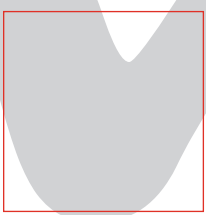
Pavement Preservation
Checklist Series

3 Thin Hot-Mix Asphalt Overlay



FP2

U.S. Department of Transportation
Federal Highway Administration

Thin Hot-Mix Asphalt Overlay Checklist

This checklist is one of a series created to guide State and local highway maintenance and inspection staff in the use of innovative pavement preventive maintenance processes. The series is provided through the joint efforts of the Pavement Preservation Program of the Federal Highway Administration (FHWA), and the Foundation for Pavement Preservation (FP^2).

FHWA uses its partnerships with FP^2, the 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 FP^2 (at www.fp2.org), and check into these FHWA Web pages:

www.fhwa.dot.gov/preservation

www.fhwa.dot.gov/infrastructure/asstmgmt/resource.htm

Thin Hot-Mix Asphalt Overlay Checklist

Preliminary Responsibilities

Project Review

- ❑ Is this project a good candidate for a thin hot-mix overlay?
- ❑ What is the existing pavement section?
- ❑ What is the average daily traffic and the percentage trucks and buses?
- ❑ Is rutting present? If so, is the rutting due to mix instability?
- ❑ Is cracking present? If so, to what extent?
  - ❑ Longitudinal
  - ❑ Transverse
- ❑ Is the pavement structurally sound (no alligator cracking or potholes)?
- ❑ Do other pavement distresses exist? If so, to what extent?
  - ❑ Raveling
  - ❑ Polished aggregate
  - ❑ Flushing/Bleeding
  - ❑ Other
- ❑ Have drainage deficiencies been corrected?
- ❑ Review project for bid/plan quantities.
- ❑ Is this treatment cost-effective?

Document Review

- ❑ Bid specifications and special provisions
- ❑ Construction sequence
- ❑ Mix design(s)
- ❑ Traffic control plan
- ❑ Construction manual
- ❑ Material safety data sheets

Material Requirements

- ❑ Are materials from an approved source?
  - ❑ Asphalt cement
  - ❑ Aggregate(s)
  - ❑ Tack coat
- ❑ Asphalt grade is based on environmental and traffic factors.
- ❑ Aggregate(s) meet consensus and source properties.
- ❑ Aggregate(s) meet required polish (skid) value.
- ❑ Mix(es) are from an approved hot-mix plant.
- ❑ Mix(es) design, asphalt content, target gradation, and air voids meet specifications.
- ❑ Asphalt/aggregate mix has been checked for moisture susceptibility.
- ❑ Nominal maximum aggregated size is less than one-half the overlay thickness for dense graded mixes.

Preoverlay Inspection Responsibilities

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.
- ❑ 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 cement.
- ❑ The plant is capable of providing the completed mix at the proper temperature and within the required timeframe.

Surge/Storage Silo (if applicable)

- ❑ The maximum mix storage time has been established.

Lime and Filler Silo (if applicable)

- ❑ The feeder system has been calibrated.

Trucks

- ❑ Trucks are equipped (if required) with tarpaulins that meet State or local regulations.

Tack Coat Distributor

- ❑ The distributor is properly calibrated.
- ❑ The nozzles are unplugged and are able to apply a uniform tack coat at the specified rate.
- ❑ Spray bar at proper height to provide double coverage from spray nozzles.

Paver

- ❑ Is a pick-up machine being used?
- ❑ Is a material transfer vehicle being used?
- ❑ Is the paving machine well maintained and in good working order?
- ❑ Tires are properly inflated or tracks properly adjusted.
- ❑ Auger
- ❑ Screed
- ❑ Flow gates
- ❑ Slat conveyor
- ❑ Hopper wings

Rollers

- ❑ What type(s) of rollers will be used for breakdown, intermediate, and finish rolling?
- ❑ A sufficient number of rollers of adequate size are available to achieve the desired compaction.
- ❑ 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.
- ❑ Rubber tires (if applicable) are inflated to within +/- 34.5 kPa (+/- 5 psi).
- ❑ Vibratory plates or hand tampers are available for areas inaccessible to rollers.

