or tires.
- Steel drums are free of grooves and dents and not warped.

## Weather Requirements

- Air and surface temperature meet agency requirements.
- Paving does not begin if rain is imminent or if freezing temperatures are possible within 24 hours.
- Air and pavement surface temperatures, humidity, wind, and lift thickness will affect how quickly a mix cools and the time available for compaction.

## Traffic Control

- Verify that traffic control conforms to plans and specifications and complies with the *Manual on Uniform Traffic Control Devices (MUTCD)*.
- Verify that traffic control personnel are trained and qualified in accordance with agency requirements.
- Determine whether conditions warrant use of a pilot vehicle. The pilot car leads traffic slowly, 25 mph or less, through the work zone.
- Ensure that flaggers do not hold traffic for extended periods of time. Long work zones need two-way communication between flaggers.
- Ensure that flaggers do not hold traffic stopped on freshly placed material.
- Any unsafe conditions are reported to a supervisor.
- Signs are removed or covered when they are no longer needed.

## Project Inspection Responsibilities

### Emulsion Membrane

- Confirm that emulsion is within the required application temperature range.
- Verify that the application rate meets project specifications.

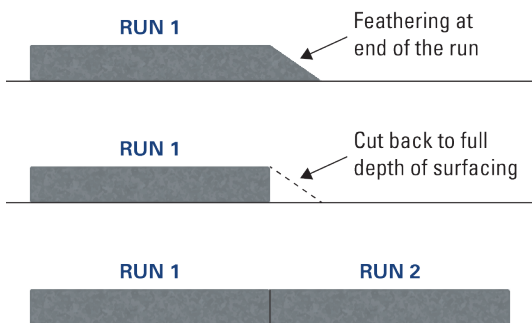
- Visually verify that the spray bar is applying a uniform coat of emulsion on the pavement.
- Verify that the spray bar is applying the emulsion membrane to the same width as the screed extension. If the screed extension is wider than the spray bar, the emulsion membrane will need to be applied manually between the end of the spray bar and 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.

## **Truck Operation**

- The trucks servicing the paving operation should operate in a smooth manner, causing no bumps and allowing the paving to proceed continuously.
- Verify that the material meets the minimum delivery temperature. Placement should be stopped if asphalt temperatures fall below this threshold value.

## Asphalt Mixture Application

- Handwork areas, turn lanes, and miscellaneous areas should be paved before paving the main line.
- Longitudinal joints should be straight or correctly aligned to the curvature of the roadway.
- Longitudinal joints should occur at the edge of the lane, never in the wheel path.
- Existing asphalt pavement at the start and end of a project should be cut out to a depth of 1 ¼ in. and tapered back a distance of 10 ft.
- At the end of the run, where the material begins to feather (taper), a butt joint should be cut out before the next run is started.



## Rolling

- Rolling must be performed in static mode only.
- Compaction of the ultrathin bonded wearing course should begin immediately after placement and must be completed before the pavement temperature falls below the agency's minimum required compaction temperature.

## Opening to Traffic

- Traffic can be allowed onto the surface once rolling is completed and the pavement temperature has fallen below 160°F. This typically occurs within 15 minutes of placement.
- Sweeping is generally not needed unless the mix begins to ravel.
- All construction-related signs are removed when opening pavement to normal traffic.

# Common Problems and Solutions

## (Problem: Solution)

### Washboarding:

- The roller is operating too fast—reduce the speed.

### Surface Waves:

- Ensure that the mix has not fallen below the minimum application temperature.
- Ensure that the mix is not too stiff.
- Verify that the level of material in front of the paver screed is at the correct height and does not fluctuate.
- Ensure that the dump trucks are not bumping the paving unit.
- Verify grade control equipment is functioning properly (if used).

### Delamination:

- Verify the surface is cleaned immediately before paving.
- Verify rollers are not dirty and have working spray systems.
- Ensure the existing pavement surface temperature is above the minimum application temperature before paving.
- Ensure the mix is above the minimum application temperature.

**Bleeding and Fat Spots:**

- Ensure that the emulsion application rate is not too high for the surface on which it is applied.
- Ensure the mix temperature is not too high.
- Ensure there is no moisture in the mix or on the pavement.
- Ensure the spray bar is operating properly.
- Check the mix design for too much asphalt or too coarse an aggregate grading. If necessary, adjust the design.

**Tears in the Plant Mix after Rolling:**

- Ensure that paving unit is being operated correctly.
- Ensure the mix is not too cold or too stiff.
- Ensure the application is not too thin.

**Raveling:**

- Ensure mix design meets agency specifications, particularly that the mix contains sufficient binder.
- Ensure rolling is carried out above the minimum temperature.



## Sources

Information in this checklist is based on or refers to the following sources:

*Manual on Uniform Traffic Control Devices*. 2009, Revised May 2012. Washington, DC: Federal Highway Administration. Available at <http://mutcd.fhwa.dot.gov>.

*Pavement Preservation Treatment Construction Guide*. 2008. Washington, DC: Federal Highway Administration.

### **For more information on the Pavement Preservation Checklist Series, contact:**

Construction Management Team, HICP-30  
Office of Preconstruction, Construction,  
and Pavements

Federal Highway Administration

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