Surface Preparation

- ❑ Pavement distress and drainage deficiencies have been corrected.
  - ❑ Cracks greater than 7.9 mm (5/16 in) have been sealed within 3.2 mm (1/8 in) or flush with existing surface.
  - ❑ Alligator cracks and potholes have been removed and patched.
  - ❑ Rutting has been milled where it is the result of mix deficiencies and milled or leveled where it is due to wear or postconstruction consolidation.
- ❑ Grade and cross-slope have been established.
- ❑ Manholes, catch basins, and utility appurtenances have been raised to the level of the new overlay.
- ❑ A scratch or leveling course, if required, is applied prior to the overlay.

Project Operational Considerations

Weather Requirements

- ❑ Air and surface temperature meet agency requirements.
- ❑ Paving does not begin if rain is imminent.
- ❑ Check temperature, wind, humidity, sun/clouds (and lift thickness). All will affect how quickly a mix cools and the time available for compaction.

Traffic Control

- ❑ Signs and devices match the traffic control plan.
- ❑ The set-up complies with local agency requirements or the *Federal Manual on Uniform Traffic Control Devices* (MUTCD).
- ❑ *Any unsafe conditions are reported to a supervisor.*
- ❑ The pavement will not be opened to traffic until it has cooled to 60 ”C (140 ”F) or the agency s required temperature.

Surface Preparation

- ❑ The surface is clean and dry.
- ❑ The tack coat is being applied uniformly at proper rate.
- ❑ The tack coat is cured prior to placement of overlay.

Hot-Mix Plant

- ❑ Sample aggregate stockpiles and compare gradation of each to design.
- ❑ Sample aggregate from cold feeds and compare combined gradation to design.
- ❑ Sample aggregate for moisture and make any necessary adjustments to the hot-mix plant.
- ❑ Take random samples of aggregate per the approved quality control plan.
- ❑ Sample hot-bin (if applicable) aggregates and run gradation, calculating percentage required from each bin to meet the design gradation.
- ❑ Check that asphalt cement is within the required specification range.
- ❑ Check plant mix for uncoated aggregate.
- ❑ Random sample and test plant mix, checking it against mix design:
  - ❑ Temperature
  - ❑ Percentage asphalt
  - ❑ Gradation
  - ❑ Air voids
  - ❑ Other agency requirements

Trucks

- ❑ Sufficient trucks are available to allow the paver to keep moving at a uniform speed.
- ❑ Trucks are clean and free of solvents before the mix is loaded.
- ❑ Trucks have tarpaulins to cover mix (when required).
- ❑ Trucks are insulated (when required).
- ❑ Trucks are loaded in a manner that avoids segregation.

Paving Machine

- ❑ Paving screed is preheated before starting placement.
- ❑ Mix arriving at the paving site is within the specified temperature range.
- ❑ Mix is being placed at the proper grade and cross-slope and at the specified thickness.
- ❑ Surface texture is uniform, free of segregation, tearing, or scuffing.
- ❑ Placement is providing a smooth riding surface.
- ❑ Automatic screed control is used whenever possible. (If manual controls are used, avoid frequent changes.)
- ❑ Construction joints (transverse and longitudinal) are tight with a smooth transition.
- ❑ Quantity yields or thicknesses are checked throughout the placement. Note: Inspectors should not direct thickness changes to paver operators, especially on projects with smoothness specifications.

Rollers

- ❑ A roller pattern has been established that achieves the proper in-place air voids.
- ❑ The established rolling pattern is being followed.
- ❑ Check density of finished mat: are air voids within specifications?
- ❑ Steel-wheeled vibratory, steel-wheeled static, or rubber-tired rollers are used for breakdown and intermediate rolling.
- ❑ Steel-wheeled static rollers or vibratory rollers in the static mode are used for finish rolling.
- ❑ Vibratory rollers are operated
  - ❑ at an amplitude and frequency as selected according to mix harshness and lift thickness (for thin lifts, high frequency and low amplitude are usually used).
  - ❑ at maximum frequency and at a speed that provides a minimum of 1 impact per 2.54 cm (1 in).
  - ❑ in the static mode when lift thickness is 2.54 cm (1 in) or less.
- ❑ Rubber-tired rollers
  - ❑ have tires warmed up to prevent pick-up.
  - ❑ are used on scratch/leveling courses.

Opening to Traffic

- ❑ The pavement can be opened to traffic after the mix has been compacted and the mat has cooled to 60 ”C (140 ”F) or the agency s required temperature.

Common Problems and Solutions

(Problem: Solution)

- ❑ **Plant mix discharge temperatures too low:** Moisture in the stockpile may be higher than initially planned; decrease production rate.
- ❑ **Uncoated aggregate in the plant mix:**
  1. Moisture may be in the aggregate.
  2. Worn or missing flights may be in the hot-plant drum dryer.
  3. Mixing time may be too short (check slope of drum for drum mix plants).

❑ **Segregation in the mix:**

1. Use multiple drops instead of a single drop when loading the trucks from the hot-mix plant storage silo.
2. The haul truck should raise the truck bed slightly to break the load before unloading into the paver hopper.
3. Paver wings should be folded on every load, or not at all. Material that builds up in the wings should be properly disposed of at the end of the day. When the paver wings are folded, do it slowly and be sure mix remains above the flow gates.
4. Keep a constant head of material to the paver s auger and screed.
5. Paver screed extension use should conform to paver manufacturer recommendations and agency requirements. Watch for possible segregation in areas where long extensions are used.
6. Harsher or stiffer mixes will require more care when placing and compacting.

- **Lack of in-place density:**
  1. The aggregate gradation may be outside of the target gradation.
  2. Asphalt content may be too low.
  3. Roller pattern or the frequency or amplitude of the vibratory roller may need adjusting.
  4. Plant mix may be below optimal rolling temperatures.
  5. Check the density of the underlying mat, which will influence nuclear gauge readings on thin overlays. If this is the case, a control strip can determine the maximum achievable density.
  6. Nominal maximum aggregate size may be too large for lift thickness. Use different mix or increase thickness.
- **Plant mix has a lean or dull appearance:** The mix may contain too little asphalt or an excess of minus No. 200 sieve material.
- **Plant mix slumped in the haul truck:** Properly mixed material in a haul truck will have a dome shape. If the load of mix has a flat shape, there may be excessive asphalt or moisture.
- **Tears in the plant mix after rolling:** Tearing of the surface occurs if the mix is too cold, too dry, has too many fines, has excess moisture, or has been overrolled.

- **Poor surface smoothness or rough ride:**
  1. Multiple stop-starts of the paver.
  2. Excessive paver speed.
  3. Improper use of manual screed controls.
  4. Vibratory rollers operating at excessive speed (impacts spaced too far apart).
  5. Poor joint construction practices.

Sources

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

Manual on Uniform Traffic Control Devices, Millennium Edition. 2000. Washington, DC: Federal Highway Administration.

An Overview of Surface Rehabilitation Techniques for Asphalt Pavements. Pub. No. FHWA-PD-92-008. 1992. Washington, DC: Federal Highway Administration.

Pavement Maintenance Effectiveness: Preventive Maintenance Treatments. Instructor s Guide, pp. 111-133. Pub. No. FHWA-SA-96-028. 1996. Washington, DC: Federal Highway Administration.

Pavement Maintenance Effectiveness: Preventive Maintenance Treatments. Participant s Handbook, pp. 113-132. Pub. No. FHWA-SA-96-027. 1996. Washington, DC: Federal Highway Administration.

Thin-Surfaced Pavements, Synthesis of User Practices, NCHRP Synthesis 260. 1998. Washington, DC: Transportation Research Board, National Cooperative Highway Research Program.

For more information about pavement preservation, visit these Web sites:

www.fhwa.dot.gov/preservation

www.fhwa.dot.gov/infrastructure/asstmgmt/resource.htm

www.fp2.org

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

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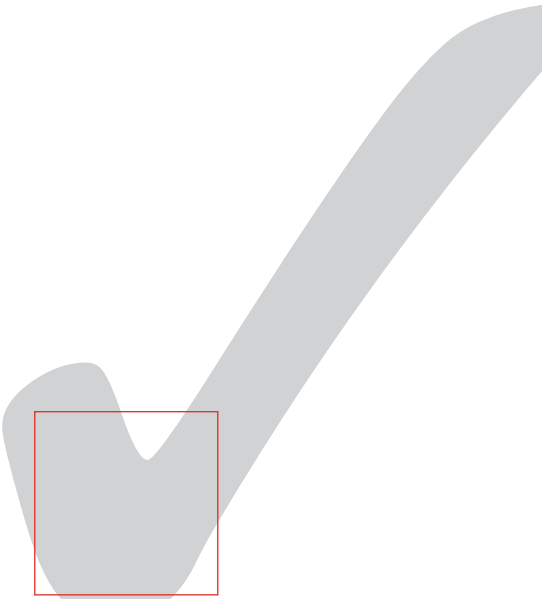

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